

**COSNER
V.
UMATILLA COUNTY**

LUBA NO. 2011-070, 2011-071, 2011-072

Local File Number
Text Amendment, #T-10-042

CONSOLIDATED RECORD

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Wendie L. Kellington
Attorney at Law, P.C.
Licensed in Oregon and Washington

P.O. Box 1930
Lake Oswego Or
97035

Phone (503) 624-7790
Mobile (503) 804-0535
Facsimile (503) 620-5562
Email: wk@wkellington.com

March 17, 2011

Via Hand Delivery
Umatilla County Board of Commissioners
Umatilla County Courthouse
216 SE Fourth Street
Pendleton, Oregon 97801

Re: Proposed Amendments UCDC 152.615 & 616 (CUP Standards for Wind Energy
Generation Facilities)

Dear Members of the Board:

This firm represents the Cunningham Sheep Company (Cunningham). Please include this letter and its attachments in the record of the above referenced matter. Thank you for the opportunity to comment on the above referenced county proposal.

For many years, Umatilla County has demonstrated leadership in supporting the utilization of its significant wind energy resources. The county has benefitted from its abundance of this important natural resource and its support of the wind energy industry in many ways including with new and stable tax revenues and good jobs. The county has to date been a positive influence in state and federal efforts to reduce dependence on foreign oil. The proposed amendments take the county in an opposite direction converting its influence to that of hostile to wind energy. Respectfully, the proposed amendments impose significant and unreasonable barriers to the maintenance and establishment of wind energy facilities in Umatilla County. They convert many if not most of the county's existing renewable energy facilities to nonconforming uses and prevent the establishment of new wind energy facilities in much of the county. The proposed amendments are at best a gamble; threatening to lock out the wind industry in Umatilla County. Cunningham requests the County not adopt the proposed amendments but rather either (1) leave the existing local regulatory program in place, or (2) adopt the amendments suggested by RES and Element Power.

Cunningham is adversely affected by the proposed amendments because it has in place leases with wind energy companies to develop wind energy facilities on their properties. The terms of those contracts were developed with the reasonable expectation that county siting regulations would not prohibit wind development on the Cunningham Ranch company property and would allow development of wind energy facilities including near where the county approved Met towers. It is significant that under those leases, Cunningham's lessees received county approval for, and have installed, Met towers on Cunningham's property. Moreover,

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several expensive studies have been undertaken on the strength of the county regulations in place at the time the leases were executed and the applications for the Met towers were submitted and approved.

Cunningham is further aggrieved by the proposed ordinance amendments because Cunningham and the individual members of its Board of Directors have a demonstrated interest in the public policy of establishing renewable energy in Umatilla County as an alternative to reliance on foreign oil. Wind energy is a renewable energy source Cunningham and its individual members of its Board of Directors strongly believe should be encouraged through county policy rather than the county establishing unreasonable barriers to it.

There are two good categories of reasons not to adopt the proposed amendments. One is they are unlawful and require significant work and adjustment to be made merely reasonably defensible. The other, with all due respect, is they are bad policy; based on anecdotal, speculative and extremist rationales; as directly contrary to state objectives to achieve renewable energy portfolio targets. The proposal further is confusing and expensive, setting the county on a course that duplicates the work of state and federal agency experts, adding the county as regulator on topics the county lacks the expertise, financial resources, and time to evaluate and control. The county has uniquely superior wind energy resources that are important to the region, state and federal energy system. Cunningham requests you take some time and a hard look before embarking on a course that shuts out the county's nascent green economy and locks up this important natural resource.

Proposed Amendments Are Unlawful

Contrary to Statewide Planning Goals

Statewide Planning Goal 2 requires all local land use decisions be supported by an adequate factual base. There is no adequate factual basis to support the proposed setbacks of 2 miles from a "rural home"¹ (or 20 times the overall tower-to-blade tip height whichever is greater); or 2 miles from a city UGB (or 20 times the overall tower-to-blade tip height whichever is greater), or "10 times the overall tower to blade tip height, whichever is greater" from land zoned Unincorporated Community). The stated rationale for these proposed setbacks are "to better protect neighbors to wind power development sites from noise and other adverse effects of wind towers". However, there is and can be no evidence that the proposed setbacks are within any reasonable range to achieve the stated objective. The evidence in the attached is that:

"In the range of 35 to 45 dB (A), at a distance of 350 meters, sound produced by wind turbines is similar to the background sound found in a typical home."
(Large Scale Wind and Sound Factsheet)

¹ As we point out later in this paper, it is anyone's guess what will constitute a "rural home" and prevent establishment of wind energy facilities.

Attached to this submittal are numerous scientific studies and information that confirm there is no noise, safety or other reason that supports imposing the proposed setbacks. With no legitimate basis, the proposed setbacks are, respectfully, simply a way of attempting to prevent wind energy development in Umatilla County and this, the county, is not permitted to do.

Statewide Planning Goal 2 and its implementing rules require coordination with other affected agencies. Notwithstanding that OAR 660-023-0190(3) requires the county to coordinate the proposed "planning activity" with the Oregon Department of Energy, as far as Cunningham is aware, the county has failed to coordinate the proposal and this is a fatal substantive error. Coordination of the proposed amendments with the Department of Energy would be useful at a number of levels beyond the Goal 2 coordination requirement, including likely avoidance of the county adopting regulations that trigger protracted litigation.

The proposal fails to comply with Goal 5 and its implementing rules established in OAR 660-023-000 et seq. In fact, the proposal achieves the reverse of the Goal 5 requirements with respect to wind energy sources. Statewide Planning Goal 5 requires the county to protect renewable energy natural resources which includes significant wind resources in wind energy areas such as on the Cunningham property.² The Goal 5 administrative rules identify wind energy areas as significant natural resources. Without considering EFSC's authority or the full Goal 5 process, the proposal improperly protects allegedly conflicting uses, not the Goal 5 protected wind energy area and wind energy use. The proposal makes no allowance for applicant's rights to invoke the jurisdiction of EFSC which, as a matter of law, attaches Goal 5 "significance" to the energy source site. The county is not permitted to adversely affect significant Goal 5 energy source sites in the manner proposed. In this regard, OAR 660-023-0190 requires the following:

Energy Sources

(1) For purposes of this rule,

- (a) "Energy source" includes naturally occurring locations, accumulations, or deposits of one or more of the following resources used for the generation of energy: natural gas, surface water (i.e., dam sites), geothermal, solar, *and wind areas*. Energy sources *applied for or approved through the Oregon Energy*

²Goal 5 states, among other things:

"3. Natural resources and required sites for the generation of energy (i.e. natural gas, oil, coal, hydro, geothermal, uranium, solar and others) should be conserved and protected * * *."

* * * * *

"The conservation of both renewable and non-renewable natural resources and physical limitations of the land should be used as the basis for determining the quantity, quality, location, rate and type of growth in the planning area * * *"

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Facility Siting Council (EFSC) or the Federal Energy Regulatory Commission (FERC) shall be deemed significant energy sources for purposes of Goal 5.

- (b) "Protect," for energy sources, means to adopt plan and land use regulations for a significant energy source *that limit new conflicting uses within the impact area of the site and authorize the present or future development or use of the energy source at the site.*
- (2) In accordance with OAR 660-023-0250(5), local governments shall amend their acknowledged comprehensive plans to address energy sources using the standards and procedures in OAR 660-023-0030 through 660-023-0050. *Where EFSC or FERC regulate a local site or an energy facility that relies on a site specific energy source, that source shall be considered a significant energy source under OAR 660-023-0030.* Alternatively, local governments may adopt a program to evaluate conflicts and develop a protection program on a case-by-case basis, i.e., upon application to develop an individual energy source, as follows:
 - (a) For proposals involving energy sources under the jurisdiction of EFSC or FERC, the local government shall comply with Goal 5 by amending its comprehensive plan and land use regulations to implement the EFSC or FERC decision on the proposal as per ORS 469.504; and
 - (b) For proposals involving energy sources not under the jurisdiction of EFSC or FERC, the local government shall follow the standards and procedures of OAR 660-023-0030 through 660-023-0050.
- (3) *Local governments shall coordinate planning activities for energy sources with the Oregon Department of Energy. (Emphasis supplied.)*

The proposal is contrary to Goal 9 (Economy of the State) which makes it an overarching requirement:

"To provide adequate opportunities throughout the state for a variety of economic activities vital to the health, welfare, and prosperity of Oregon's citizens.

"Comprehensive plans and policies shall contribute to a stable and healthy economy in all regions of the state. Such plans shall be based on inventories of areas suitable for increased economic growth and activity after taking into consideration the health of the current economic base; materials and energy availability and cost; * * *; current market forces; location relative to markets; availability of renewable and non-renewable resources; availability of land; and pollution control requirements. "

There can be little dispute that wind energy development has been a significant economic industry in Umatilla County for many years. It is precisely because of the unique locational characteristics of the county having superior wind natural resources that makes this industry compelling and healthy in Umatilla County. Goal 9 requires the county's planning programs to:

- "4. Plans should strongly emphasize the expansion of and increased productivity from existing industries and firms as a means to strengthen local and regional economic development."

OAR 660-009-0005(3) clearly defines energy facilities as industrial ones and the types of existing industries that Goal 9 protects.

Goal 9 further provides:

- "1. A principal determinant in planning for major industrial and commercial developments should be the comparative advantage of the region within which the developments would be located. Comparative advantage industries are those economic activities which represent the most efficient use of resources, relative to other geographic areas"

The comparative advantage of the wind energy industry in Umatilla County cannot be denied; the county has significant natural wind resources upon which the wind energy industry necessarily depends. Instead of planning for this important locationally dependent industry, the proposal plans to attempt to prohibit wind energy industry facilities where they are locationally dependant.

The proposal is contrary to Goal 13, which requires:

"Land and uses developed on the land shall be managed and controlled so as to maximize the conservation of all forms of energy, based upon sound economic principles."

There is no factual basis to support a conclusion that the proposal maximizes the conservation of renewable energy (a form of energy) when it, effectively, prohibits most new wind energy development and makes existing wind facilities nonconforming uses. Further, there is no adequate factual basis to support a finding that the proposal is based on sound economic principles. The factual base so far developed to support the proposal establishes the converse. The proposal significantly increases the cost of providing renewable energy, makes it more difficult to establish renewable energy in the county, and calls for numerous expensive studies that duplicate efforts that will attend later parts of the required state and federal permitting processes.

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Contrary to County Comprehensive Plan

The county comprehensive plan (at least the version the undersigned was able to locate online), contains significant policies favoring the protection and encouragement of energy sources, including wind resources. The proposal fails to reconcile how the proposed land use regulation amendments are consistent with the county plan including:

- "Finding 7. Comparative advantages over neighboring jurisdictions exist in availability of labor, reasonably priced lands, access to energy sources, and excellent transportation systems.
- "Policy 7. Cooperate with development oriented entities in promoting advantageous aspects of the area.
- "Finding 37. Areas specifically set aside for natural resource exploitation, future development of reservoirs, energy generation and transmission facilities, and industry will lower the cost of eventual use, as compared to allowing incompatible development on the same lands before such facilities use.
- "Policy 37. The County shall ensure compatible interim uses through Development Ordinance standards, and where applicable *consider agriculturally designated land as open space for appropriate and eventual resource or energy facilities use.*
- "Finding 42. Alternative energy resources should be explored more fully Umatilla County
- "Policy 42. (a) *Encourage development of alternative sources of energy.*

"ENERGY CONSERVATION

* * * * *

"FINDING POLICY

- "1. Escalating cost of depleting: Encourage * * * the alternatives (e.g. solar, utilization of locally-wind) increasingly more feasibly renewable energy economical and * * * tax and permit incentives.
- "2. Appropriate planning: [M]ake more efficient use of existing and potential energy sources.
 - "(d) With the availability and/or addition of adequate information on wind, solar and other alternate energy resources, the County shall complete the Goal 5 analysis process for those resources (OAR 660-16-000).

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Comprehensive plan policies that implement Goal 9 call for the county to "Encourage diversification within existing and potential resource-based industries." The wind industry is both an existing and potential resource based industry. The plan acknowledges the county's "comparative advantage" in its "access to energy sources" and states it will "Cooperate with development oriented entities in promoting advantageous aspects of the area." Yet, instead of cooperating and promoting the county's superior comparative advantage regarding access to energy sources, the proposal effectively presumes against such access in proposed UCC HHH 152.616.C.2-3 labeled at the planning commission as "Evidence of Marketing Connections" but in reality are demands for impossible transmission route plans and "active" transmission requests. This is, among other impermissible things, a reintroduction of the "need" standard the state legislature abolished in 1997 and replaced with the policy now expressed in ORS 469.310:

"It is furthermore the policy of this state * * * that the need for new generating facilities, as defined in ORS 469.503 (Requirements for approval of energy facility site certificate), is sufficiently addressed by reliance on competition in the market rather than by consideration of cost-effectiveness and *shall not be a matter requiring determination* by the Energy Facility Siting Council in the siting of a generating facility, as defined in ORS 469.503 (Requirements for approval of energy facility site certificate)." (Emphasis supplied.)

Apart from the serious preemption problems presented by the proposal as discussed below, this part of the proposal suffers from problems related to the county Comprehensive Plan Economy Element as well. In this regard, the only evidence in the record is that the nature of this natural resource industry -- the wind energy business -- is that this evidence does not usually exist at the time of land use review for a wind project. This is yet another way the proposed ordinance effectively prohibits the industry. The county never required evidence that timber cut from county forests were feasibly going to be sold in order for a forest industry applicant to get a land use permit and similarly such a requirement here has no legitimate rationale. The only evidence in the record is that wind energy projects are very expensive and require financing and would not be embarked upon if the developers did not believe the requisite transmission facilities would be established in the usual course.

Also, as a matter of law, not only Oregon, but California and numerous other states have explicit requirements to supply large percentages of their energy needs from renewable sources including wind (Renewable Portfolio Standards or RPS). Information on the Oregon RPS is included in the attachments to this letter. Further, under the Federal Energy Policy Act of 2005, the federal government has embarked on a massive undertaking to establish transmission corridors. The federal government assumed the overriding authority over transmission line siting decisions in certain circumstances. The federal Department of Energy under the Energy Policy Act of 2005 has the authority and responsibility to designate any geographic area experiencing electric energy transmission capacity constraints or electrical energy "congestion" that adversely affects consumers, as a "national interest electric transmission corridor." Further, the Western Governor's Association has for many years to cooperatively establish Western Renewable Energy Zones (WREZ) with the idea being a concerted regional and national effort to establish

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“utility transmission interconnect requests and/or process and description of same and the [r]oute and plan for transmission facilities connecting [projects] to the grid.” The presumption implicit in the proposed ordinance that connections will not occur and must be proven up in the local land use permitting stage against this evidentiary and legal background is unreasonable both at the Goal 2 “adequate factual basis” level but also against the backdrop of the county Comprehensive Plan with which the proposal must be consistent. *Baker v. City of Milwaukie*, 271 Or 500 (1975).

Preemption

Encouraging renewable energy is a matter of statewide concern. In this regard, among many statements of such policy, ORS 469.010 provides, among other things:

“(2) It is the goal of Oregon to promote the efficient use of energy resources *and to develop permanently sustainable energy resources*. The *need exists for comprehensive state leadership in energy production, distribution and utilization*. It is, therefore, the policy of Oregon:

- (a) That *development* and use of a diverse array of permanently sustainable energy resources *be encouraged utilizing to the highest degree possible the private sector of our free enterprise system*
* * *” (Emphasis supplied.)

Also, ORS 469.310, provides in part:

“* * * It is, therefore, the purpose of ORS 469.300 (Definitions) to 469.563 (Court orders for enforcement), 469.590 (Definitions for ORS 469.590 to 469.595) to 469.619 (State Department of Energy to make federal regulations available), 469.930 (Northwest Interstate Compact on Low-Level Radioactive Waste Management) and 469.992 (Civil penalties) to exercise the jurisdiction of the State of Oregon to the maximum extent permitted by the United States Constitution and to establish in cooperation with the federal government a comprehensive system for the siting, monitoring and regulating of the location, construction and operation of all energy facilities in this state. * * *”

While the state contemplates renewable energy be established in compliance with state land use regulations, such land use regulations may not be employed to undermine the state policy of promoting and encouraging the development and distribution of renewable energy sources. In this regard ORS 469.310 also provides in relevant part:

“* * * it is the declared public policy of this state that the siting, construction and operation of energy facilities shall be accomplished in a manner consistent with protection of the public health and safety and in compliance with the energy

policy and air, water, solid waste, land use and other environmental protection policies of this state * * *

The proposal has either the attempted direct or indirect effect of prohibiting the development of renewable energy in Umatilla County under the guise of land use regulation. The type of wholesale local control in the proposal, circumvents state policy and therefore is preempted. *See Eker Bros. v. Calumet County*, 321 Wis.2d 51, 772 N.W.2d 240 (2009) (“* * * This determination must be made on a case-by-case basis where the local governing arm first hears the specifics of the particular wind system and then decides whether a restriction is warranted. But here, Calumet County promulgated an ordinance in which it arbitrarily set minimum setback, height and noise requirements for any wind system that might want to exist in Calumet County. We hold that this “one size fits all” scheme violates the legislative idea that localities must look at each wind system on its own merits and decide, in each specific case, whether the wind system conflicts with public health or safety. We reverse and remand with directions that the circuit court strike the County's ordinance as ultra vires.”) In short, the proposal impermissibly regulates and purports to prohibit directly and indirectly the business of wind energy in Umatilla County rather than address reasonable land use concerns.

Preemption is also evident in the county's effective reintroduction of the public need standard that was banned by the legislature in 1997 in the amendments to ORS 469.310 quoted in the above section of this letter, in the proposed amendments that demand the remarkable condition precedent for land use approval to show specific evidence of transmission interconnection and the route and plan for transmission facilities. *See proposed UCO 152.616.C.2 and 3.* The state has made a decision that the renewable energy industry recognizes a feasible project and state and federal requirements establish what the proposal purports to demand individual applicants show. The county is not in a position to undermine the state's decision about how this works in the guise of land use regulation.

The proposal further intrudes on state and federal policy supporting, encouraging and regulating renewable energy resources and related state and federal environmental requirements by imposing more onerous, and in large measure, impossible performance standards on topics comprehensively and completely regulated by the state and federal government in the proposed CDC 152.616(8)(C) requiring a project:

“preserve existing trees, vegetation, water resources, wildlife, wildlife habitat, fish, avian, archeological sites and objects, sites of historic or religious significance to Native American Tribes and natural resources. Compliance with this standard may require mitigation and/or submission of an annual monitoring report.”

The proposed amendments are further designed to and do remove (as seen via the proposed draft's strike through text) any concept of “reasonableness” in favor of an absolute strict liability standard that totally prohibits any wind project development if it involves, for example, any tree or it appears via the syntax, any vegetation removal. Also these preservation

standards ostensibly are ongoing requirements under the proposed amendments. There is no terrestrial project on the planet that can meet the proposed standard. Aside from usurping state and federal rights to develop and distribute renewable energy projects in the state, the proposal usurps state and federal authority expressed in comprehensive regulatory schemes that totally occupy ESA, water, and habitat permitting. Ostensibly a project could be permitted by the state and federal government but on the same topics regulated by the state and federal government, the county could purport to deny. Thus, respectfully, it is evident that the proposal improperly uses land use to prohibit, or at best unreasonably restrict, wind energy projects and as such, deprives state and federal authorities of the ability to achieve renewable energy policy, including the RPS, and other energy related requirements. As such, the proposal is well beyond implementing state land use rules and beyond the county's authority.

Finally, there is another related problem. That problem is that the proposal seeks to impose the above described strict regulatory liability on wind energy projects on topics that the county has no expertise or resources to dictate and manage. This should be of concern to the county for a number of reasons including fiscal self-preservation (*viz.*) as a matter of liability the county is putting itself as the governing authority over whether all natural and other resources on the site are preserved. This means the county is inviting itself to status as a defendant in citizen suits and claims by tribes for liability if the listed resources are alleged as not "preserved." The Board should understand that this liability under the proposed amendments does not purport to end at project land use permitting and statutes of limitation don't appear to start to run merely when land use permits are issued. Rather, the county purports to make this "preservation" requirement and ongoing responsibility attended by the misguided idea of county monitoring.

Proposal is Unconstitutional Under Commerce Clause

At the planning commission and in particular in one planning commissioner's written comments ("Proposed Amendments to the Umatilla County Ordinance: RE: Wind Power Development Comments Provided by Clinton Reeder, Member Umatilla County Planning Commission For Discussion and Comment February 24, 2011") there was more than a whiff of local protectionism as the rationale for the proposed amendments. Given the apparent lack of any other factual bases for the proposed new setbacks, local environmental, archeological, religious, economic (project "need" or feasibility) requirements, the reasonable conclusion is that the regulatory foundation for the proposed prohibitory program is the idea that "Local people increasing resent having wind tower projects 'in-their-face' that are financed by foreign money, with the energy being sold out of state, while local landowners receiving no rents from the projects are being forced against their will to suffer the adverse consequences of wind towers in their view and the noise from the wind towers * * *" and of "resisting paying the costs locally while the power generated is sold out-of-state." *Id* at p 11 of 14 and p 12 of 14 respectively)

It is well established that a local distaste for sale of electricity and other natural resources in interstate commerce is prohibited by the Commerce Clause of the United States Constitution, Article I, Section 8, Clause 3, which "precludes a state from mandating that its residents be given a preferred right of access, over out-of-state consumers, to natural resources located within its

borders or to the products derived therefrom.” *New England Power Co. v. New Hampshire*, 455 US 331, 338, 102 S Ct 1096, 71 L Ed2d 188, 194 (1982). The Oregon Attorney General has explained:

“In sum, where a state directly discriminates against interstate commerce, that discrimination violates the Commerce Clause unless the state can demonstrate both that the act serves a legitimate state purpose and that the purpose could not be served as well by available nondiscriminatory means.” Op. Atty. Gen. OP-6185, 1988 WL 416240

Here, with all due respect, no legitimate regulatory rationale is evident to support much of the proposal and courts are expert at uncovering pretext. However, even if there were a legitimate rationale, and even if all of the other problems noted above could be solved (which seems unlikely), the Commerce Clause can still be offended:

“then the question becomes one of degree. And the extent of the burden that will be tolerated will of course depend upon the nature of the local interest involved, and on whether it could be promoted as well with a lesser impact on interstate activities.” *Philadelphia v. New Jersey*, 57 L Ed2d at 482 (quoting *Pike v. Bruce Church, Inc.*, 397 US 137, 90 S Ct 844, 25 L Ed2d 174, 178 (1970)).

Given the importance to state and federal policy of developing and distributing renewable energy, the impact of the prohibitory proposal on interstate commerce cannot be expected to be lightly tolerated.

Contract impairment

The United States Constitution prohibits the impairment of contracts. Cunningham has in place leases with wind energy companies to develop wind energy facilities on their properties. The terms of those contracts were developed in the background of strong state and federal policy supporting the development of wind energy facilities on property like theirs. Moreover, those contracts were developed with the reasonable expectation that county siting regulations would not prohibit wind development on the Cunningham Ranch company property and would allow development of wind energy facilities including near where the county approved Met towers. It is significant that under those leases, Cunningham’s lessees received county approval for, and have installed, Met towers on Cunningham’s property. Further, several expensive studies have been undertaken on the strength of the county regulations in place at the time the leases were executed and the applications for the Met towers were submitted and approved. If the proposed amendments are adopted, they will impair those contracts to the extent they would foreclose the development of wind energy projects on the Cunningham properties.

Proposed Amendments Are Impermissibly Vague and Compliance Measures are Impermissibly Uncertain

The proposal includes a number of requirements that do not tell a reasonable applicant with any clarity what it must do. For example, one of the setback requirements runs from "tower to rural home." What is a "rural home"? Is it a permanent dwelling? An RV? A seasonal dwelling? A temporary dwelling? A tent? This vagueness is not permitted and is both a constitutional, statutory and interpretative problem. See U.S. Constitution 14th Amendment; Oregon Constitution, Article 1 Sec. 20 (equal privileges and immunities); ORS 215.416(8) (standards and criteria must be in the county code); *Renaissance Dev. v. City of Lake Oswego*, 45 Or LUBA 312 (2003).

No Change in the Goalposts

ORS 215.427(3) requires that the applicable standards and criteria that apply to a development proposal be fixed when the application is submitted. This statute is often referred to as the "no change in the goal posts" rule. Where the county approves wind energy Met towers, as has occurred on the Cunningham Sheep property, the county should be bound to apply the standards in affect when the Met tower application is submitted. The reason is that Met towers measure wind in particular locations. Those locations should not be subsequently put off limits by the time the wind energy applicant applies for the wind energy development at the location. The purpose of the ORS 215.427(3) is to lock in the goalposts that apply to a development proposal. The unique nature of wind development demands this principle be applied to projects for which Met towers have been approved.

Measure 56 Notice is Required but has not been Provided

As applicable to counties, Ballot Measure 56 is codified in ORS 215.503. It requires specific individualized notice to property owners where land uses previously allowed are limited or prohibited. The proposal at issue here either limits or prohibits wind energy development that was previously allowed by the county. This means individualized Measure 56 notice is required. However, the required Measure 56 notice has not been provided to property owners as required. This is substantive error.

Policy Reasons Not to Adopt the Proposed Amendments

The proposal advances policy that respectfully Cunningham believes to be bad for the county. Some policy problems under the proposal that compel it to be either significantly changed or rejected, are listed below.

- The setback, "preservation" and specific interconnection information requirements both individually and together appear to have the effect of prohibiting wind energy

development in the County. This deprives the county of the good jobs and tax benefits of wind energy facilities. It also sets the county up as the barrier to state and national achievement of renewable energy objectives and potentially transmission.

- The requirements are so extreme, that no wind energy developer will ever seek county land use approval and will ask EFSC not to apply county requirements. In effect, the county will have taken itself out of the land use game.
- The county is stepping in to regulate activities the state or federal government already manage, and where it has no authority, expertise, or staff resources to accomplish what the ordinance requires. This is expensive to the county, applicants and observers.
- The proposal sets the county up for liability. On liability, as explained in the previous section, if the county purports to require absolute preservation, requires that it monitor absolute preservation, of trees, vegetation, wildlife, archeological sites and so forth, and those are not "preserved", then the county exposes itself to liability in citizen suits and from the tribes. Absolute preservation is a tricky thing to address and maintain at a number of levels. If wildlife leave an area or a carcass is found, it may have nothing to do with a wind facility. But under the proposed amendments causation becomes a juicy issue of proof benefitting only lawyers and opponent litigants.
- The proposal appears to make many existing wind energy facilities nonconforming uses. Also, depending on what the county does with the "rural home" setback language, if merely driving an RV within two miles of a tower invokes the setback, all existing facilities could become "nonconforming" uses.
- The proposal contains uncertain and vague requirements. As above, the definition of a "rural home" for purposes of imposing setback requirements is anyone's guess. But as presently written, are a recipe for mischief as a temporary dwelling, tent or RV may all qualify.
- The proposal is expensive including for the county to attempt to implement.
- The proposal invites contention between the county and its other governmental partners at the state and federal level. It invites contention between the county and its nascent wind energy industry as well as with environmentalists and other green power advocates who strongly support the development of renewable energy.
- Respectfully, the only "benefit" of the proposal is that it is a monument to an effort to stop renewable energy development in Umatilla County and as such is a full employment act for lawyers and policy wonks.

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Conclusion

Cunningham Sheep Company requests that you either reject the proposal outright, adopt the amendments proposed by the wind industry or stop consideration of the proposal pending the required Measure 56 notice and after pursuing state Goal 2 and Goal 5 coordination with the Oregon Department of Energy. Thank you for your consideration.

Very truly yours,

Wendie L. Kellington

Wendie L. Kellington

WLK:wlk

Enclosures

CC: Bob Levy

Tom Stoops, Oregon Dept. of Energy

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Cunningham Sheep Co.

Submittal

03/15/2011

Tab	Document	Notes
1	AWEA Clean. Affordable. Homegrown. American Wind Power (6 pages)	
2	Oregon Department of Energy Wind Energy Myths (2 pages)	May 2005
3	AWEA Rhetoric vs. Reality: Wind Energy and Birds (2 pages)	Mar. 1 2011
4	AWEA & CANWEA Wind Turbine Sound and Health Effects: An Expert Panel Review Executive Summary (2 pages)	Dec. 2009
5	AWEA & CANWEA Wind Turbine Sound and Health Effects: An Expert Panel Review (69 pages)	Dec. 2009
6	Renewable Northwest Project Reviewing the Facts on Wind Turbine Sound Impact (2 pages)	
7	AWEA Wind Energy: Clean and Reliable (2 pages)	
8	AWEA Utility Scale Wind Energy and Sound (2 pages)	
9	AWEA Wind Turbines and Health (2 pages)	
10	AWEA Wind Energy and Wildlife (4 pages)	
11	AWEA Building a Green Power Superhighway (2 pages)	
12	AWEA The Hidden Costs of Energy: National Academy of Sciences (2 pages)	
13	Presidential Documents, Executive Order 13212 of May 18, 2001: Actions to Expedite Energy-Related Projects (2 pages)	
14	74 th Oregon Legislative Assembly – 2007 Regular Session Enrolled Senate Bill 838 (26 pages)	
15	Oregon Renewable Energy Standard: Progress Made and Remaining Opportunities (2 pages)	
16	20% Wind Energy by 2030 Increasing Wind Energy's Contribution to U.S. Electricity Supply (3 pages)	
17	From Snack Bars to Rebar: How Project Development Boosted Local Businesses Up and Down the Wind Energy 'Supply Chain' in Lamar, Colorado Craig Cox (45 pages)	March 2004
18	Oregon: Facility Siting Rules and Statutes (6 pages)	
19	AWEA Siting Handbook Chapter 4: Regulatory Framework (46 pages)	
20	Oregon Columbia Plateau Ecoregion Wind Energy Siting and Permitting Guidelines	

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Cunningham Sheep Co.
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	September 29, 2008 (38 pages)	
21	Residents opposed to Kittitas Turbines v. State Energy Facility Site Evaluation Council (EFSEC) and Christine O. Gregoire, Governor of the State of Washington, Respondents. ... (165 Wash.2d 275, 197 P.3d 1153)(2008) (29 pages)	
22	Wind Energy Technology Renewable Northwest Project (5 pages)	
23	Oregon's Statewide Planning Goals & Guidelines GOAL 2: LAND USE PLANNING OAR 660-015-0000(2) (5 pages)	
24	Oregon's Statewide Planning Goals & Guidelines GOAL 5: NATURAL RESOURCES, SCENIC AND HISTORIC AREAS, AND OPEN SPACES OAR 660-015-0000(5) (Please note: Amendments Effective 08/30/96) (3 pages)	
25	Oregon's Statewide Planning Goals & Guidelines GOAL 13: ENERGY CONSERVATION OAR 660-015-0000(13) (1 page)	
26	Umatilla County Comprehensive Plan: Energy Conservation (2 pages)	
27	152.616 (HHH) Standards for review of conditional uses and land use decisions. Page 23 of 24 Ordinance No. 2009-09 (1 page)	
28	Legal Requirements of the Planning Office (Measure 56) Prepared by Gary Darnielle Lane Council of Government (3 pages)	September 2006

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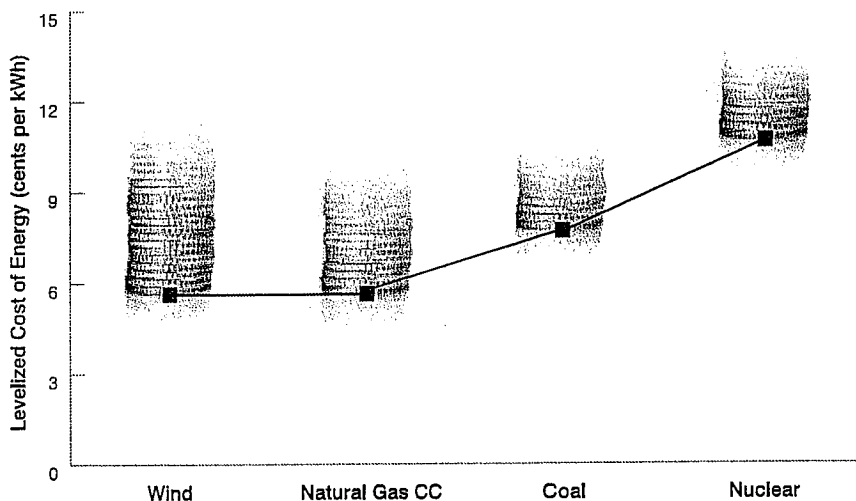
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Wind is Affordable

Not only does wind provide a clean source of energy, it safeguards our families' checkbooks and creates opportunities for businesses large and small. Its cost has dropped over the past few years as the technology has matured with more efficient manufacturing and better turbine performance. Wind energy is now one of the most cost-effective sources of new electricity generation, competing with new installations of natural gas and costing less than either coal or nuclear power. That's one reason wind power accounted for 40% of all new energy chosen by electric utilities in 2008 and 2009.

The wind that turns the turbine blades costs nothing, locking in the long-term cost of electricity and protecting families and businesses from unpredictable price spikes. Steady and cost-effective energy sources are critical to the growth and development of American business in the long-term.

Wind is an Affordable Form of New Energy



Data Source: Lazard, Levelized Cost of Energy, June 2009

And wind delivers: a December 2010 study from Georgia Tech and Duke University researchers finds the Southeast could

save \$23 billion by 2030 by investing today in renewable energy, with wind being the most competitive resource.¹

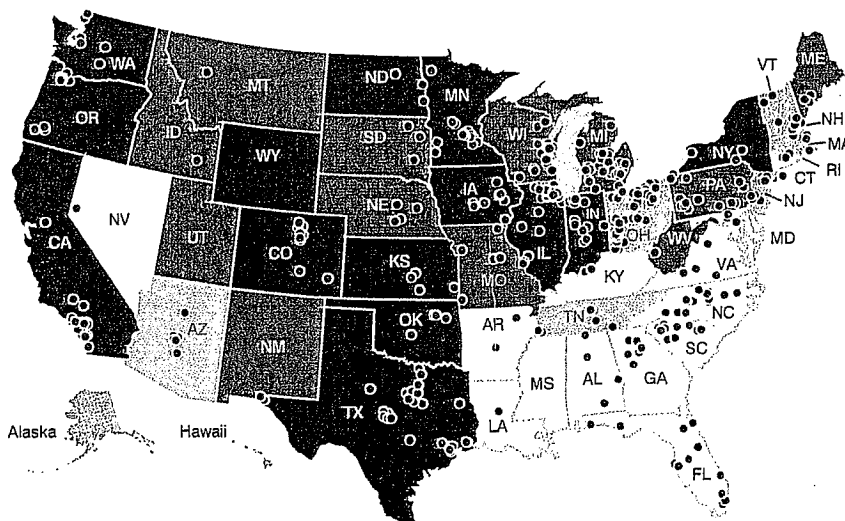
Wind is Homegrown

Wind power delivers in other ways.

A robust U.S. wind energy market spurs a sizable manufacturing sector to provide the workers and materials the industry needs. Between 2005 and 2009, a period of relative policy stability never before seen by the industry, wind power grew at a fierce pace. Wind added 40% of all new electricity capacity between 2008 and 2009, neck and neck with natural gas as the top-two new electricity sources.

As a result of this market growth, today over 400 American manufacturing plants build wind components, including all the major turbine components, towers, and blades. Since 2007 over 100 wind energy manufacturing facilities have come online, been announced or expanded. Now over 50% of a U.S.-installed turbine's value is produced right here in America, a 12-fold increase from just a few years ago. Some turbine manufacturers have already said they plan to make 100% of their components in America.

Over 400 U.S. Manufacturing Plants Serve the Wind Industry Today



Utility-scale Wind Installations

- ◻ < 100MW
- ▒ 100 - 1,000 MW
- > 1,000 MW
- Wind Energy Manufacturing Facility

The trend is expected to continue – that is, if long-term policies are put in place to signal the market stability enjoyed by other energy industries.

Data source: AWEA U.S. Wind Industry Annual Market Report, 2009. Manufacturing data updated through November 2010, includes wind-related facilities

¹ Southeast Energy Efficiency Alliance, "Renewable Energy in the South," December 2010.

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Fifth-generation rancher Shaun Sims has tapped a new revenue stream he can count on: wind power. Evanston, Wyoming



Mike Mayer's tire and oil shop got a big boost in business when developers began work on a local wind farm. Milford, Utah



Thanks to the construction of a nearby wind farm, Judy Cleaves' bed & breakfast gained visibility and visitors. Weston, Maine



Rural economic development fostered by a local wind farm helped build a new hospital, where Nancy Carter works. Milford, Utah

Wind power is good for America

that's why Americans want more of it.

Wind power is good for the rancher who has a new source of steady income that helps preserve a way of life. It's good for the American manufacturer who produces one of the 8,000 components that make up a wind turbine. It's good for the family farmer who can now harvest the natural resource that blows across his land. And wind power is good for the rural school teacher who's been teaching in a trailer, but now educates students in a brand-new school built with revenue generated by way of the local wind farm development.

Wind is cost competitive with all other sources of new electricity. It bolsters America's economy through a supply chain of hundreds of manufacturing plants and over 2,500 companies investing in all stages of American wind power.

Did you know that existing wind projects in Iowa could provide 20% of the state's electricity? In 2009 alone, the U.S. wind industry installed enough new capacity to power nearly 3 million homes.

An overwhelming majority of Americans—well over 80% of all Republicans, Democrats, and Independents—want more wind power.

When you step back and look at the facts, it becomes clear that wind energy works for America.

To learn more about what wind power can do for America.... and the federal and state policies that will unleash its potential.... please visit www.PowerofWind.com

Wind is Clean and Abundant

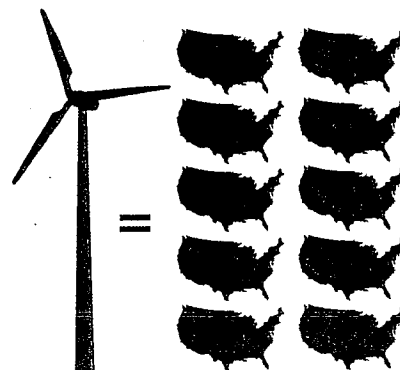
The United States boasts the perfect combination of massive electricity demand and a wind resource that is one of the best in the world. The wind power potential to be tapped is nothing short of amazing: 37 trillion kilowatt-hours of electricity annually—equivalent to nearly 10 times the country's existing power needs.¹

Wind energy is already helping the nation meet America's electricity demand by powering the equivalent of over 9.7 million American homes. Today's wind farms produce enough electricity to power all of Virginia, Oklahoma or Tennessee. In Iowa existing wind projects could produce 20% of the state's electricity. Minnesota, North Dakota, Oregon, Colorado, and Kansas all receive more than 5% of their electricity from wind, and other states are following close behind with ever-growing wind power fleets.

According to the Bush Administration's U.S. Department of Energy report, "20% Wind Energy by 2030: Increasing Wind Energy's Contribution to U.S. Electricity Supply," wind can play a major role in meeting America's increasing demand for electricity, while producing multiple other benefits. Having 20% of the nation's electricity come from wind power is feasible with today's technology, the report found.

Moreover, the report found that installing more wind power would foster rural economic development, job creation, and energy price stability (by sidestepping fossil-fuel price volatility in addition to easing the pressure on natural gas prices). In the decade leading up to the 20% wind power benchmark, the U.S. wind industry could support roughly 500,000 jobs. It could also increase annual payments to rural landowners to more than \$600 million in 2030.

U.S. Wind Resource Potential Could Power the Nation 10 Times Over



Data Source: NREL, Wind Resource Potential, 2010

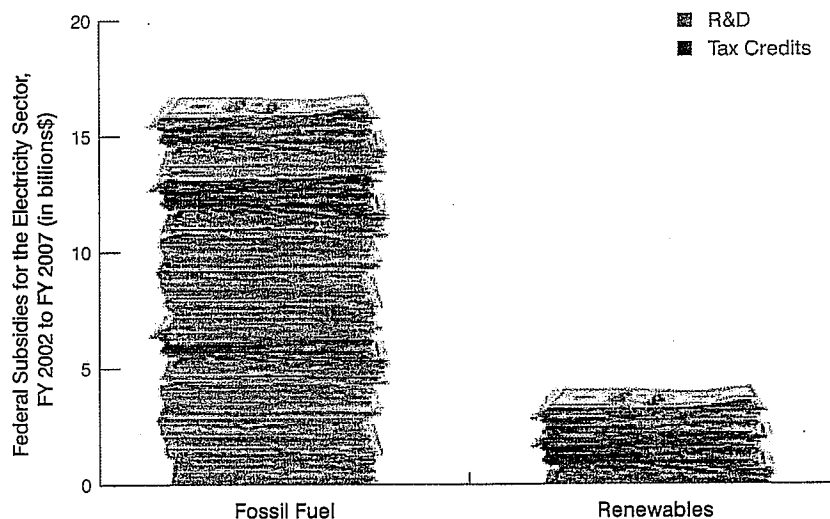
Wind is a source of clean energy that has virtually no polluting properties or side effects. Each year, U.S. wind installations will save the nation over 20 billion gallons of water that would otherwise be withdrawn for steam or cooling in conventional power plants.

A Lopsided Playing Field

Some people assume that wind power needs extra help from the government to compete. Since it's relatively new on the scene and boasts so many win-win attributes, are policy incentives really necessary? Only to level the playing field.

Fossil-fuel subsidies are – well, as old as fossil fuels. The Congressional Research Service notes that for more than 90 years, fossil fuel industries have taken subsidies via generous tax breaks. They are seldom debated or even heard of, because they are permanent. Examining the issue during the Bush Administration, the Government Accountability Office concluded that fossil fuels continue to receive nearly five times the tax incentives as renewable energy.² American taxpayers have already paid well over \$500 billion to fossil fuel industries.³

Fossil Fuels Enjoy Permanent Incentives 5x Those of Renewables



Data Source: Government Accountability Office, October 2007

Such strong policy support for old technologies like oil, gas, and coal during the last century succeeded in its goal:

it helped create an abundance of affordable domestic energy, powering strong economic growth. Rising demand,

volatile prices and national security concerns have since created a need for a more diverse energy supply.

¹ NREL, Wind Resource Potential, 2010

² Federal Electricity Subsidies (Government Accountability Office, October 2007).

³ An Analysis of Federal Incentives Used to Stimulate Energy Production (U.S. Department of Energy, Pacific Northwest Laboratory Operated by Battelle Memorial Institute, December 1978) and Analysis of Federal Expenditures of Energy Development (Management Information Services, Inc (MIS)), September 2008).

Predictable Policies Improve Investment

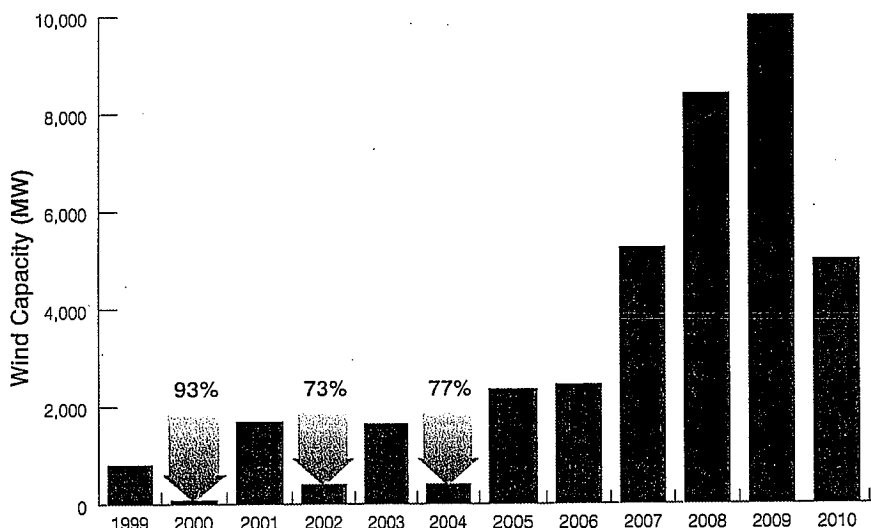
It's a wonder there's a U.S. wind industry at all, when you consider the lack of certainty companies have had to confront through the years. First, consider nearly 100 years of policy stability that has provided old technologies with a consistent environment in which to operate, plan, and grow.

Now consider wind power. The federal Production Tax Credit – the primary financial policy for the industry through the years – has been extended mostly in one- and two-year intervals, and even allowed to expire on occasion. The up-and-down nature of the industry is mainly the result of this short-term – and short-sighted – policy environment.

Wind has proven that it's a superior energy source. Why? Because it competes even on this uneven playing field. American wind installed 10,000 megawatts in 2009 – enough to power nearly 3 million homes. In recent years, it has gone head-to-head with natural gas for the leadership position in new power plant installations.

How did American wind power achieve such impressive numbers? Although it still operated with short-term policy,

Lack of Stable Market Signals Creates a Boom-Bust Cycle for Wind

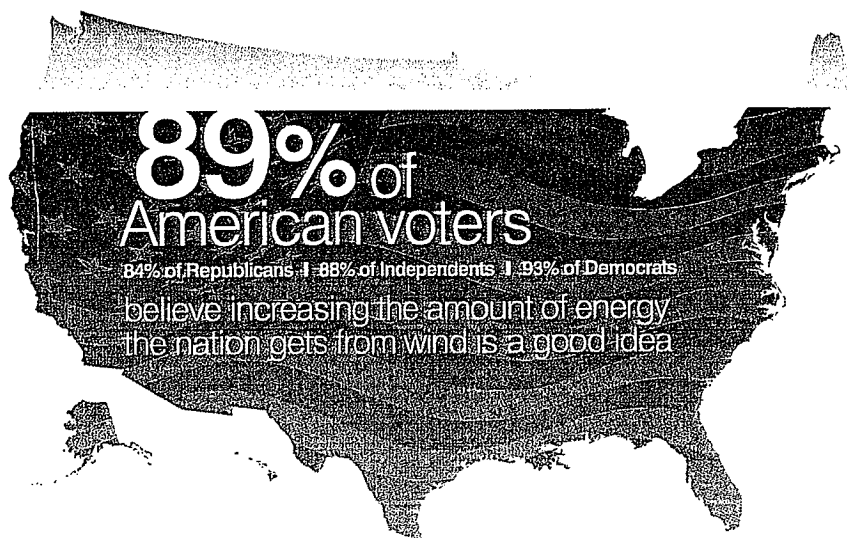


there was a temporary period of stability for the industry. The PTC was extended for several years in a row without being allowed to expire. The frequent eleventh-hour extensions caused the industry some degree of stress as it began to establish a manufacturing base here; nevertheless, through its investments, the industry literally banked on Congress to act on long-term

policy. It's still waiting. One such policy is a national Renewable Electricity Standard, which would set targets for a certain portion of each utility's electricity mix to come from clean, renewable sources. Long-term tax policies, lasting more than just a few years, would also provide consistency and market certainty.

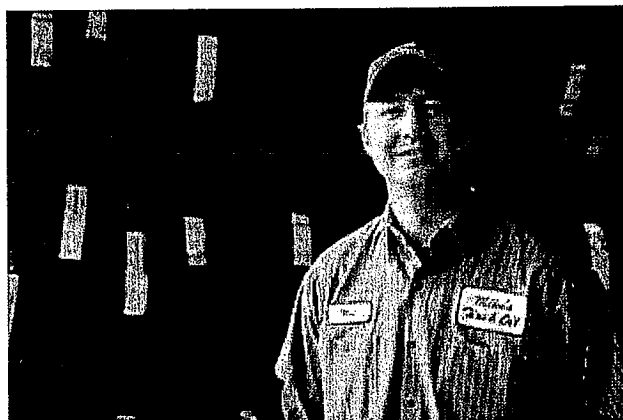
America's Choice

Hands down, the American people support wind energy development. Recent polls consistently show that nearly nine out of ten voters – Republicans, Democrats, and Independents – believe increasing the amount of energy the nation gets from wind is a good idea. That's because wind power doesn't just generate electricity. It powers economic development. It adds a new source of steady income to family farmers' and ranchers' bottom line. It opens the doors of factories previously mothballed. It sends clean, home-grown energy to our homes and businesses, while protecting family budgets and small businesses from volatile price spikes. No wonder Americans want more wind power.



Data Source: March 2010 survey by Neil Newhouse, Public Opinion Strategies, Anna Bennett, Bennett, Peltis & Normington

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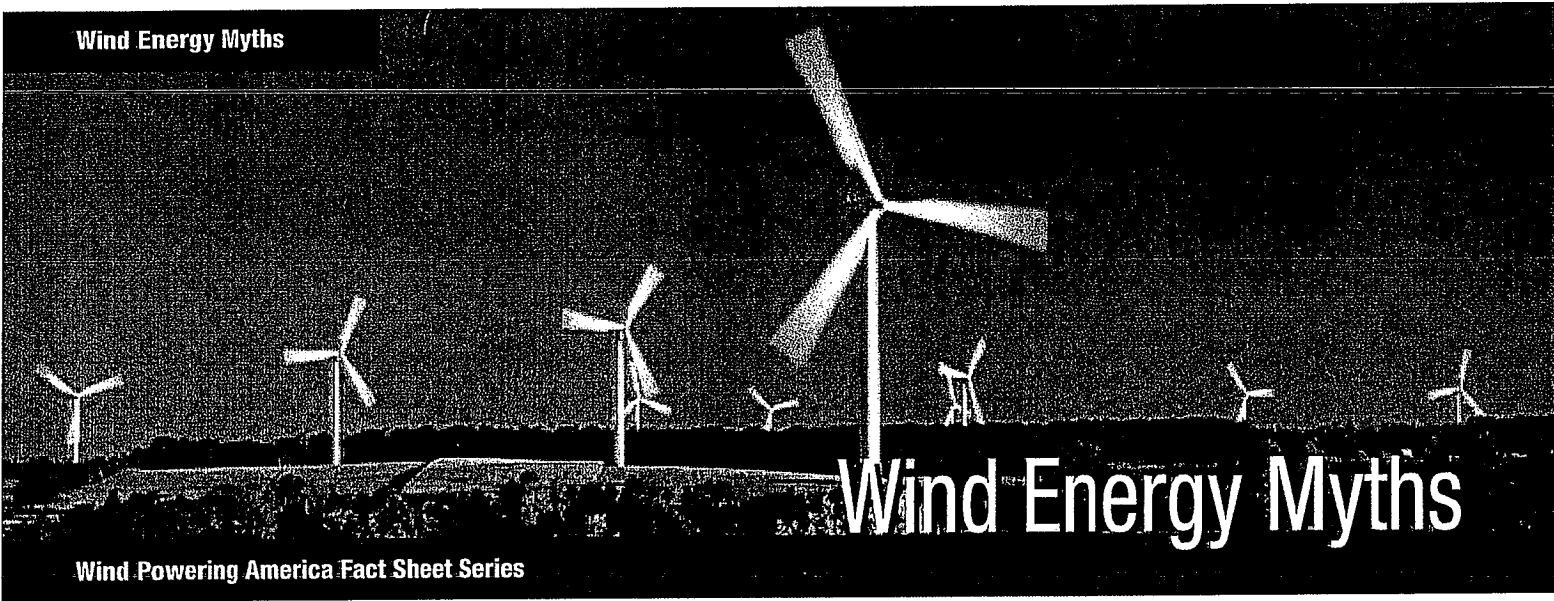


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1 Wind energy is more expensive than conventional energy. Wind's variability does increase the day-to-day and minute-to-minute operating costs of a utility system because the wind variations do affect the operation of other plants. But investigations by utility engineers show these costs to be relatively small—less than about 2 mills/kilowatt-hour (kWh) at penetrations under 5% and possibly rising to 5 mills at 20% penetration. In fact, when the Colorado Public Service Commission issued a ruling in 2001 on the 161-megawatt (MW) wind project in Lamar, Colorado, the commission determined that wind energy provided the lowest cost of any new generation resource submitted to an Xcel Energy solicitation bidding process (except for one small hydro plant). The commission also noted that unlike the other generation resources considered, the Lamar project avoided the risk of future increased fuel prices.¹ And in a recent landmark study of wind integration into the New York State electric power system, a 10% addition of wind generation (3,300 MW of wind in a 34,000-MW system) actually projected a reduction in payments by electricity customers of \$305 million in one year.²



When the Colorado Public Service Commission issued a ruling in 2001 on the 161-MW wind project in Lamar, Colorado (pictured above), the commission determined that wind energy provided the lowest cost of any new generation resource submitted to an Xcel Energy solicitation bidding process (except for one small hydro plant).

2 Wind energy requires a production tax credit (PTC) to achieve these economics. True, but every energy source receives significant federal subsidies; it is disingenuous to expect wind energy to compete in the marketplace without the incentives enjoyed by established technologies.³

3 The production tax credit and accelerated depreciation are helpful only to big, out-of-state developers. The economic benefits aren't local, and rural electric cooperatives and municipal utilities can't receive the same benefits. It's true that only entities that pay federal taxes can use the tax credits to reduce their tax liability. But those tax credits result in lower wind energy costs for the benefit of all electricity customers. However, if local entities assume equity positions in wind plants, then they can receive the tax credit benefits. Whether or not the wind-plant equity is locally held, wind plants result in jobs for the local community and the need for local services—both during construction and during operation. Additionally, the added county and state taxes and the landowner lease payments directly benefit the local and state economies. And to the extent that debt financing comes from local sources, debt-service payments stay within the local community.

Also, in some cases farmers have joined together in a cooperative arrangement to build and own wind plants. In aggregate, their tax liability can be sufficient to make full use of the tax credits.⁴

4 Wind energy is unpredictable and must be "backed up" by conventional generation. No power plant is 100% reliable. During a power plant outage—whether a conventional plant or a wind plant—backup is provided by the entire interconnected utility system. The system operating strategy strives to make best use of all elements of the overall system, taking into account the operating characteristics of each generating unit and planning for contingencies such as plant or transmission line outages. The utility system is also designed to accommodate load fluctuations, which occur continuously. This feature also facilitates accommodation of wind plant output fluctuations. In



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Denmark, Northern Germany, and parts of Spain, wind supplies 20% to 40% of electric loads without sacrificing reliability. When wind is added to a utility system, no new backup is required to maintain system reliability.

5 If wind energy displaces energy from existing coal plants, then rates will go up. Rates for electricity from wind plants being installed today are comparable to wholesale electric power prices of 2.5¢ to 3.5¢/kWh. The incremental cost of wind power, if any, will be negligible when distributed among all customers. A number of studies have examined the rate impacts of wind and have considered the costs of various renewable portfolio standard percentages from 5% to 10%, and average residential bill impacts are predicted to range from a savings to a premium of 25¢/month. In fact, some studies predict the accompanying decrease in demand for conventional fuels will reduce fuel prices enough to fully compensate for slightly higher costs for renewables. In the New York study mentioned above, wind displaced energy from both coal and natural gas plants. Rates decreased, and harmful emissions from the coal and gas plants were reduced as well.⁵

6 New natural gas power plants provide cheaper energy than wind plants. This is not likely with today's rising gas prices. At \$3/MBTU, the fuel cost alone is 2.5¢ to 3¢/kWh, and capital and O&M costs add a similar amount. Today, gas prices have risen to more than \$6/MBTU, yielding a fuel cost alone in the 5¢ to 6¢/kWh range. And gas prices have spiked to more than \$10/MBTU in past years. Betting on low gas prices over the foreseeable future is highly risky, while energy costs from wind plants will be relatively stable over time. In a recent study, Lawrence Berkeley National Laboratory found that the natural gas "hedge value" of wind could be conservatively estimated to be 1/2 cent/kWh.^{6,7}

7 Large, utility-grade wind turbines can't be installed on the distribution grid without expensive upgrades and power-quality issues. In situations with weak distribution grids (long lines with thin wires and few customers—maybe even single-phase), this can be true. However, in many cases wind generation can be connected to the distribution system in amounts up to about the rating of the nearest substation transformer. One study of a rural Midwestern county estimated that several tens of megawatts of turbines could be installed on the local distribution grid with a minimum of upgrade expense and minimal power-quality impacts. A number of single wind turbines and clusters of turbines are currently connected to the distribution system.⁸

8 Small projects that might be suitable for co-ops or small municipal utilities are not economical. Small projects generally have a higher cost per megawatt than larger wind plants, as would be expected. However, the incremental costs on customers'

bills are likely to be small. The energy premium for a small project is unlikely to exceed 50%. If the project provides a small portion of the community's needs—say 2%—then the premium is reduced to about 1% if distributed among all customers. Some communities view this premium as a worthwhile investment to obtain local environmental benefits and experience with wind power.

9 Wind turbines kill birds and thus have serious environmental impacts. Bird kills have caused serious scientific concern at only one location in the United States: Altamont Pass in California, one of the first areas in the country to experience significant wind development. Over the past decade, the wind community has learned that wind farms and wildlife can and do coexist successfully. Wind energy development's overall impact on birds is extremely low (<1 of 30,000) compared to other human-related causes, such as buildings, communications towers, traffic, and house cats. Birds can fly into wind turbines, as they do with other tall structures. However, conventional fuels contribute to air and water pollution that can have far greater impact on wildlife and their habitat, as well as the environment and human health.

10 Wind turbines are noisy. Modern wind turbines produce very little noise. The turbine blades produce a whooshing sound as they encounter turbulence in the air, but this noise tends to be masked by the background noise of the blowing wind. An operating modern wind farm at a distance of 750 feet to 1000 feet is no more noisy than a kitchen refrigerator.

You can find more information on wind energy myths at www.eere.energy.gov/windandhydro/windpoweringamerica/pdfs/wpa/34600_misconceptions.pdf

¹ www.eere.energy.gov/windandhydro/windpoweringamerica/pdfs/xcel_wind_decision.pdf

² www.nyserda.org/publications/wind_integration_report.pdf

³ For more on energy subsidies, visit www.earthtrack.net

⁴ Mark Bolinger, A Survey of State Support for Community Wind Power Development (<http://eetd.lbl.gov/ea/EMS/cases/>)

⁵ www.nyserda.org/publications/wind_integration_report.pdf

⁶ <http://eetd.lbl.gov/ea/ems/reports/56756.pdf>

⁷ Alan Greenspan, Federal Reserve Chairman, testimony at Senate committee hearing, July 10, 2003

⁸ Distributed Wind Power Assessment, National Wind Coordinating Committee, February 2001, available at www.nationalwind.org

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CONTACT

Ellen Carey

202-249-7357

ecarey@awea.org

Rhetoric vs. Reality: Wind Energy and Birds

Rhetoric: Wind turbines are killing birds at an alarming rate.

*"[W]ind-powered turbines are killing a vast number of birds every year."*¹

—Robert Bryce, senior fellow at the Manhattan Institute

*"Bird deaths from wind power are the new inconvenient truth. The total number of birds killed and the amount of bird habitat lost will dramatically increase as wind power build-out continues across the country in a rush to meet federal renewable energy targets."*²

—Mike Parr, Vice President of the American Bird Conservancy

The Reality: Wind power is far less harmful to birds than the fossil fuels it displaces. Incidental losses of individual birds at turbine sites will always be an extremely small fraction of bird deaths caused by human activities.:

- Wind is the only source of energy that does not present population-level risks to birds, according to a study of coal, oil, natural gas, nuclear, hydroelectric, and wind power.³
- Wind turbines are estimated to cause less than three out of every 100,000 human-related bird deaths in the U.S., and will never cause more than a very small fraction no matter how extensively wind power is used in the future, the National Academy of Sciences found.⁴
- Wind power causes far fewer losses of birds (approximately 108,000 a year) than buildings (550 million), power lines (130 million), cars (80 million), poisoning by pesticides (67 million), domestic cats (at least 10 million), and radio and cell towers (4.5 million).⁵
- Non-renewable energy sources "pose higher risks to wildlife" than renewable sources. Coal - which wind directly replaces - "is by far the largest contributor" to wildlife risks.⁶

¹ "Windmills Are Killing Our Birds," Robert Bryce op-ed in the Wall Street Journal, September 7, 2009

² "Bird Deaths from Wind Farms to Continue Under New Federal Voluntary Industry Guidelines," American Bird Conservancy press release, February 8, 2011

³ "Comparison Of Reported Effects And Risks To Vertebrate Wildlife From Six Electricity Generation Types In The New York/New England Region," New York State Research and Development Authority, March 2009

⁴ "Environmental Impacts of Wind-Energy Projects," National Academy of Sciences, 2007

⁵ "A Summary and Comparison of Bird Mortality from Anthropogenic Causes with an Emphasis on Collisions," USDA Forest Service, 2005

AWEA is the national trade association of America's wind industry, with more than 2,500 member companies, including global leaders in wind power and energy development, wind turbine manufacturing, component and service suppliers, and the world's largest wind power trade show. AWEA is the voice of wind energy in the U.S., promoting renewable energy to power a cleaner, stronger America. Look up information on wind energy at the AWEA Web site. Find insight on industry issues at AWEA's blog *Into the Wind*. Join AWEA on Facebook. Follow AWEA on Twitter.

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Wind Turbine Sound and Health Effects An Expert Panel Review

Prepared by (in alphabetical order):

W. David Colby, M.D.

Robert Dobie, M.D.

Geoff Leventhall, Ph.D.

David M. Lipscomb, Ph.D.

Robert J. McCunney, M.D.

Michael T. Seilo, Ph.D.

Bo Søndergaard, M.Sc.

Prepared for:

American Wind Energy Association

and

Canadian Wind Energy Association

December 2009

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Executive Summary

People have been harnessing the power of the wind for more than 5,000 years. Initially used widely for farm irrigation and millworks, today's modern wind turbines produce electricity in more than 70 countries. As of the end of 2008, there were approximately 120,800 megawatts of wind energy capacity installed around the world (Global Wind Energy Council, 2009).

Wind energy enjoys considerable public support, but it also has its detractors, who have publicized their concerns that the sounds emitted from wind turbines cause adverse health consequences.

In response to those concerns, the American and Canadian Wind Energy Associations (AWEA and CanWEA) established a scientific advisory panel in early 2009 to conduct a review of current literature available on the issue of perceived health effects of wind turbines. This multidisciplinary panel is comprised of medical doctors, audiologists, and acoustical professionals from the United States, Canada, Denmark, and the United Kingdom. The objective of the panel was to provide an authoritative reference document for legislators, regulators, and anyone who wants to make sense of the conflicting information about wind turbine sound.

The panel undertook extensive review, analysis, and discussion of the large body of peer-reviewed literature on sound and health effects in general, and on sound produced by wind turbines. Each panel member contributed a unique expertise in audiology, acoustics, otolaryngology, occupational/ environmental medicine, or public health. With a diversity of perspectives represented, the panel assessed the plausible biological effects of exposure to wind turbine sound.

Following review, analysis, and discussion of current knowledge, the panel reached consensus on the following conclusions:

- There is no evidence that the audible or sub-audible sounds emitted by wind turbines have any direct adverse physiological effects.
- The ground-borne vibrations from wind turbines are too weak to be detected by, or to affect, humans.
- The sounds emitted by wind turbines are not unique. There is no reason to believe, based on the levels and frequencies of the sounds and the panel's experience with sound exposures in occupational settings, that the sounds from wind turbines could plausibly have direct adverse health consequences.

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and

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December 2009

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Acronyms and Abbreviations

μPa	microPascal
ACOEM	American College of Occupational and Environmental Medicine
ANSI	American National Standards Institute
AWEA	American Wind Energy Association
ASHA	American Speech-Language-Hearing Association
CanWEA	Canadian Wind Energy Association
dB	decibel
dBA	decibel (on an A-weighted scale)
DNL	day-night-level
DSM-IV-TR	<i>Diagnostic and Statistical Manual of Mental Disorders</i> , Fourth Edition
EPA	U.S. Environmental Protection Agency
FDA	Food and Drug Administration
FFT	Fast Fourier Transform
GI	gastrointestinal
HPA	Health Protection Agency
Hz	Hertz
IARC	International Agency for Research on Cancer
ICD-10	International Statistical Classification of Diseases and Related Health Problems, 10th Revision
IEC	International Engineering Consortium
ISO	International Organization for Standardization
Km	kilometer
kW	kilowatt
L_{eq}	equivalent level
LPALF	large pressure amplitude and low frequency
m/s	meters per second
m/s^2	meters per second squared
NIESH	National Institute of Environmental Health Sciences
NIHL	noise-induced hearing loss
NIOSH	National Institute for Occupational Safety and Health
N/m^2	Newtons per square meter
NRC	National Research Council
NTP	National Toxicology Program
ONAC	Office of Noise Abatement and Control
OSHA	Occupational Safety and Health Administration
Pa	Pascal
UK	United Kingdom
VAD	vibroacoustic disease
VVVD	vibratory vestibular disturbance
VEMP	vestibular evoked myogenic potential response
WHO	World Health Organization

Executive Summary

People have been harnessing the power of the wind for more than 5,000 years. Initially used widely for farm irrigation and millworks, today's modern wind turbines produce electricity in more than 70 countries. As of the end of 2008, there were approximately 120,800 megawatts of wind energy capacity installed around the world (Global Wind Energy Council, 2009).

Wind energy enjoys considerable public support, but it also has its detractors, who have publicized their concerns that the sounds emitted from wind turbines cause adverse health consequences.

In response to those concerns, the American and Canadian Wind Energy Associations (AWEA and CanWEA) established a scientific advisory panel in early 2009 to conduct a review of current literature available on the issue of perceived health effects of wind turbines. This multidisciplinary panel is comprised of medical doctors, audiologists, and acoustical professionals from the United States, Canada, Denmark, and the United Kingdom. The objective of the panel was to provide an authoritative reference document for legislators, regulators, and anyone who wants to make sense of the conflicting information about wind turbine sound.

The panel undertook extensive review, analysis, and discussion of the large body of peer-reviewed literature on sound and health effects in general, and on sound produced by wind turbines. Each panel member contributed a unique expertise in audiology, acoustics, otolaryngology, occupational/ environmental medicine, or public health. With a diversity of perspectives represented, the panel assessed the plausible biological effects of exposure to wind turbine sound.

Following review, analysis, and discussion of current knowledge, the panel reached consensus on the following conclusions:

- There is no evidence that the audible or sub-audible sounds emitted by wind turbines have any direct adverse physiological effects.
- The ground-borne vibrations from wind turbines are too weak to be detected by, or to affect, humans.
- The sounds emitted by wind turbines are not unique. There is no reason to believe, based on the levels and frequencies of the sounds and the panel's experience with sound exposures in occupational settings, that the sounds from wind turbines could plausibly have direct adverse health consequences.

SECTION 1

Introduction

The mission of the American Wind Energy Association (AWEA) is to promote the growth of wind power through advocacy, communication, and education. Similarly, the mission of the Canadian Wind Energy Association (CanWEA) is to promote the responsible and sustainable growth of wind power in Canada. Both organizations wish to take a proactive role in ensuring that wind energy projects are good neighbors to the communities that have embraced wind energy.

Together AWEA and CanWEA proposed to a number of independent groups that they examine the scientific validity of recent reports on the adverse health effects of wind turbine proximity. Such reports have raised public concern about wind turbine exposure. In the absence of declared commitment to such an effort from independent groups, the wind industry decided to be proactive and address the issue itself. In 2009, AWEA and CanWEA commissioned this report. They asked the authors to examine published scientific literature on possible adverse health effects resulting from exposure to wind turbines.

The objective of this report is to address health concerns associated with sounds from industrial-scale wind turbines. Inevitably, a report funded by an industry association will be subject to charges of bias and conflicts of interest. AWEA and CanWEA have minimized bias and conflicts of interest to the greatest possible extent through selection of a distinguished panel of independent experts in acoustics, audiology, medicine, and public health. This report is the result of their efforts.

1.1 Expert Panelists

The experts listed below were asked to investigate and analyze existing literature and publish their findings in this report; their current positions and/or qualifications for inclusion are also provided.

- W. David Colby, M.D.: Chatham-Kent Medical Officer of Health (Acting); Associate Professor, Schulich School of Medicine & Dentistry, University of Western Ontario
- Robert Dobie, M.D.: Clinical Professor, University of Texas, San Antonio; Clinical Professor, University of California, Davis
- Geoff Leventhall, Ph.D.: Consultant in Noise Vibration and Acoustics, UK
- David M. Lipscomb, Ph.D.: President, Correct Service, Inc.
- Robert J. McCunney, M.D.: Research Scientist, Massachusetts Institute of Technology Department of Biological Engineering; Staff Physician, Massachusetts General Hospital Pulmonary Division; Harvard Medical School
- Michael T. Seilo, Ph.D.: Professor of Audiology, Western Washington University

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- Bo Søndergaard, M.Sc. (Physics): Senior Consultant, Danish Electronics Light and Acoustics (DELTA)

Mark Bastasch, an acoustical engineer with the consulting firm of CH2M HILL, acted as technical advisor to the panel.

1.2 Report Terminology

Certain terms are used frequently throughout this report. Table 1-1 defines these terms. An understanding of the distinction between “sound” and “noise” may be particularly useful to the reader.

TABLE 1-1
Definitions of Acoustical Terms

Term	Definitions
Sound	Describes wave-like variations in air pressure that occur at frequencies that can stimulate receptors in the inner ear and, if sufficiently powerful, be appreciated at a conscious level.
Noise	Implies the presence of sound but also implies a response to sound: noise is often defined as unwanted sound.
Ambient noise level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Decibel (dB)	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the measured pressure to the reference pressure, which is 20 micropascals (μPa).
A-weighted sound pressure level (dBA)	The sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighted filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Hertz (Hz)	A unit of measurement of frequency; the number of cycles per second of a periodic waveform.
Infrasound	According to the International Electrotechnical Commission's (IEC's) IEC 1994, infrasound is: Acoustic oscillations whose frequency is below the low-frequency limit of audible sound (about 16 Hz). However this definition is incomplete as infrasound at high enough levels is audible at frequencies below 16 Hz. (IEC (1994): 60050-801:1994 International Electrotechnical Vocabulary - Chapter 801: Acoustics and electroacoustics).
Low-frequency sound	Sound in the frequency range that overlaps the higher infrasound frequencies and the lower audible frequencies, and is typically considered as 10 Hz to 200 Hz, but is not closely defined.

Source: HPA, 2009.

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SECTION 2

Methodology

Three steps form the basis for this report: formation of an expert panel, review of literature directly related to wind turbines, and review of potential environmental exposures.

2.1 Formation of Expert Panel

The American and Canadian wind energy associations, AWEA and CanWEA, assembled a distinguished panel of independent experts to address concerns that the sounds emitted from wind turbines cause adverse health consequences.

The objective of the panel was to provide an authoritative reference document for the use of legislators, regulators, and people simply wanting to make sense of the conflicting information about wind turbine sound.

The panel represented expertise in audiology, acoustics, otolaryngology, occupational/environmental medicine, and public health. A series of conference calls were held among panel members to discuss literature and key health concerns that have been raised about wind turbines. The calls were followed by the development of a draft that was reviewed by other panel members. Throughout the follow-up period, literature was critically addressed.

2.2 Review of Literature Directly Related to Wind Turbines

The panel conducted a search of Pub Med under the heading "Wind Turbines and Health Effects" to research and address peer-reviewed literature. In addition, the panel conducted a search on "vibroacoustic disease." The reference section identifies the peer and non-peer reviewed sources that were consulted by the panel.

2.3 Review of Potential Environmental Exposures

The panel conducted a review of potential environmental exposures associated with wind turbine operations, with a focus on low frequency sound, infrasound, and vibration.

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Overview and Discussion

This section summarizes the results of the review and analysis conducted by the expert panel and responds to a number of key questions:

- How do wind turbine operations affect human auditory response?
- How do we determine the loudness and frequency of sound and its effects on the human ear?
- How do wind turbines produce sound?
- How is sound measured and tested?
- What is vibration?
- What type of exposure to wind turbines is more likely to be perceived by humans (low frequency sound, infrasound or vibration)?
- Can sounds in the low frequency range, most notably the infrasonic range, adversely affect human health? Even when such levels are below the average person's ability to hear them?
- How does the human vestibular system respond to sound?
- What are the potential adverse effects and health implications of sound exposure?
- What does scientific literature say about wind turbines, low frequency sound, and infrasound?

3.1 Wind Turbine Operation and Human Auditory Response to Sound

3.1.1 Overview

The normal operation of a wind turbine produces sound and vibration, arousing concern about potential health implications. This section addresses the fundamental principles associated with sound and vibration, sound measurement, and potential adverse health implications. Sound from a wind turbine arises from its mechanical operation and the turning of the blades.

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3.1.2 The Human Ear and Sound

The human ear is capable of perceiving a wide range of sounds, from the high-pitched sounds of a bird song to the low-pitched sound of a bass guitar. Sounds are perceived based on their loudness (i.e., volume or sound pressure level) or pitch (i.e., tonal or frequency content). The standard unit of measure for sound pressure levels is the decibel (dB). The standard unit used to describe the tonal or frequency content is the Hertz (Hz), measured in cycles per second) – Appendix A provides more information on the fundamentals of sound. Customarily, the young, non-pathological ear can perceive sounds ranging from 20 Hz to 20,000 Hz. Appendix B provides more information on the human ear.

Frequencies below 20 Hz are commonly called “infrasound,” although the boundary between infrasound and low frequency sound is not rigid. Infrasound, at certain frequencies and at high levels, can be audible to some people. Low frequency sound is customarily referred to as that between 10 Hz and 200 Hz, but any definition is arbitrary to some degree. Low frequency sound is the subject of concern to some with respect to potential health implications.

TABLE 3-1
TYPICAL SOUND PRESSURE LEVELS MEASURED IN THE ENVIRONMENT AND
INDUSTRY

Noise Source At a Given Distance	A-Weighted Sound Level in Decibels	Qualitative Description
Carrier deck jet operation	140	
	130	Pain threshold
Jet takeoff (200 feet)	120	
Auto horn (3 feet)	110	Maximum vocal effort
Jet takeoff (1000 feet)	100	
Shout (0.5 feet)		
N.Y. subway station	90	Very annoying
Heavy truck (50 feet)		Hearing damage (8-hour, continuous exposure)
Pneumatic drill (50 feet)	80	Annoying
Freight train (50 feet)	70 to 80	
Freeway traffic (50 feet)	70	Intrusive (Telephone use difficult)
Air conditioning unit (20 feet)	60	
Light auto traffic (50 feet)	50	Quiet
Living room	40	
Bedroom		
Library	30	Very quiet
Soft whisper (5 feet)		
Broadcasting/Recording studio	20	
	10	Just audible

Adapted from Table E, “Assessing and Mitigating Noise Impacts”, NY DEC, February 2001.

Table 3-1 shows sound pressure levels associated with common activities. Typically, environmental and occupational sound pressure levels are measured in decibels on an A-weighted scale (dBA). The A-weighted scale de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear. For comparison, the sound from a wind turbine at distances between 1,000 and 2,000 feet is generally within 40 to 50 dBA.

Section 3.2 discusses the effects of exposure to wind turbine sound. Section 3.3 describes the potential adverse effects of sound exposure as well as the health implications.

3.1.3 Sound Produced by Wind Turbines

Wind turbine sound originates from either a mechanical or aerodynamic generation mechanism. Mechanical sound originates from the gearbox and control mechanisms. Standard noise control techniques typically are used to reduce mechanical sound. Mechanical noise is not typically the dominant source of noise from modern wind turbines (except for an occasional gear tone).

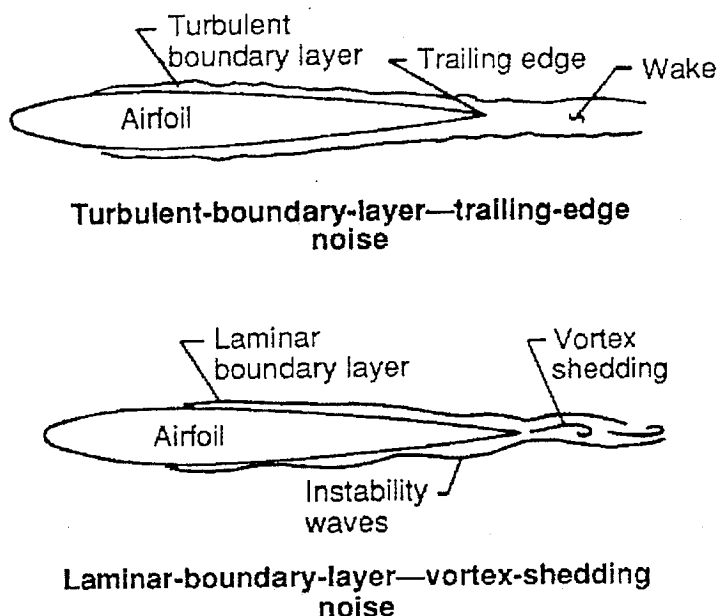
The aerodynamic noise is present at all frequencies, from the infrasound range over low frequency sound to the normal audible range and is the dominant source. The aerodynamic noise is generated by several mechanisms as is described below. The aerodynamic noise tends to be modulated in the mid frequency range, approximately 500 to 1,000 Hz.

Aerodynamic sound is produced by the rotation of the turbine blades through the air. A turbine blade shape is that of an airfoil. An airfoil is simply a structure with a shape that produces a lift force when air passes over it. Originally developed for aircraft, airfoil shapes have been adapted to provide the turning force for wind turbines by employing a shape which causes the air to travel more rapidly over the top of the airfoil than below it. The designs optimize efficiency by minimizing turbulence, which produces drag and noise. An aerodynamically efficient blade is a quiet one.

The aerodynamic sound from wind turbines is caused by the interaction of the turbine blade with the turbulence produced both adjacent to it (turbulent boundary layer) and in its near wake (see Figure 3-1) (Brooks et al., 1989). Turbulence depends on how fast the blade is moving through the air. A 100-meter-diameter blade, rotating once every three seconds, has a tip velocity of just over 100 meters per second. However, the speed reduces at positions closer to the centre of rotation (the wind turbine hub). The main determinants of the turbulence are the speed of the blade and the shape and dimensions of its cross-section.

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FIGURE 3-1
Sound Produced by Wind Turbine Flow



The following conclusions have been derived from the flow conditions shown in Figure 3-1 (Brooks et al., 1989):

- At high velocities for a given blade, turbulent boundary layers develop over much of the airfoil. Sound is produced when the turbulent boundary layer passes over the trailing edge.
- At lower velocities, mainly laminar boundary layers develop, leading to vortex shedding at the trailing edge.

Other factors in the production of aerodynamic sound include the following:

- When the angle of attack is not zero—in other words, the blade is tilted into the wind—flow separation can occur on the suction side near to the trailing edge, producing sound.
- At high angles of attack, large-scale separation may occur in a stall condition, leading to radiation of low frequency sound.
- A blunt trailing edge leads to vortex shedding and additional sound.
- The tip vortex contains highly turbulent flow.

Each of the above factors may contribute to wind turbine sound production. Measurements of the location of the sound source in wind turbines indicate that the dominant sound is produced along the blade—nearer to the tip end than to the hub. Reduction of turbulence sound can be facilitated through airfoil shape and by good maintenance. For example, surface irregularities resulting from damage or to accretion of additional material, may increase the sound.

Aerodynamic sound has been shown to be generated at higher levels during the downward motion of the blade (i.e., the three o'clock position). This results in a rise in level of approximately once per second for a typical three-bladed turbine. This periodic rise in level is also referred to as amplitude modulation, and as described above for a typical wind turbine, the modulation frequency is 1 Hz (once per second). In other words, the sound level rises and falls about once per second. The origin of this amplitude modulation is not fully understood. It was previously assumed that the modulation was caused when the blade went past the tower (given the tower disturbed the airflow), but it is now thought to be related to the difference in wind speed between the top and bottom of the rotation of a blade and directivity of the aerodynamic noise (Oerlemans and Schepers, 2009).

In other words, the result of aerodynamic modulation is a perceivable fluctuation in the sound level of approximately once per second. The frequency content of this fluctuating sound is typically between 500 Hz and 1,000 Hz, but can occur at higher and lower frequencies. That is, the sound pressure levels between approximately 500 and 1,000 Hz will rise and fall approximately once per second. It should be noted, however, that the magnitude of the amplitude modulation that is observed when standing beneath a tower does not always occur at greater separation distances. A study in the United Kingdom (UK) also showed that only four out of about 130 wind farms had a problem with aerodynamic modulation and three of these have been solved (Moorhouse et al., 2007).

In addition to the sound levels generated by the turbines, environmental factors affect the levels received at more distant locations. For example, warm air near the ground causes the turbine sound to curve upwards, away from the ground, which results in reduced sound levels, while warm air in a temperature inversion may cause the sound to curve down to the earth resulting in increased sound levels. Wind may also cause the sound level to be greater downwind of the turbine—that is, if the wind is blowing from the source towards a receiver—or lower, if the wind is blowing from the receiver to the source. Most modeling techniques, when properly implemented, account for moderate inversions and downwind conditions. Attenuation (reduction) of sound can also be influenced by barriers, ground surface conditions, shrubbery and trees, among other things.

Predictions of the sound level at varying distances from the turbine are based on turbine sound power levels. These turbine sound power levels are determined through standardized measurement methods.

3.1.4 Sound Measurement and Audiometric Testing

A sound level meter is a standard tool used in the measurement of sound pressure levels. As described in Section 3.1.2, the standard unit of sound pressure level (i.e., volume) is dB and the standard unit used to describe the pitch or frequency is Hz (cycles per second). A sound level meter may use the A-weighting filter to adjust certain frequency ranges (those that humans detect poorly), resulting in a reading in dBA (decibels, A-weighted). Appendix C provides more information on the measurement of sound. The pitch or frequencies (sometimes referred to as sound level spectrum) can be quantified using a sound level meter that includes a frequency analyzer. Octave band, one-third octave band, and narrow band (such as Fast Fourier Transform, or FFT) are three common types of frequency analyzers.

Consider, for example, a routine audiometric test (hearing test) in which a person sits in a booth and wears headphones, through which sounds are transmitted to evaluate hearing. Outside the booth, a technician turns a dial which yields certain frequencies (for example, 125 Hz, a low-pitched sound, or 4,000 Hz, a high-pitched sound) and then the technician raises the volume of each frequency until the person recognizes the sound of each tone. This is a standard approach used to measure thresholds for many reasons, including noise-induced hearing loss (NIHL). As the technician raises the volume of the designated frequency, the sound level (in dB) is noted. People who need more than 25 dB at more than one frequency to hear the sound (ie loudness of the tone) are considered to have an abnormal test.

The effects of prolonged, high-level sound exposure on hearing have been determined through audiometric tests of workers in certain occupations. The studies have been published in major medical journals and subjected to the peer review process (see, for example, McCunney and Meyer, 2007). Studies of workers have also served as the scientific basis for regulations on noise in industry that are overseen by the Occupational Safety and Health Administration (OSHA). Workers in noise-intensive industries have been evaluated for NIHL and certain industries are known to be associated with high noise levels, such as aviation, construction, and areas of manufacturing such as canning. Multiyear worker studies suggest that prolonged exposure to high noise levels can adversely affect hearing. The levels considered sufficiently high to cause hearing loss are considerably higher than one could experience in the vicinity of wind turbines. For example, prolonged, unprotected high exposure to noise at levels greater than 90 dBA is a risk for hearing loss in occupational settings such that OSHA established this level for hearing protection. Sound levels from wind turbines do not approach these levels (50 dBA at a distance of 1,500 feet would be a conservative estimate for today's turbines). Although the issue of NIHL has rarely been raised in opposition to wind farms, it is important to note that the risk of NIHL is directly dependent on the intensity (sound level) and duration of noise exposure and therefore it is reasonable to conclude that there is no risk of NIHL from wind turbine sound. Such a conclusion is based on studies of workers exposed to noise and among whom risk of NIHL is not apparent at levels less than 75 dBA.

3.2 Sound Exposure from Wind Turbine Operation

This section addresses the questions of (1) whether sounds in the low frequency range, most notably the infrasonic range, adversely affect human health, and whether they do so even when such levels are below the average person's ability to hear them; (2) what we are referring to when we talk about vibration; and (3) how the human vestibular system responds to sound and disturbance.

3.2.1 Infrasound and Low-Frequency Sound

Infrasound and low frequency sound are addressed in some detail to offer perspective on publicized hypotheses that sound from a wind turbine may damage health even if the noise levels are below those associated with noise-induced hearing loss in industry. For example, it has been proposed that sounds that contain low frequency noise, most notably within the infrasonic level, can adversely affect health even when the levels are below the average person's ability to detect or hear them (Alves-Pereira and Branco, 2007b).

Comprehensive reviews of infrasound and its sources and measurement have been published (Berglund and Lindvall, 1995; Leventhall et al., 2003). Table 3-2 shows the sound pressure level, in decibels, of the corresponding frequency of infrasound and low frequency sound necessary for the sound to be heard by the average person (Leventhall et al., 2003).

TABLE 3-2
Hearing Thresholds in the Infrasonic and Low Frequency Range

Frequency (Hz)	4	8	10	16	20	25	40	50	80	100	125	160	200
Sound pressure level (dB)	107	100	97	88	79	69	51	44	32	27	22	18	14

NOTE:

Average hearing thresholds (for young healthy people) in the infrasound (4 to 20 Hz) and low frequency region (10 to 200 Hz).

Source: Leventhall et al., 2003

As Table 3-2 indicates, at low frequencies, a much higher level sound is necessary for a sound to be heard in comparison to higher frequencies. For example, at 10 Hz, the sound must be at 97 dB to be audible. If this level occurred at the mid to high frequencies, which the ear detects effectively, it would be roughly equivalent to standing without hearing protection directly next to a power saw. Decibel for decibel, the low frequencies are much more difficult to detect than the high frequencies, as shown in the hearing threshold levels of Table 3-2.

Table 3-2 also shows that even sounds as low as 4 Hz can be heard if the levels are high enough (107 dB). However, levels from wind turbines at 4 Hz are more likely to be around 70 dB or lower, and therefore inaudible. Studies conducted to assess wind turbine noise have shown that wind turbine sound at typical distances does not exceed the hearing threshold and will not be audible below about 50 Hz (Hayes 2006b; Kamperman and James, 2008). The hearing threshold level at 50 Hz is 44 dB, as shown in Table 3-2. Recent work on evaluating a large number of noise sources between 10 Hz and 160 Hz suggests that wind turbine noise heard indoors at typical separation distances is modest on the scale of low frequency sound sources (Pedersen, 2008). The low levels of infrasound and low frequency sound from wind turbine operations have been confirmed by others (Jakobsen, 2004; van den Berg, 2004).

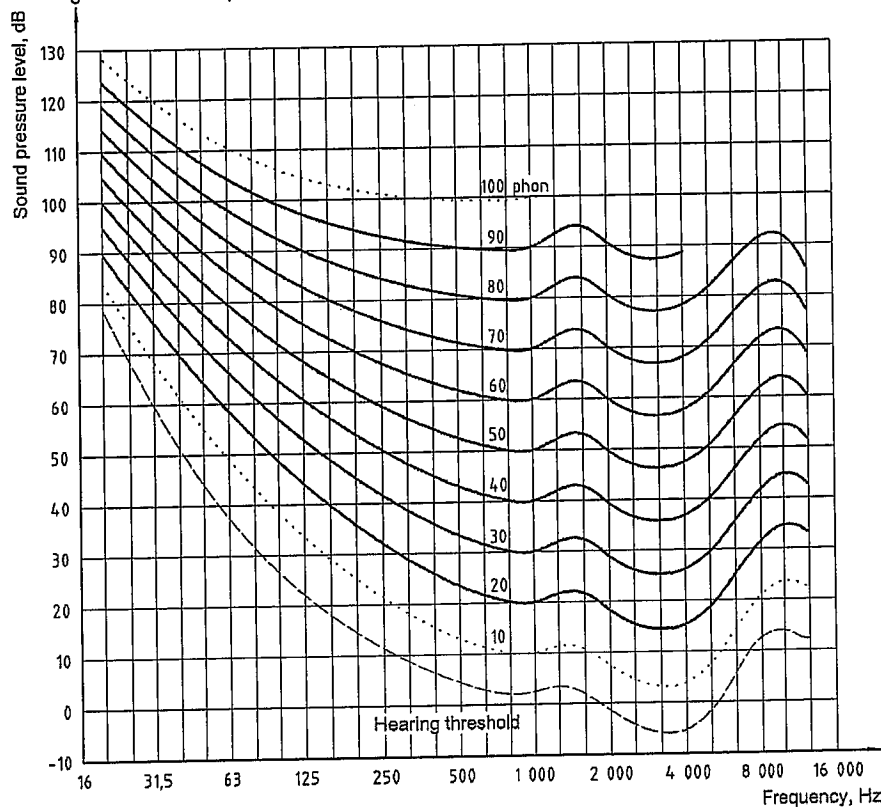
The low frequency sound associated with wind turbines has attracted attention recently since the A-weighting scale that is used for occupational and environmental regulatory compliance does not work well with sounds that have prominently low frequency components. Most environmental low frequency sound problems are caused by discrete tones (pitch or tones that are significantly higher in level (volume) than the neighboring frequencies); from, for example, an engine or compressor, not by continuous broadband sound. The high frequency sounds are assessed by the A-weighted measurement and, given their shorter wavelengths, are controlled more readily. Low frequency sounds may be irritating to some people and, in fact, some low frequency sound complaints prove impossible to resolve (Leventhall et al., 2003). This observation leads to a perception that there is something special, sinister, and harmful about low frequency sound. To the contrary, most external sound when heard indoors is biased towards low frequencies due to the efficient building attenuation of higher frequencies. One may recognize this when noise

from a neighbor's stereo is heard within their home—the bass notes are more pronounced than the higher frequency sounds. Any unwanted sound, whether high frequency or low frequency, can be irritating and stressful to some people.

Differences in how a low frequency sound and high frequency sound are perceived are well documented. Figure 3-2 shows that lower-frequency sounds typically need to be at a high sound pressure level (dB) to be heard. Figure 3-2 also demonstrates that as the frequency lowers, the audible range is compressed leading to a more rapid rise in loudness as the level changes in the lower frequencies. At 1,000 Hz, the whole range covers about 100 dB change in sound pressure level, while at 20 Hz the same range of loudness covers about 50 dB (note the contours displayed in Figure 3-2 are in terms of phons, a measure of equal loudness; for additional explanation on phons, the reader is referred to <http://www.sfu.ca/sonic-studio/handbook/Phon.html> [Truax, 1999]). As the annoyance of a given sound increases as loudness increases, there is also a more rapid growth of annoyance at low frequencies. However, there is no evidence for direct physiological effects from either infrasound or low frequency sound at the levels generated from wind turbines, indoors or outside. Effects may result from the sounds being audible, but these are similar to the effects from other audible sounds.

Low frequency sound and infrasound are further addressed in Section 3.3, Potential Adverse Effects of Exposure to Sound.

FIGURE 3-2
Hearing Contours for Equal Loudness Level (International Standards Organization, 2003)



3.2.2 Vibration

Vibration, assumed to result from inaudible low frequency sounds, has been postulated to have a potential adverse effect on health. This section defines vibration, describes how it is measured, and cites studies that have addressed the risk of vibration on health.

Vibration refers to the way in which energy travels through solid material, whether steel, concrete in a bridge, the earth, the wall of a house or the human body. Vibration is distinguished from sound, which is energy flowing through gases (like air) or liquids (like water).

As higher frequency vibrations attenuate rapidly, it is low frequencies which are of potential concern to human health. When vibration is detected through the feet or through the seat, the focus of interest is the vibration of the surface with which one is in contact—for example, when travelling in a vehicle.

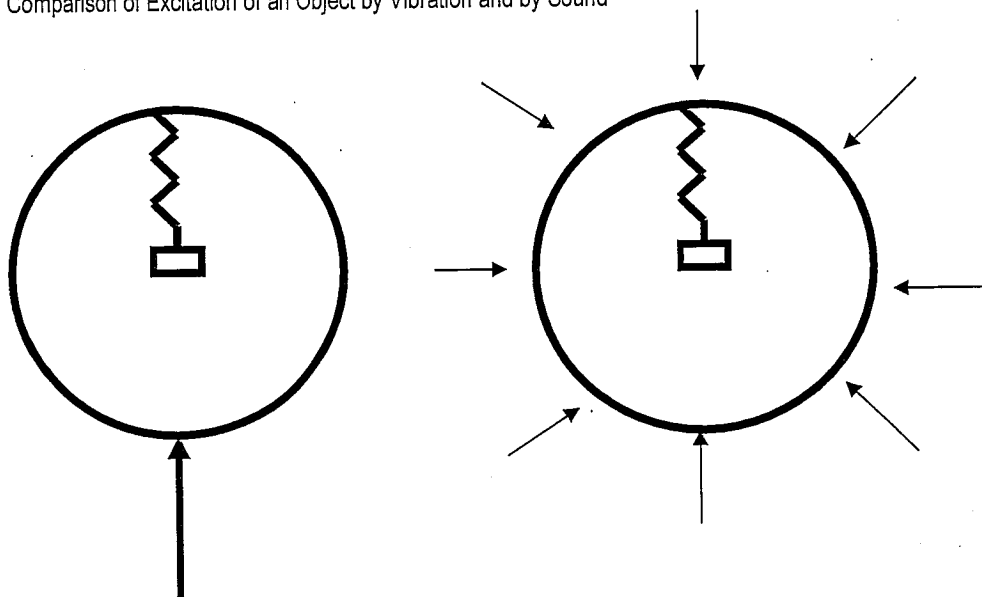
Vibration is often measured by the acceleration of the surface in meters per second, squared (m/s^2), although other related units are used. Vibration can also be expressed in decibels, where the reference excitation level used in buildings is often 10^{-5}m/s^2 and the vibration level is $20\log(A/10^{-5})$ dB, where A is the acceleration level in m/s^2 .

The threshold of perception of vibration by humans is approximately 0.01 m/s^2 . If a frequency of excitation (vibration) corresponds with a resonant frequency of a system, then

excitation at the resonant frequency is greater than at other frequencies. However, excitation by sound is not the same as excitation by mechanical excitation applied at, say, the feet.

Figure 3-3 shows an object excited by point mechanical vibration and by sound. The object contains a resiliently suspended system. For example, if the object was the body, the suspended system might be the viscera (internal organs of the body). The left hand of the figure can be interpreted as the body vibrated by input to the feet. The vibration of the viscera will be maximum at the resonant frequency¹ of the suspended system, which, for viscera, is about 4 Hz. When excitation is by long wavelength low frequency sound waves, as shown at the right of the figure, not only is the force acting on the body much smaller than for vibration input, but, as the wavelength is much greater than the dimensions of the body, it is acting around the body in a compressive manner so that there is no resultant force on the suspended system and it does not vibrate or resonate.

FIGURE 3-3
Comparison of Excitation of an Object by Vibration and by Sound



Unfortunately, this lack of effect has not been addressed by those who have suggested the mechanical vibration response of the body instead of the acoustic response as a potential health consequence. This oversight has led to inaccurate conclusions. For example, Dr. Nina Pierpont bases one of her key hypotheses for the cause of "wind turbine syndrome" on such an egregious error (Pierpont, 2009, pre-publication draft). Although not a recognized medical diagnosis, "wind turbine syndrome" has been raised as a concern for proposed projects—refer to Section 4.3 for more information.

Vibration of the body by sound at one of its resonant frequencies occurs only at very high sound levels and is not a factor in the perception of wind turbine noise. As will be discussed

¹ A common example of resonance is pushing a child on a swing in which energy is given to the swing to maximize its oscillation.

below, the sound levels associated with wind turbines do not affect the vestibular or other balance systems.

3.2.3 Vestibular System

The vestibular system of the body plays a major role in maintaining a person's sense of balance and the stabilization of visual images. The vestibular system responds to pressure changes (sound pressure, i.e., decibels) at various frequencies. At high levels of exposure to low frequency sound, nausea and changes in respiration and blood pressure may occur. Studies have shown, however, that for these effects to occur, considerably high noise levels (greater than 140 dB, similar in sound level of a jet aircraft heard 80 feet away) are necessary (Berglund et al., 1996).

Head vibration resulting from low frequency sound has been suggested as a possible cause of a variety of symptoms that some hypothesize as being associated with wind turbines. In order to properly assess this hypothesis, this section addresses the human vestibular system. The "vestibular system" comprises the sense organs in the vestibular labyrinth, in which there are five tiny sensory organs: three semicircular canals that detect head rotation and two chalk-crystal-studded organs called otoliths (literally "ear-stones") that detect tilt and linear motion of the head. All five organs contain hair cells, like those in the cochlea, that convert motion into nerve impulses traveling to the brain in the vestibular nerve.

These organs evolved millions of years before the middle ear. Fish, for example, have no middle ear or cochlea but have a vestibular labyrinth nearly identical to ours (Baloh and Honrubia, 1979). The vestibular organs are specialized for stimulation by head position and movement, not by airborne sound. Each vestibular organ is firmly attached to the skull, to enable them to respond to the slightest head movement. In contrast, the hair cells in the cochlea are not directly attached to the skull; they do not normally respond to head movement, but to movements of the inner ear fluids.

The otolith organs help fish hear low frequency sounds; even in primates, these organs will respond to head vibration (i.e., bone-conducted sound) at frequencies up to 500 Hz (Fernandez and Goldberg, 1976). These vibratory responses of the vestibular system can be elicited by *airborne* sounds, however, only when they are at a much higher level than normal hearing thresholds² (and much higher than levels associated with wind turbine exposure). Thus, they do not help us hear but appear to be vestiges of our evolutionary past.

The vestibular nerve sends information about head position and movement to centers in the brain that also receive input from the eyes and from stretch receptors in the neck, trunk, and

² Young et al. (1977) found that neurons coming from the vestibular labyrinth of monkeys responded to head vibration at frequencies of 200-400 Hz, and at levels as low as 70 to 80 dB below gravitational force. However, these neurons could not respond to airborne sound at the same frequencies until levels exceeded 76 dB sound pressure level (SPL), which is at least 40 dB higher than the normal threshold of human hearing in this frequency range. Human eye movements respond to 100 Hz head vibration at levels 15 dB below audible levels (Todd et al., 2008a). This does not mean that the vestibular labyrinth is more sensitive than the cochlea to airborne sound, because the impedance-matching function of the middle ear allows the cochlea to respond to sounds that are 50-60 dB less intense than those necessary to cause detectable head vibration. Indeed, the same authors (Todd et al., 2008b) found that for airborne sound, responses from the cochlea could always be elicited by sounds that were below the threshold for vestibular responses. Similarly, Welgampola et al. (2003) found that thresholds for vestibular evoked myogenic potential response (VEMP) were higher than hearing thresholds and stated: "the difference between hearing thresholds and VEMP thresholds is much greater for air conducted sounds than for bone vibration." In other words, the vestigial vestibular response to sound is relatively sensitive to bone conduction, which involves vibration of the whole head, and much less sensitive to air conduction.

legs (these stretch receptors tell which muscles are contracted and which joints are flexed, and provide the "proprioceptive" sense of the body's position and orientation in space). The brain integrates vestibular, visual, and proprioceptive inputs into a comprehensive analysis of the position and movement of the head and body, essential for the sense of balance, avoidance of falls, and keeping the eyes focused on relevant targets, even during movement.

Perception of the body's position in space may also rely in part on input from receptors in abdominal organs (which can shift back and forth as the body tilts) and from pressure receptors in large blood vessels (blood pools in the legs when standing, then shifts back to the trunk when lying down). These "somatic graviceptors" (Mittelstaedt, 1996) could be activated by whole-body movement and possibly by structure-borne vibration, or by the blast of a powerful near explosion, but, as described in Section 4.3.2, it is unlikely that intra-abdominal and intra-thoracic organs and blood vessels could detect airborne sound like that created by wind turbines.

Trauma, toxins, age-related degeneration, and various ear diseases can cause disorders of the vestibular labyrinth. A labyrinth not functioning properly can cause a person to feel unsteady or even to fall. Since the semicircular canals of the ear normally detect head rotation (such as shaking the head to indicate "no"), one of the consequences of a dysfunctional canal is that a person may feel a "spinning" sensation. This reaction is described as vertigo, from the Latin word to turn. In normal conversation, words like vertigo and dizziness can be used in ambiguous ways and thus make careful interpretation of potential health claims problematic. "Dizzy," for example, may mean true vertigo or unsteadiness, both of which may be symptoms of inner ear disease. A person who describes being "dizzy" may actually be experiencing light-headedness, a fainting sensation, blurred vision, disorientation, or almost any other difficult-to-describe sensation in the head. The word "dizziness" can represent different sensations to each person, with a variety of causes. This can make the proper interpretation of research studies in which dizziness is evaluated a challenge to interpret.

Proper diagnostic testing to evaluate dizziness can reduce errors in misclassifying disease. The vestibular labyrinth, for example, can be tested for postural stability. Information from the semicircular canals is fed to the eye muscles to allow us to keep our eyes focused on a target; when the head moves; this "vestibulo-ocular reflex" is easily tested and can be impaired in vestibular disorders (Baloh and Honrubia, 1979).

3.3 Potential Adverse Effects of Exposure to Sound

Adverse effects of sound are directly dependent on the sound level; higher frequency sounds present a greater risk of an adverse effect than lower levels (see Table 3-2). Speech interference, hearing loss, and task interference occur at high sound levels. Softer sounds may be annoying or cause sleep disturbance in some people. At normal separation distances, wind turbines do not produce sound at levels that cause speech interference, but some people may find these sounds to be annoying.

3.3.1 Speech Interference

It is common knowledge that conversation can be difficult in a noisy restaurant; the louder the background noise, the louder we talk and the harder it is to communicate. Average

levels of casual conversation at 1 meter (arm's length) are typically 50 to 60 dBA. People raise their voices—slightly and unconsciously at first—when ambient levels exceed 50 to 55 dBA, in order to keep speech levels slightly above background noise levels. Communication at arm's length requires conscious extra effort when levels exceed about 75 dBA. Above ambient levels of 80 to 85 dBA, people need to shout or get closer to converse (Pearsons et al., 1977; Webster, 1978). Levels below 45 dBA can be considered irrelevant with respect to speech interference.

3.3.2 Noise-Induced Hearing Loss

Very brief and intense sounds (above 130 dBA, such as in explosions) can cause instant cochlear damage and permanent hearing loss, but most occupational NIHL results from prolonged exposure to high noise levels between 90 and 105 dBA (McCunney and Meyer 2007). Regulatory (OSHA, 1983) and advisory (NIOSH, 1998) authorities in the U.S. concur that risk of NIHL begins at about 85 dBA, for an 8-hour day, over a 40-year career. Levels below 75 dBA do not pose a risk of NIHL. Thus, the sound levels associated with wind turbine operations would not cause NIHL because they are not high enough.

3.3.3 Task Interference

Suter (1991) reviewed the effects of noise on performance and behavior. Simple tasks may be unaffected even at levels well above 100 dBA, while more complex tasks can be disrupted by intermittent noise as low as 75 dBA. Speech sounds are usually more disruptive than nonspeech sounds. Levels below 70 dBA do not result in task interference.

3.3.4 Annoyance

Annoyance as a possible “effect” of wind turbine operations is discussed in detail in later sections of this report (Sections 3.4 and 4.1). In summary, annoyance is a subjective response that varies among people to many types of sounds. It is important to note that although annoyance may be a frustrating experience for people, it is not considered an adverse health effect or disease of any kind. Certain everyday sounds, such as a dripping faucet—barely audible—can be annoying. Annoyance cannot be predicted easily with a sound level meter. Noise from airports, road traffic, and other sources (including wind turbines) may annoy some people, and, as described in Section 4.1, the louder the noise, the more people may become annoyed.

3.3.5 Sleep Disturbance

The U.S. Environmental Protection Agency (EPA) document titled *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety* (1974) recommends that indoor day-night-level (DNL) not exceed 45 dBA. DNL is a 24-hour average that gives 10 dB extra weight to sounds occurring between 10p.m. and 7 a.m., on the assumption that during these sleep hours, levels above 35 dBA indoors may be disruptive.

3.3.6 Other Adverse Health Effects of Sound

At extremely high sound levels, such as those associated with explosions, the resulting sound pressure can injure any air-containing organ: not only the middle ear (eardrum

perforations are common) but also the lungs and intestines (Sasser et al., 2006). At the other extreme, any sound that is chronically annoying, including very soft sounds, may, for some people, create chronic stress, which can in turn lead to other health problems. On the other hand, many people become accustomed to regular exposure to noise or other potential stressors, and are no longer annoyed. The hypothesis that chronic noise exposure might lead to chronic health problems such as hypertension and heart disease has been the subject of hundreds of contradictory studies of highly variable quality, which will not be reviewed in this document. Other authors have reviewed this literature, and some of their conclusions are quoted below:

"It appears not likely that noise in industry can be a direct cause of general health problems..., except that the noise can create conditions of psychological stress...which can in turn cause physiological stress reactions..." (Kryter, 1980)

"Epidemiological evidence on noise exposure, blood pressure, and ischemic heart disease is still limited." (Babisch, 2004), and "contradictory" (Babisch, 1998), but "there is some evidence...of an increased risk in subjects who live in noisy areas with outdoor noise levels of greater than 65 - 70 dBA." (Babisch, 2000)

"The present state of the art does not permit any definite conclusion to be drawn about the risk of hypertension." (van Dijk, Ettema, and Zielhuis, 1987)

"At this point, the relationship between noise induced hearing loss and hypertension must be considered as possible but lacking sufficient evidence to draw causal associations." (McCunney and Meyer, 2007)

3.3.7 Potential Health Effects of Vibration Exposure

People may experience vibration when some part of the body is in direct contact with a vibrating object. One example would be holding a chainsaw or pneumatic hammer in the hands. Another would be sitting in a bus, truck, or on heavy equipment such as a bulldozer. Chronic use of vibrating tools can cause "hand-arm vibration syndrome," a vascular insufficiency condition characterized by numbness and tingling of the fingers, cold intolerance, "white-finger" attacks, and eventually even loss of fingers due to inadequate blood supply. OSHA does not set limits for vibration exposure, but the American National Standards Institute (ANSI) (2006) recommends that 8-hour workday exposures to hand-arm vibration (5 to 1400 Hz, summed over three orthogonal axes of movement) not exceed acceleration values of 2.5 m/s^2 .

Excessive whole-body vibration is clearly linked to low back pain (Wilder, Wasserman, and Wasserman, 2002) and may contribute to gastrointestinal and urinary disorders, although these associations are not well established. ANSI (1979) recommends 8-hour limits for whole-body vibration of 0.3 m/s^2 , for the body's most sensitive frequency range of 4 to 8 Hz. This is about 30 times more intense than the weakest vibration that people can detect (0.01 m/s^2).

Airborne sound can cause detectable body vibration, but this occurs only at very high levels — usually above sound pressure levels of 100 dB (unweighted) (Smith, 2002; Takahashi et al., 2005; Yamada et al., 1983). There is no scientific evidence to suggest that modern wind turbines cause perceptible vibration in homes or that there is an associated health risk.

3.4 Peer-Reviewed Literature Focusing on Wind Turbines, Low-Frequency Sound, and Infrasound

This section addresses the scientific review of the literature that has evaluated wind turbines, the annoyance effect, low frequency sound, and infrasound.

3.4.1 Evaluation of Annoyance and Dose-Response Relationship of Wind Turbine Sound

To date, three studies in Europe have specifically evaluated potential health effects of people living in proximity to wind turbines (Pedersen and Persson Waye, 2004; Pedersen and Persson Waye, 2007; Pedersen et al., 2009). These studies have been primarily in Sweden and the Netherlands. Customarily, an eligible group of people are selected for possible participation in the study based on their location with respect to a wind turbine. Control groups have not been included in any of these reports.

In an article published in August 2009, investigators reported the results of their evaluation of 725 people in the Netherlands, who lived in the vicinity of wind turbines (Pedersen et al., 2009). The potential study population consisted of approximately 70,000 people living within 2.5 kilometers of a wind turbine at selected sites in the Netherlands. The objective of the study was to (1) assess the relationship between wind turbine sound levels at dwellings and the probability of noise annoyance, taking into account possible moderating factors, and (2) explore the possibility of generalizing a dose response relationship for wind turbine noise by comparing the results of the study with previous studies in Sweden.

Noise impact was quantified based on the relationship between the sound level (dose) and response with the latter measured as the proportion of people annoyed or highly annoyed by sound. Prior to this study, dose response curves had been modeled for wind turbines. Previous studies have noted different degrees of relationships between wind turbine sound levels and annoyance (Wolsink et al., 1993; Pedersen and Persson Waye, 2004; Pedersen and Persson Waye, 2007).

Subjective responses were obtained through a survey. The calculation of the sound levels (dose) in Sweden and the Netherlands were similar. A dose response relationship was observed between calculated A-weighted sound pressure levels and annoyance. Sounds from wind turbines were found to be more annoying than several other environmental sources at comparable sound levels. A strong correlation was also noted between noise annoyance and negative opinion of the impact of wind turbines on the landscape, a finding in earlier studies as well. The dominant quality of the sound was a swishing, the quality previously found to be the most annoying type.

The authors concluded that this study could be used for calculating a dose response curve for wind turbine sound and annoyance. The study results suggest that wind turbine sound is easily perceived and, compared with sound from other sources, is annoying to a small percentage of people (5 percent at 35 to 40 dBA).

In this study, the proportion of people who reported being annoyed by wind turbine noise was similar to merged data from two previous Swedish studies (Pederson and Persson

Waye, 2004; Pedersen and Persson Waye, 2007). About 5 percent of respondents were annoyed at noise levels between 35 to 40 dBA and 18 percent at 40 to 45 dBA.

Pedersen et al. also reported significant dose responses between wind turbine sound and self-reported annoyance (Pedersen and Persson Waye, 2004). High exposed individuals responded more (78 percent) than low exposed individuals (60 percent), which suggests that bias could have played a role in the final results.

An analysis of two cross-sectional socio-acoustic studies—one that addressed flat landscapes in mainly rural settings (Pedersen and Persson Waye, 2004) and another in different terrains (complex or flat) and different levels of urbanization (rural or suburban) (Pedersen and Persson Waye, 2007)—was performed (Pedersen, 2008). Approximately 10 percent of over 1000 people surveyed via a questionnaire reported being very annoyed at sound levels of 40 dB and greater. Attitude toward the visual impact of the wind turbines had the same effect on annoyance. Response to wind turbine noise was significantly related to exposure expressed as A-weighted sound pressure levels dB. Among those who could hear wind turbine sound, annoyance with wind turbine noise was highly correlated to the sound characteristics: swishing, whistling, resounding and pulsating/throbbing (Pedersen, 2008).

A similar study in Sweden evaluated 754 people living near one of seven sites where wind turbine power was greater than 500 kilowatt (kW) (Pedersen and Persson Waye, 2007). Annoyance was correlated with sound level and also with negative attitude toward the visual impact of the wind turbines. Note that none of these studies included a control group. Earlier field studies performed among people living in the vicinity of wind turbines showed a correlation between sound pressure level and noise annoyance; however, annoyance was also influenced by visual factors and attitudes toward the impact of the wind turbines on the landscape. Noise annoyance was noted at lower sound pressure levels than annoyance from traffic noise. Although some people may be affected by annoyance, there is no scientific evidence that noise at levels created by wind turbines could cause health problems (Pedersen and Högskolan, 2003).

3.4.2 Annoyance

A feeling described as “annoyance” can be associated with acoustic factors such as wind turbine noise. There is considerable variability, however, in how people become “annoyed” by environmental factors such as road construction and aviation noise, among others (Leventhall, 2004). Annoyance is clearly a subjective effect that will vary among people and circumstances. In extreme cases, sleep disturbance may occur. Wind speed at the hub height of a wind turbine at night may be up to twice as high as during the day and may lead to annoyance from the amplitude modulated sound of the wind turbine (van den Berg, 2003). However, in a study of 16 sites in 3 European countries, only a weak correlation was noted between sound pressure level and noise annoyance from wind turbines (Pedersen and Högskolan, 2003).

In a detailed comparison of the role of noise sensitivity in response to environmental noise around international airports in Sydney, London, and Amsterdam, it was shown that noise sensitivity increases one’s perception of annoyance independently of the level of noise exposure (van Kamp et al., 2004).

In a Swedish study, 84 out of 1,095 people living in the vicinity of a wind turbine in 12 geographical areas reported being fairly or very annoyed by wind turbines (Pedersen, 2008). It is important to note that no differences were reported among people who were "annoyed" in contrast to those who were not annoyed with respect to hearing impairment, diabetes, or cardiovascular disease. An earlier study in Sweden showed that the proportion of people "annoyed" by wind turbine sound is higher than for other sources of environmental noise at the same decibel level (Pedersen and Persson Waye, 2004).

3.4.3 Low-Frequency Sound and Infrasound

No scientific studies have specifically evaluated health effects from exposure to low frequency sound from wind turbines. Natural sources of low frequency sound include wind, rivers, and waterfalls in both audible and non-audible frequencies. Other sources include road traffic, aircraft, and industrial machinery. The most common source of infrasound is vehicular (National Toxicology Program, 2001).

Infrasound at a frequency of 20 Hz (the upper limit of infrasound) is not detectable at levels lower than 79 dB (Leventhall et al., 2003). Infrasound at 145 dB at 20 Hz and at 165 dB at 2 Hz can stimulate the auditory system and cause severe pain (Leventhall, 2006). These noise levels are substantially higher than any noise generated by wind turbines. The U.S. Food and Drug Administration (FDA) has approved the use of infrasound for therapeutic massage at 70 dB in the 8 to 14 Hz range (National Toxicology Program, 2001). In light of the FDA approval for this type of therapeutic use of infrasound, it is reasonable to conclude that exposure to infrasound in the 70 dB range is safe. According to a report of the National Research Council (NRC), low frequency sound is a concern for older wind turbines but not the modern type (National Research Council, 2007).

Results

This section discusses the results of the analysis presented in Section 3. Potential effects from infrasound, low frequency sound, and the fluctuating aerodynamic "swish" from turbine blades are examined. Proposed hypotheses between wind turbine sound and physiological effects in the form of vibroacoustic disease, "wind turbine syndrome," and visceral vibratory vestibular disturbance are discussed.

4.1 Infrasound, Low-Frequency Sound, and Annoyance

Sound levels from wind turbines pose no risk of hearing loss or any other nonauditory effect. In fact, a recent review concluded that "Occupational noise-induced hearing damage does not occur below levels of 85 dBA." (Ising and Kruppa, 2004) The levels of sound associated with wind turbine operations are considerably lower than industry levels associated with noise induced hearing loss.

However, some people attribute certain health problems to wind turbine exposure. To make sense of these assertions, one must consider not only the sound but the complex factors that may lead to the perception of "annoyance." Most health complaints regarding wind turbines have centered on sound as the cause. There are two types of sounds from wind turbines: mechanical sound, which originates from the gearbox and control mechanisms, and the more dominant aerodynamical sound, which is present at all frequencies from the infrasound range over low frequency sound to the normal audible range.

Infrasound from natural sources (for example, ocean waves and wind) surrounds us and is below the audible threshold. The infrasound emitted from wind turbines is at a level of 50 to 70 dB, sometimes higher, but well below the audible threshold. There is a consensus among acoustic experts that the infrasound from wind turbines is of no consequence to health. One particular problem with many of these assertions about infrasound is that is that the term is often misused when the concerning sound is actually low frequency sound, not infrasound.

Under many conditions, low frequency sound below about 40 Hz cannot be distinguished from environmental background sound from the wind itself. Perceptible (meaning above both the background sound and the hearing threshold), low frequency sound can be produced by wind turbines under conditions of unusually turbulent wind conditions, but the actual sound level depends on the distance of the listener from the turbine, as the sound attenuates (falls off) with distance. The higher the frequency, the greater the sound attenuates with distance — Appendix D provides more information on the propagation of sound. The low frequency sound emitted by spinning wind turbines could possibly be annoying to some when winds are unusually turbulent, but there is no evidence that this level of sound could be harmful to health. If so, city dwelling would be impossible due to the similar levels of ambient sound levels normally present in urban environments. Nevertheless, a small number of people find city sound levels stressful.

It is not usually the low frequency nonfluctuating sound component, however, that provokes complaints about wind turbine sound. The fluctuating aerodynamic sound (swish) in the 500 to 1,000 Hz range occurs from the wind turbine blades disturbing the air, modulated as the blades rotate which changes the sound dispersion characteristics in an audible manner. This fluctuating aerodynamic sound is the cause of most sound complaints regarding wind turbines, as it is harder to become accustomed to fluctuating sound than to sound that does not fluctuate. However, this fluctuation does not always occur and a UK study showed that it had been a problem in only four out of 130 UK wind farms, and had been resolved in three of those (Moorhouse et al., 2007).

4.1.1 Infrasound and Low-Frequency Sound

Infrasound occurs at frequencies less than 20 Hz. At low and inaudible levels, infrasound has been suggested as a cause of “wind turbine syndrome” and vibroacoustic disease (VAD)—refer to Section 4.2.1 for more information on VAD. For infrasound to be heard, high sound levels are necessary (see Section 3, Table 3-2). There is little risk of short term acute exposure to high levels of infrasound. In experiments related to the Apollo space program, subjects were exposed to between 120 and 140 dB without known harmful effects. High level infrasound is less harmful than the same high levels of sound in the normal audible frequency range.

High levels of low frequency sound can excite body vibrations (Leventhall, 2003). Early attention to low frequency sound was directed to the U.S. space program, studies from which suggested that 24-hour exposures to 120 to 130 dB are tolerable below 20 Hz, the upper limit of infrasound. Modern wind turbines produce sound that is assessed as infrasound at typical levels of 50 to 70 dB, below the hearing threshold at those frequencies (Jakobsen, 2004). Jakobsen concluded that infrasound from wind turbines does not present a health concern. Fluctuations of wind turbine sound, most notably the swish-swish sounds, are in the frequency range of 500 to 1,000 Hz, which is neither low frequency sound nor infrasound. The predominant sound from wind turbines, however, is often mischaracterized as infrasound and low frequency sound. Levels of infrasound near modern-scale wind farms are in general not perceptible to people. In the human body, the beat of the heart is at 1 to 2 Hz. Higher-frequency heart sounds measured externally to the body are in the low frequency range (27 to 35 dB at 20 to 40 Hz), although the strongest frequency is that of the heartbeat (Sakai, Feigen, and Luisada, 1971). Lung sounds, measured externally to the body are in the range of 5 to 35 dB at 150 to 600 Hz (Fiz et al., 2008). Schust (2004) has given a comprehensive review of the effects of high level low frequency sound, up to 100 Hz.

4.1.2 Annoyance

Annoyance is a broad topic on which volumes have been written. Annoyance can be caused by constant amplitude and amplitude modulated sounds containing rumble (Bradley, 1994).

As the level of sound rises, an increasing number of those who hear it may become distressed, until eventually nearly everybody is affected, although to different degrees. This is a clear and easily understood process. However, what is not so clearly understood is that when the level of the sound reduces, so that very few people are troubled by it, there remain a small number who may be adversely affected. This occurs at all frequencies, although there seems to be more subjective variability at the lower frequencies. The effect of low

frequency sound on annoyance has recently been reviewed (Leventhall, 2004). The standard deviation of the hearing threshold is approximately 6 dB at low frequencies (Kurakata and Mizunami, 2008), so that about 2.5 percent of the population will have 12 dB more sensitive hearing than the average person. However, hearing sensitivity alone does not appear to be the deciding factor with respect to annoyance. For example, the same type of sound may elicit different reactions among people: one person might say "Yes, I can hear the sound, but it does not bother me," while another may say, "The sound is impossible, it is ruining my life." There is no evidence of harmful effects from the low levels of sound from wind turbines, as experienced by people in their homes. Studies have shown that peoples' attitudes toward wind turbines may affect the level of annoyance that they report (Pedersen et al., 2009).

Some authors emphasize the psychological effects of sounds (Kalveram, 2000; Kalveram et al., 1999). In an evaluation of 25 people exposed to five different wind turbine sounds at 40 dB, ratings of "annoyance" were different among different types of wind turbine noise (Persson Waye and Öhrström, 2002).

None of the psycho-acoustic parameters could explain the difference in annoyance responses. Another study of more than 2,000 people suggested that personality traits play a role in the perception of annoyance to environmental issues such as sound (Persson et al., 2007). Annoyance originates from acoustical signals that are not compatible with, or that disturb, psychological functions, in particular, disturbance of current activities. Kalveram et al. (1999) suggest that the main function of noise annoyance is as a warning that fitness may be affected but that it causes little or no physiological effect. Protracted annoyance, however, may undermine coping and progress to stress related effects. It appears that this is the main mechanism for effects on the health of a small number of people from prolonged exposure to low levels of noise.

The main health effect of noise stress is disturbed sleep, which may lead to other consequences. Work with low frequencies has shown that an audible low frequency sound does not normally become objectionable until it is 10 to 15 dB above hearing threshold (Inukai et al., 2000; Yamada, 1980). An exception is when a listener has developed hostility to the noise source, so that annoyance commences at a lower level.

There is no evidence that sound at the levels from wind turbines as heard in residences will cause direct physiological effects. A small number of sensitive people, however, may be stressed by the sound and suffer sleep disturbances.

4.1.3 Other Aspects of Annoyance

Some people have concluded that they have health problems caused directly by wind turbines. In order to make sense of these complaints, we must consider not only the sound, but the complex factors culminating in annoyance.

There is a large body of medical literature on stress and psychoacoustics. Three factors that may be pertinent to a short discussion of wind turbine annoyance effects are the nocebo effect, sensory integration dysfunction and somatoform disorders.

4.1.4 Nocebo Effect

The nocebo effect is an adverse outcome, a worsening of mental or physical health, based on fear or belief in adverse effects. This is the opposite of the well known placebo effect, where belief in positive effects of an intervention may produce positive results (Spiegel, 1997). Several factors appear to be associated with the nocebo phenomenon: expectations of adverse effects; conditioning from prior experiences; certain psychological characteristics such as anxiety, depression and the tendency to somatize (express psychological factors as physical symptoms; see below), and situational and contextual factors. A large range of reactions include hypervagotonia, manifested by idioventricular heart rhythm (a slow heart rate of 20 to 50 beats per minute resulting from an intrinsic pacemaker within the ventricles which takes over when normal sinoatrial node regulation is lost), drowsiness, nausea, fatigue, insomnia, headache, weakness, dizziness, gastrointestinal (GI) complaints and difficulty concentrating (Sadock and Sadock, 2005, p.2425). This array of symptoms is similar to the so-called "wind turbine syndrome" coined by Pierpont (2009, pre-publication draft). Yet these are all common symptoms in the general population and no evidence has been presented that such symptoms are more common in persons living near wind turbines. Nevertheless, the large volume of media coverage devoted to alleged adverse health effects of wind turbines understandably creates an anticipatory fear in some that they will experience adverse effects from wind turbines. Every person is suggestible to some degree. The resulting stress, fear, and hypervigilance may exacerbate or even create problems which would not otherwise exist. In this way, anti-wind farm activists may be creating with their publicity some of the problems that they describe.

4.1.5 Somatoform Disorders

There are seven somatoform disorders in the Fourth Edition of *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV-TR) (American Psychiatric Association, 2000). Somatoform disorders are physical symptoms which reflect psychological states rather than arising from physical causes. One common somatoform disorder, Conversion Disorder, is the unconscious expression of stress and anxiety as one or more physical symptoms (Escobar and Canino, 1989). Common conversion symptoms are sensations of tingling or discomfort, fatigue, poorly localized abdominal pain, headaches, back or neck pain, weakness, loss of balance, hearing and visual abnormalities. The symptoms are not feigned and must be present for at least six months according to DSM-IV-TR and two years according to the International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10) (WHO, 1993). ICD-10 specifies the symptoms as belonging to four groups: (1) Gastrointestinal (abdominal pain, nausea, bloating/gas/, bad taste in mouth/excessive tongue coating, vomiting/regurgitation, frequent/loose bowel movements); (2) Cardiovascular (breathlessness without exertion, chest pains); (3) Genitourinary (frequency or dysuria, unpleasant genital sensations, vaginal discharge), and (4) Skin and Pain (blotchiness or discoloration of the skin, pain in the limbs, extremities or joints, paresthesias). ICD-10 specifies that at least six symptoms must be present in two or more groups.

One feature of somatoform disorders is *somatosensory amplification*, a process in which a person learns to feel body sensations more acutely and may misinterpret the significance of those sensations by equating them with illness (Barsky, 1979). *Sensory integration dysfunction*

describes abnormal sensitivity to any or all sensory stimuli (sound, touch, light, smell, and taste). There is controversy among researchers and clinicians as to whether sensory integration problems exist as an independent entity or as components of a pervasive developmental disorder (Sadock and Sadock, 2005, p. 3135), but their presence can lead to overestimation of the likelihood of being ill (Sadock and Sadock, 2005, p. 1803). Sensory integration dysfunction as such is not listed in the DSM-IV-TR or in the ICD-10.

Day-to-day stressors and adverse life events provide multiple stimuli to which people respond, and that response is often somatic due to catecholamines and activation of the autonomic nervous system. This stress response can become conditioned as memory. There is some evidence that poor coping mechanisms (anger impulsivity, hostility, isolation, lack of confiding in others) are linked to physiological reactivity, which is associated with somatic sensation and amplification (Sadock and Sadock, 2005, p. 1806).

In summary, the similarities of common human stress responses and conversion symptoms to those described as "wind turbine syndrome" are striking. An annoyance factor to wind turbine sounds undoubtedly exists, to which there is a great deal of individual variability. Stress has multiple causes and is additive. Associated stress from annoyance, exacerbated by the rhetoric, fears, and negative publicity generated by the wind turbine controversy, may contribute to the reported symptoms described by some people living near rural wind turbines.

4.2 Infrasound, Low-frequency Sound and Disease

Some reports have suggested a link between low frequency sound from wind turbines and certain adverse health effects. A careful review of these reports, however, leads a critical reviewer to question the validity of the claims for a number of reasons, most notably (1) the level of sound exposure associated with the putative health effects, (2) the lack of diagnostic specificity associated with the health effects reported, and (3) the lack of a control group in the analysis.

4.2.1 Vibroacoustic Disease

Vibroacoustic disease (VAD) in the context of exposure of aircraft engine technicians to sound was defined by Portuguese researchers as a whole-body, multi-system entity, caused by chronic exposure to large pressure amplitude and low frequency (LPALF) sound (Alves-Pereira and Castelo Branco, 2007a; Alves-Pereira and Castelo Branco, 2007b; Alves-Pereira and Castelo Branco, 2007c; Alves-Pereira and Castelo Branco, 2007d). VAD, the primary feature of which is thickening of cardiovascular structures, such as cardiac muscle and blood vessels, was first noted among airplane technicians, military pilots, and disc jockeys (Maschke, 2004; Castelo Branco, 1999). Workers had been exposed to high levels for more than 10 years. There are no epidemiological studies that have evaluated risk of VAD from exposure to infrasound. The likelihood of such a risk, however, is remote in light of the much lower vibration levels in the body itself. Studies of workers with substantially higher exposure levels have not indicated a risk of VAD. VAD has been described as leading from initial respiratory infections, through pericardial thickening to severe and life-threatening illness such as stroke, myocardial infarction, and risk of malignancy (Alves-Pereira and Castelo Branco, 2007a).

4.2.2 High-Frequency Exposure

All of the exposures of subjects for whom the VAD concept was developed, were dominated by higher frequency sounds, a critical point since the frequency range claimed for VAD-inducing sound is much wider than the frequency range of exposures experienced by the aircraft technicians who were diagnosed with VAD (Castelo Branco, 1999). Originally, proponents of the VAD concept had proposed a "greater than 90 dB" criterion for VAD. However, now some claim that VAD will result from exposure to almost any level of infrasound and low frequency sound at any frequency below 500 Hz. This assertion is an extraordinary extrapolation given that the concept of VAD developed from observations that a technician, working around military aircraft on the ground, with engines operating, displayed disorientation (Castelo Branco, 1999). Sound levels near aircraft were very high. In an evaluation of typical engine spectra of carrier based combat aircraft operating on the ground, the spectra peaked at frequencies above 100 Hz with sound levels from 120 to 135 dB close to the aircraft (Smith, 2002). The levels drop considerably, however, into the low frequency region.

There is an enormous decibel difference between the sound exposure of aircraft technicians and the sound exposure of people who live near wind turbines. Animal experiments indicated that exposure levels necessary to cause VAD were 13 weeks of continuous exposure to approximately 100 dB of low frequency sound (Mendes et al., 2007). The exposure levels were at least 50 to 60 dB higher than wind turbine levels in the same frequency region (Hayes, 2006a).

4.2.3 Residential Exposure: A Case Series

Extrapolation of results from sound levels greater than 90 dB and at predominantly higher frequencies (greater than 100 Hz) to a risk of VAD from inaudible wind turbine sound levels of 40 to 50 dB in the infrasound region, is a new hypothesis. One investigator, for example, has claimed that wind turbines in residential areas produce acoustical environments that can lead to the development of VAD in nearby home-dwellers (Alves-Pereira and Castelo Branco, 2007a).

This claim is based on comparison of only two infrasound exposures. The first is for a family which has experienced a range of health problems and which also complained of disturbances from low frequency sound. The second is for a family which lived near four wind turbines, about which they have become anxious (Alves-Pereira and Castelo Branco, 2007a; Alves-Pereira and Castelo Branco, 2007b).

The first family (Family F), was exposed to low levels of infrasound consisting of about 50 dB at 8 Hz and 10 Hz from a grain terminal about 3 kilometers (km) away and additional sources of low frequency sound, including a nearer railway line and road. The second family (Family R) lives in a rural area and was described as exposed to infrasound levels of about 55 dB to 60 dB at 8 Hz to 16 Hz. These exposures are well below the hearing threshold and not uncommon in urban areas. Neither the frequency nor volume of the sound exposures experienced by Families F or R are unusual. Exposure to infrasound (< 20 Hz) did not exceed 50 dB.

4.2.3.1 Family F—Exposure to Low Levels of Infrasound

Family F has a long history of poor health and a 10-year-old boy was diagnosed with VAD due to exposure to infrasound from the grain terminal (Alves-Pereira and Castelo Branco, 2007a; Castelo Branco et al., 2004). However, the infrasound levels are well below hearing threshold and are typical of urban infrasound, which occurs widely and to which many people are exposed.

According to the authors, the main effect of VAD was demonstrated by the 10-year-old boy in the family, as pericardial thickening.³ However, the boy has a history of poor health of unknown etiology (Castelo Branco et al., 2004). Castelo Branco (1999) has defined pericardial thickening as an indicator of VAD and assumes that the presence of pericardial thickening in the boy from Family F must be an effect of VAD, caused by exposure to the low-level, low frequency sound from the grain terminal. This assumption excludes other possible causes of pericardial thickening, including viral infection, tuberculosis, irradiation, hemodialysis, neoplasia with pericardial infiltration, bacterial, fungal, or parasitic infections, inflammation after myocardial infarction, asbestosis, and autoimmune diseases. The authors did not exclude these other possible causes of pericardial thickening.

4.2.3.2 Family R—Proximity to Turbines and Anxiety

Family R, living close to the wind turbines, has low frequency sound exposure similar to that of Family F. The family does not have symptoms of VAD, but it was claimed that "Family R. will also develop VAD should they choose to remain in their home." (Alves-Pereira and Castelo Branco, 2007b). In light of the absence of literature of cohort and case control studies, this bold statement seems to be unsubstantiated by available scientific literature.

4.2.4 Critique

It appears that Families F and R were self-selected complainants. Conclusions derived by Alves-Pereira and Castelo Branco (2007b) have been based only on the poor health and the sound exposure of Family F, using this single exposure as a measure of potential harmful effects for others. There has been no attempt at an epidemiological study.

Alves-Pereira and Castelo Branco claim that exposure at home is more significant than exposure at work because of the longer periods of exposure (Alves-Pereira and Castelo Branco, 2007e). Because an approximate 50 dB difference occurs between the exposure from wind turbines and the exposure that induced VAD (Hayes, 2006a), it will take 10^5 years (100,000 years) for the wind turbine dose to equal that of one year of the higher level sound.

Among published scientific literature, this description of the two families is known as a case series, which are of virtually no value in understanding potential *causal associations* between exposure to a potential hazard (i.e., low frequency sound) and a potential health effect (i.e., vibroacoustic disease). Case reports have value but primarily in generating hypotheses to test in other studies such as large groups of people or in case control studies. The latter type of study can systematically evaluate people with pericardial thickening who live near wind turbines in comparison to people with pericardial thickening who do not live

³ Pericardial thickening is unusual thickening of the protective sac (pericardium) which surrounds the heart. For example, see <http://www.emedicine.com/radio/topic191.htm>.

near wind turbines. Case reports need to be confirmed in larger studies, most notably cohort studies and case-control studies, before definitive cause and effect assertions can be drawn. The reports of the two families do not provide persuasive scientific evidence of a link between wind turbine sound and pericardial thickening.

Wind turbines produce low levels of infrasound and low frequency sound, yet there is no credible scientific evidence that these levels are harmful. If the human body is affected by low, sub-threshold sound levels, a unique and not yet discovered receptor mechanism of extraordinary sensitivity to sound is necessary—a mechanism which can distinguish between the normal, relatively high-level “sound” inherent in the human body⁴ and excitation by external, low-level sound. Essential epidemiological studies of the potential effects of exposure at low sound levels at low frequencies have not been conducted. Until the fuzziness is clarified, and a receptor mechanism revealed, no reliance can be placed on the case reports that the low levels of infrasound and low frequency sound are a cause of vibroacoustic disease.⁵

The attribution of dangerous properties to low levels of infrasound continues unproven, as it has been for the past 40 years. No foundation has been demonstrated for the new hypothesis that exposure to sub-threshold, low levels of infrasound will lead to vibroacoustic disease. Indeed, human evolution has occurred in the presence of natural infrasound.

4.3 Wind Turbine Syndrome

“Wind turbine syndrome” as promoted by Pierpont (2009, pre-publication draft) appears to be based on the following two hypotheses:

1. Low levels of airborne infrasound from wind turbines, at 1 to 2 Hz, directly affect the vestibular system.
2. Low levels of airborne infrasound from wind turbines at 4 to 8 Hz enter the lungs via the mouth and then vibrate the diaphragm, which transmits vibration to the viscera, or internal organs of the body.

The combined effect of these infrasound frequencies sends confusing information to the position and motion detectors of the body, which in turn leads to a range of disturbing symptoms.

4.3.1 Evaluation of Infrasound on the Vestibular System

Consider the first hypothesis. The support for this hypothesis is a report apparently misunderstood to mean that the vestibular system is more sensitive than the cochlea to low levels of both sound and vibration (Todd et al., 2008a). The Todd report is concerned with vibration input to the mastoid area of the skull, and the corresponding detection of these vibrations by the cochlea and vestibular system. The lowest frequency used was 100 Hz,

⁴ Body sounds are often used for diagnosis. For example see Gross, V., A. Dittmar, T. Penzel, F., Schüttler, and P. von Wichert., (2000): “The Relationship between Normal Lung Sounds, Age, and Gender.” *American Journal of Respiratory and Critical Care Medicine*. Volume 162, Number 3: 905 - 909.

⁵ This statement should not be interpreted as a criticism of the work of the VAD Group with aircraft technicians at high noise levels.

considerably higher than the upper limit of the infrasound frequency (20 Hz). The report does not address air-conducted sound or infrasound, which according to Pierpont excites the vestibular system by airborne sound and by skull vibration. This source does not support Pierpont's hypothesis and does not demonstrate the points that she is trying to make.

There is no credible scientific evidence that low levels of wind turbine sound at 1 to 2 Hz will directly affect the vestibular system. In fact, it is likely that the sound will be lost in the natural infrasonic background sound of the body. The second hypothesis is equally unsupported with appropriate scientific investigations. The body is a noisy system at low frequencies. In addition to the beating heart at a frequency of 1 to 2 Hz, the body emits sounds from blood circulation, bowels, stomach, muscle contraction, and other internal sources. Body sounds can be detected externally to the body by the stethoscope.

4.3.2 Evaluation of Infrasound on Internal organs

It is well known that one source of sound may mask the effect of another similar source. If an external sound is detected within the body in the presence of internally generated sounds, the external sound must produce a greater effect in the body than the internal sounds. The skin is very reflective at higher frequencies, although the reflectivity reduces at lower frequencies (Katz, 2000). Investigations at very low frequencies show a reduction of about 30 dB from external to internal sound in the body of a sheep (Peters et al., 1993). These results suggest an attenuation (reduction) of low frequency sound by the body before the low frequency sound reaches the internal organs.

Low-level sounds from outside the body do not cause a high enough excitation within the body to exceed the internal body sounds. Pierpont refers to papers from Takahashi and colleagues on vibration excitation of the head by high levels of external sound (over 100 dB). However, these papers state that response of the head at frequencies below 20 Hz was not measurable due to the masking effect of internal body vibration (Takahashi et al., 2005; Takahashi et al., 1999). When measuring chest resonant vibration caused by external sounds, the internal vibration masks resonance for external sounds below 80 dB excitation level (Leventhall, 2006). Thus, the second hypothesis also fails.

To recruit subjects for her study, Pierpont sent out a general call for anybody believing their health had been adversely affected by wind turbines. She asked respondents to contact her for a telephone interview. The case series results for ten families (37 subjects) are presented in Pierpont (2009, pre-publication draft). Symptoms included sleep disturbance, headache, tinnitus, ear pressure, vertigo, nausea, visual blurring, tachycardia, irritability, concentration, memory, panic attacks, internal pulsation, and quivering. This type of study is known as a case series. A case series is of limited, if any, value in evaluating causal connections between an environmental exposure (in this case, sound) and a designated health effect (so called "wind turbine syndrome"). This particular case series is substantially limited by selection bias, in which people who already think that they have been affected by wind turbines "self select" to participate in the case series. This approach introduces a significant bias in the results, especially in the absence of a control group who do not live in proximity of a wind turbine. The results of this case series are at best hypothesis-generating activities that do not provide support for a causal link between wind turbine sound and so-called "wind turbine syndrome."

However, these so called “wind turbine syndrome” symptoms are not new and have been published previously in the context of “annoyance” to environmental sounds (Nagai et al., 1989; Møller and Lydolf, 2002; Mirowska and Mroz, 2000). The following symptoms are based on the experience of noise sufferers extending over a number of years: distraction, dizziness, eye strain, fatigue, feeling vibration, headache, insomnia, muscle spasm, nausea, nose bleeds, palpitations, pressure in the ears or head, skin burns, stress, and tension (Leventhall, 2002).

The symptoms are common in cases of extreme and persistent annoyance, leading to stress responses in the affected individual and may also result from severe tinnitus, when there is no external sound. The symptoms are exhibited by a small proportion of sensitive persons and may be alleviated by a course of psychotherapy, aimed at desensitization from the sound (Leventhall et al., 2008). The similarity between the symptoms of noise annoyance and those of “wind turbine syndrome” indicates that this “diagnosis” is not a pathophysiological effect, but is an example of the well-known stress effects of exposure to noise, as displayed by a small proportion of the population. These effects are familiar to environmental noise control officers and other “on the ground” professionals.

“Wind turbine syndrome,” not a recognized medical diagnosis, is essentially reflective of symptoms associated with noise annoyance and is an unnecessary and confusing addition to the vocabulary on noise. This syndrome is not a recognized diagnosis in the medical community. There are no unique symptoms or combinations of symptoms that would lead to a specific pattern of this hypothesized disorder. The collective symptoms in some people exposed to wind turbines are more likely associated with annoyance to low sound levels.

4.4 Visceral Vibratory Vestibular Disturbance

4.4.1 Hypothesis

In addition to case reports of symptoms reported by people who live near wind turbines, Pierpont has proposed a hypothesis that purports to explain how some of these symptoms arise: visceral vibratory vestibular disturbance (VVVD) (Pierpont, 2009, pre-publication draft). VVVD has been described as consisting of vibration associated with low frequencies that enters the body and causes a myriad of symptoms. Pierpont considers VVVD to be the most distinctive feature of a nonspecific set of symptoms that she describes as “wind turbine syndrome.” As the name VVVD implies, wind turbine sound in the 4 to 8 Hz spectral region is hypothesized to cause vibrations in abdominal viscera (e.g., intestines, liver, and kidneys) that in turn send neural signals to the part of the brain that normally receives information from the vestibular labyrinth. These signals hypothetically conflict with signals from the vestibular labyrinth and other sensory inputs (visual, proprioceptive), leading to unpleasant symptoms, including panic. Unpleasant symptoms (especially nausea) can certainly be caused by sensory conflict; this is how scientists explain motion sickness. However, this hypothesis of VVVD is implausible based on knowledge of sensory systems and the energy needed to stimulate them. Whether implausible or not, there are time-tested scientific methods available to evaluate the legitimacy of any hypothesis and at this stage, VVVD as proposed by Pierpont is an untested hypothesis. A case series of 10 families recruited to participate in a study based on certain symptoms would not be considered evidence of causality by research or policy institutions such as the International Agency for Research on

Cancer (IARC) or EPA. As noted earlier in this report, a case series of self-selected patients does not constitute evidence of a causal connection.

4.4.2 Critique

Receptors capable of sensing vibration are located predominantly in the skin and joints. A clinical neurological examination normally includes assessment of vibration sensitivity. It is highly unlikely, however, that airborne sound at comfortable levels could stimulate these receptors, because most of airborne sound energy is reflected away from the body.

Takahashi et al. (2005) used airborne sound to produce chest or abdominal vibration that exceeded ambient body levels. This vibration may or may not have been detectable by the subjects. Takahashi found that levels of 100 dB sound pressure level were required at 20 to 50 Hz (even higher levels would have been required at lower and higher frequencies).

Sounds like this would be considered by most people to be very loud, and are well beyond the levels produced by wind turbines at residential distances. Comparison of the responses to low frequency airborne sound by normal hearing and profoundly deaf persons has shown that deaf subjects can detect sound transmitted through their body only when it is well above the normal hearing threshold (Yamada et al., 1983). For example, at 16 Hz, the deaf persons' average threshold was 128 dB sound pressure level, 40 dB higher than that of the hearing subjects. It has also been shown that, at higher frequencies, the body surface is very reflective of sound (Katz, 2000). Similarly, work on transmission of low frequency sound into the bodies of sheep has shown a loss of about 30 dB (Peters et al., 1993)

The visceral receptors invoked as a mechanism for VVVD have been shown to respond to static gravitational position changes, but not to vibration (that is why they are called graviceptors). If there were vibration-sensitive receptors in the abdominal viscera, they would be constantly barraged by low frequency body sounds such as pulsatile blood flow and bowel sounds, while external sounds would be attenuated by both the impedance mismatch and dissipation of energy in the overlying tissues. Finally, wind turbine sound at realistic distances possesses little, if any, acoustic energy, at 4 to 8 Hz.

It has been hypothesized that the vestibular labyrinth may be "abnormally stimulated" by wind turbine sound (Pierpont, 2009, pre-publication draft). As noted in earlier sections of this report, moderately loud airborne sound, at frequencies up to about 500 Hz, can indeed stimulate not only the cochlea (the hearing organ) but also the otolith organs. This is not abnormal, and there is no evidence in the medical literature that it is in any way unpleasant or harmful. In ordinary life, most of us are exposed for hours every day to sounds louder than those experienced at realistic distances from wind turbines, with no adverse effects. This assertion that the vestibular labyrinth is stimulated at levels below hearing threshold is based on a misunderstanding of research that used bone-conducted vibration rather than airborne sound. Indeed, those who wear bone conduction hearing aids experience constant stimulation of their vestibular systems, in addition to the cochlea, without adverse effects.

4.5 Interpreting Studies and Reports

In light of the unproven hypotheses that have been introduced as reflective of adverse health effects attributed to wind turbines, it can be instructive to review the type of research studies that can be used to determine definitive links between exposure to an environmental

hazard (in this case, sound and vibration emissions from wind turbines) and adverse health effects (the so-called “wind turbine syndrome”).

How do we know, for example, that cigarettes cause lung cancer and that excessive noise causes hearing loss? Almost always, the first indication that an exposure might be harmful comes from the informal observations of doctors who notice a possible correlation between an exposure and a disease, then communicate their findings to colleagues in case reports, or reports of groups of cases (*case series*). These initial observations are usually uncontrolled; that is, there is no comparison of the people who have both exposure and disease to control groups of people who are either non-exposed or disease-free. There is usually no way to be sure that the apparent association is statistically significant (as opposed to simple coincidence), or that there is a causal relationship between the exposure and the disease in question, without control subjects. For these reasons, case reports and case series cannot prove that an exposure is really harmful, but can only help to develop hypotheses that can then be tested in controlled studies (Levine et al., 1994; Genovese, 2004; McLaughlin, 2003).

Once suspicion of harm has been raised, controlled studies (case-control or cohort) are essential to determine whether or not a causal association is likely, and only after multiple independent-controlled studies show consistent results is the association likely to be broadly accepted (IARC, 2006).

Case-control studies compare people with the disease to people without the disease (ensuring as far as possible that the two groups are well-matched with respect to all other variables that might affect the chance of having the disease, such as age, sex, and other exposures known to cause the disease). If the disease group is found to be much more likely to have had the exposure in question, and if multiple types of error and bias can be excluded (Genovese, 2004), a causal link is likely. Multiple case-control studies were necessary before the link between smoking and lung cancer could be proved.

Cohort studies compare people with the exposure to well-matched control subjects who have not had that exposure. If the exposed group proves to be much more likely to have the disease, assuming error and bias can be excluded, a causal link is likely. After multiple cohort studies, it was clear that excessive noise exposure caused hearing loss (McCunney and Meyer, 2007).

In the case of wind turbine noise and its hypothetical relationships to “wind turbine syndrome” and vibroacoustic disease, the weakest type of evidence — case series — is available, from only a single investigator. These reports can do no more than suggest hypotheses for further research. Nevertheless, if additional and independent investigators begin to report adverse health effects in people exposed to wind turbine noise, in excess of those found in unexposed groups, and if some consistent syndrome or set of symptoms emerges, this advice could change. Thus, at this time, “wind turbine syndrome” and VVVD are unproven hypotheses (essentially unproven ideas) that have not been confirmed by appropriate research studies, most notably cohort and case control studies. However, the weakness of the basic hypotheses makes such studies unlikely to proceed.

4.6 Standards for Siting Wind Turbines

4.6.1 Introduction

While the use of large industrial-scale wind turbines is well established in Europe, the development of comparable wind energy facilities in North America is a more recent occurrence. The growth of wind and other renewable energy sources is expected to continue. Opponents of wind energy development argue that the height and setback regulations established in some jurisdictions are too lenient and that the noise limits which are applied to other sources of noise (either industrial or transportation) are not sufficient for wind turbines for a variety of reasons. Therefore, they are concerned that the health and well-being of some residents who live in the vicinity (or close proximity to) of these facilities is threatened. Critics maintain that wind turbine noise may present more than an annoyance to nearby residents especially at night when ambient levels may be low. Consequently, there are those who advocate for a revision of the existing regulations for noise and setback pertaining to the siting of wind installations (Kamperman and James, 2009). Some have indicated their belief that setbacks of more than 1 mile may be necessary. While the primary purpose of this study was to evaluate the potential for adverse health effects rather than develop public policy, the panel does not find that setbacks of 1 mile are warranted.

4.6.2 Noise Regulations and Ordinances

In 1974, EPA published a report that examined the levels of environmental noise necessary to protect public health and welfare (EPA, 1974). Based on the analysis of available scientific data, EPA specified a range of day-night sound levels necessary to protect the public health and welfare from the effects of environmental noise, with a reasonable margin of safety. Rather than establishing standards or regulations, however, EPA simply identified noise levels below which the general public would not be placed at risk from any of the identified effects of noise. Each federal agency has developed its own noise criteria for sources for which they have jurisdiction (i.e., the Federal Aviation Administration regulates aircraft and airport noise, the Federal Highway Administration regulates highway noise, and the Federal Energy Regulatory Commission regulates interstate pipelines (Bastasch, 2005). State and local governments were provided guidance by EPA on how to develop their own noise regulations, but the establishment of appropriate limits was left to local authorities to determine given each community's differing values and land use priorities (EPA, 1975).

4.6.3 Wind Turbine Siting Guidelines

Establishing appropriate noise limits and setback distances for wind turbines has been a concern of many who are interested in wind energy. There are several approaches to regulating noise, from any source, including wind turbines. They can generally be classified as absolute or relative standards or a combination of absolute and relative standards. Absolute standards establish a fixed limit irrespective of existing noise levels. For wind turbines, a single absolute limit may be established regardless of wind speed (i.e., 50 dBA) or different limits may be established for various wind speeds (i.e., 40 dBA at 5 meters per second [m/s] and 45 dBA at 8 m/s). The Ontario Ministry of Environment (2008) wind turbine noise guidelines is an example of fixed limits for each integer wind speed between 4 and 10 meters per second. Relative standards limit the increase over existing levels and may

also establish either an absolute floor or ceiling beyond which the relative increase is not considered. That is, for example, if a relative increase of 10 dBA with a ceiling of 50 dBA is allowed and the existing level is 45 dBA, a level of 55 dBA would not be allowed. Similarly, if a floor of 40 dBA was established and the existing level is 25 dBA, 40 dBA rather than 35 dBA would be allowed. Fixed distance setbacks have also been discussed. Critics of this approach suggest that fixed setbacks do not take into account the number or size of the turbines nor do they consider other potential sources of noise within the project area. It is clear that like many other sources of noise, a uniform regulator approach for wind turbine noise has not been established either domestically or internationally.

A draft report titled *Environmental Noise and Health in the UK*, published for comment in 2009 by the Health Protection Agency (HPA) on behalf of an ad hoc expert group, provides insightful comments on the World Health Organization's noise guidelines (WHO, 1999). The HPA draft report can be viewed at the following address:

http://www.hpa.org.uk/web/HPAwebFile/HPAweb_C/1246433634856

The HPA report states the following:

It is important to bear in mind that the WHO guideline values, like other WHO guidelines, are offered to policymakers as a contribution to policy development. They are not intended as standards in a formal sense but as a possible basis for the development of standards. By way of overall summary, the 1998 NPL report noted [a British report titled Health-Based Noise Assessment Methods – A Review and Feasibility Study (Porter et al., 1998) as quoted in HPA 2009]:

The WHO guidelines represent a consensus view of international expert opinion on the lowest noise levels below which the occurrence rates of particular effects can be assumed to be negligible. Exceedances of the WHO guideline values do not necessarily imply significant noise impact and indeed, it may be that significant impacts do not occur until much higher degrees of noise exposure are reached. The guidelines form a starting point for policy development. However, it will clearly be important to consider the costs and benefits of reducing noise levels and, as in other areas, this should inform the setting of objectives.

(From: HPA, 2009, p. 77)

The HPA report further states the following:

Surveys have shown that about half of the UK population lives in areas where daytime sound levels exceed those recommended in the WHO Community Noise Guidelines. About two-thirds of the population live in areas where the night-time guidelines recommended by WHO are exceeded. (p. 81)

That sleep can be affected by noise is common knowledge. Defining a dose-response curve that describes the relationship between exposure to noise and sleep disturbance has, however, proved surprisingly difficult. Laboratory studies and field studies have generated different results. In part this is due to habituation to noise which, in the field, is common in many people. (p. 82)

Our examination of the evidence relating to the effects of environmental noise on health has demonstrated that this is a rapidly developing area. Any single report will, therefore, need to be revised within a few years. We conclude and recommend that an

independent expert committee to address these issues on a long-term basis be established. (p. 82)

The statements cited above from the HPA and WHO documents address general environmental noise concerns rather than concerns focused solely on wind turbine noise.

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Conclusions

Many countries have turned to wind energy as a key strategy to generate power in an environmentally clean manner. Wind energy enjoys considerable public support, but it has its detractors, who have publicized their concerns that the sounds emitted from wind turbines cause adverse health consequences.

The objective of the panel was to develop an authoritative reference document for the use of legislators, regulators, and citizens simply wanting to make sense of the conflicting information about wind turbine sound. To this end, the panel undertook extensive review, analysis, and discussion of the peer-reviewed literature on wind turbine sound and possible health effects. The varied professional backgrounds of panel members (audiology, acoustics, otolaryngology, occupational and environmental medicine, and public health) were highly advantageous in creating a diversity of informed perspectives. Participants were able to examine issues surrounding health effects and discuss plausible biological effects with considerable combined expertise.

Following review, analysis, and discussion, the panel reached agreement on three key points:

- There is nothing unique about the sounds and vibrations emitted by wind turbines.
- The body of accumulated knowledge about sound and health is substantial.
- The body of accumulated knowledge provides no evidence that the audible or subaudible sounds emitted by wind turbines have any direct adverse physiological effects.

The panel appreciated the complexities involved in the varied human reactions to sound, particularly sounds that modulate in intensity or frequency. Most complaints about wind turbine sound relate to the aerodynamic sound component (the swish sound) produced by the turbine blades. The sound levels are similar to the ambient noise levels in urban environments. A small minority of those exposed report annoyance and stress associated with noise perception.

This report summarizes a number of physical and psychological variables that may influence adverse reactions. In particular, the panel considered "wind turbine syndrome" and vibroacoustic disease, which have been claimed as causes of adverse health effects. The evidence indicates that "wind turbine syndrome" is based on misinterpretation of physiologic data and that the features of the so-called syndrome are merely a subset of annoyance reactions. The evidence for vibroacoustic disease (tissue inflammation and fibrosis associated with sound exposure) is extremely dubious at levels of sound associated with wind turbines.

The panel also considered the quality of epidemiologic evidence required to prove harm. In epidemiology, initial case reports and uncontrolled observations of disease associations

need to be confirmed through controlled studies with case-control or cohort methodology before they can be accepted as reflective of casual connections between wind turbine sound and health effects. In the area of wind turbine health effects, no case-control or cohort studies have been conducted as of this date. Accordingly, allegations of adverse health effects from wind turbines are as yet unproven. Panel members agree that the number and uncontrolled nature of existing case reports of adverse health effects alleged to be associated with wind turbines are insufficient to advocate for funding further studies.

In conclusion:

1. Sound from wind turbines does not pose a risk of hearing loss or any other adverse health effect in humans.
2. Subaudible, low frequency sound and infrasound from wind turbines do not present a risk to human health.
3. Some people may be annoyed at the presence of sound from wind turbines. Annoyance is not a pathological entity.
4. A major cause of concern about wind turbine sound is its fluctuating nature. Some may find this sound annoying, a reaction that depends primarily on personal characteristics as opposed to the intensity of the sound level.

References

- Alves-Pereira, M., and N.A.A. Castelo Branco. 2007a. Public Health and Noise Exposure: The Importance of Low Frequency Noise. *Proceedings of the Inter-Noise 2007 Conference*. Istanbul: Sponsored by the International Institute of Noise Control Engineering (I-INCE) and Organized by the Turkish Acoustical Society. August 28-31, 2007.
- Alves-Pereira, M., and N.A.A. Castelo Branco. 2007b. In-Home Wind Turbine Noise is Conducive to Vibroacoustic Disease. *Proceedings of the Second International Meeting on Wind Turbine Noise*. Lyon, France: September 20-21, 2007. INCE/Europe.
- Alves-Pereira, M., and N.A.A. Castelo Branco. 2007c. The Scientific Arguments Against Vibroacoustic Disease. *Proceedings of the Inter-Noise 2007 Conference*. Istanbul: Sponsored by the International Institute of Noise Control Engineering (I-INCE) and Organized by the Turkish Acoustical Society. August 28-31, 2007.
- Alves-Pereira, M., and N.A.A. Castelo Branco. 2007d. Infrasound and Low Frequency Noise Dose Responses: Contributions. *Proceedings of the Inter-Noise 2007 Conference*. Istanbul: Sponsored by the International Institute of Noise Control Engineering (I-INCE) and Organized by the Turkish Acoustical Society. August 28-31, 2007.
- Alves-Pereira, M., and N.A.A. Castelo Branco. 2007e. Infrasound and low frequency noise dose responses: Contributions. *Proceedings of the Inter-Noise 2007 Conference*, CDROM. Istanbul: Sponsored by the International Institute of Noise Control Engineering (I-INCE) and Organized by the Turkish Acoustical Society. August 28-31, 2007.
- American National Standards Institute (ANSI). 2006. *Guide for the Measurement and Evaluation of Human Exposure to Vibration Transmitted to the Hand*, ANSI S2.70-2006. New York: Acoustical Society of America.
- American National Standards Institute (ANSI). 1979. *Guide for the Evaluation of Human Exposure to Whole-Body Vibration*, ANSI S3.18-1979. New York: Acoustical Society of America.
- American Psychiatric Association. 2000. *Diagnostic and Statistical Manual of Mental Disorders*, 4th Ed. Text rev. Washington DC.
- Babisch, W. 2004. Health Aspects of Extra-Aural Noise Research. *Noise & Health* 6(22): 69-81.
- Babisch, W. 2000. Traffic Noise and Cardiovascular Disease: Epidemiological Review and Synthesis. *Noise & Health* 2(8): 9-32.
- Babisch, W. 1998. Epidemiological Studies of the Cardiovascular Effects of Occupational Noise—A Critical Appraisal. *Noise & Health* 1(1): 24–39.
- Baloh, R.W. and V. Honrubia. 1979. *Clinical Neurophysiology of the Vestibular System*. Philadelphia, Pennsylvania: F. A. Davis Company.

00003866

- Barsky, A.J. 1979. Patients who amplify body symptoms. *Annals of Internal Medicine* 91: 63.
- Bastasch, M. 2005. Regulation of Wind Turbine Noise in the Western U.S. *Proceedings of the 1st International Conference on Wind Turbine Noise: Perspectives for Control*. Berlin. October 17-18, 2005. INCE/Europe.
- Berglund, B., P. Hassmen, and R. F. Job. 1996. Sources and effects of low frequency noise. *Journal of the Acoustical Society of America* 99: 2985-3002
- Berglund, B. and T. Lindvall. 1995. Community Noise. *Archives of the Centre for Sensory Research, Karolinska Institute, Stockholm University Vol 2, Issue 1*.
- Brooks, Thomas F., D. Stuart Pope, and Michael A. Marcolini. 1989. Airfoil self-noise and prediction. L-16528; NAS 1.61:1218; NASA-RP-1218.
http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/19890016302_1989016302.pdf
- Bradley, J. S. 1994. Annoyance Caused by Constant Amplitude and Amplitude Modulated Sounds Containing Rumble. *Noise Control Engineering Journal* 42: 203-208.
- Castelo Branco, N.A.A. 1999. The Clinical Stages of Vibroacoustic Disease. *Aviation, Space and Environmental Medicine* 70 (3 II Suppl.): A32-A39.
- Castelo Branco, N.A.A., A. Araujo, J. Jonaz de Melo, and M. Alves-Pereira. 2004. Vibroacoustic Disease in a Ten Year Old Male. *Proceedings of the Inter-Noise 2004 Conference*. Prague: Czech Acoustical Society and the International Institute of Noise Control Engineering
- Escobar, J, and G. Canino. 1989. Unexplained physical complaints: Psychopathology and epidemiological correlates. *British Journal of Psychiatry* 154 [Suppl 4]: 24.
- Fernandez, C., and J.M. Goldberg. 1976. Physiology of Peripheral Neurons Innervating Otolith Organs of the Squirrel Monkey. III: Response dynamics. *Journal of Neurophysiology* 39: 996.
- Fiz, J. A., J. Gnitecki, S.S. Kraman, H. Pasterkamp and G.R. Wodicka. 2008. Effect of Body Position on Lung Sounds in Healthy Young Men. *Chest* 133 (3): 729-736.
- Genovese E. 2004. Evidence-based medicine: What does it mean? Why do we care? In *Occupational Medicine Practice Guidelines*, ed Glass LS, American College of Occupational and Environmental Medicine, OEM Press, Beverly Farms, MA.
- Global Wind Energy Council. 2009. Global Wind 2008 Report.
<http://www.gwec.net/fileadmin/documents/Publications/Global%20Wind%202008%20Report.pdf>.
- Gross, V., A. Dittmar, T. Penzel, F. Schüttler, and P. von Wichert. 2000. The Relationship Between Normal Lung Sounds, Age, and Gender. *American Journal of Respiratory and Critical Care Medicine*. 162 (3): 905 - 909.
- Hayes, M. 2006a. Low Frequency and Infrasound Noise Emissions from Wind Farms and the Potential for Vibroacoustic Disease. *Proceedings of the 12th International Meeting on Low Frequency Noise and Vibration and Its Control*. Bristol: Journal of Low Frequency Noise, Vibration and its Control, INCE/Europe, and EAA.

- Hayes, M. 2006b. The Measurement of Low Frequency Noise at Three UK Wind Farms. URN No.: 06/1412
<http://webarchive.nationalarchives.gov.uk/+http://www.berr.gov.uk/whatwedo/energy/sources/renewables/explained/wind/onshore-offshore/page31267.html>.
- Health Protection Agency (HPA). 2009. *Environmental Noise and Health in the UK*. Dr. Andy Moorhouse, Ed.
http://www.hpa.org.uk/web/HPAwebFile/HPAweb_C/1246433634856.
- IEC. 1994. 60050-801:1994 International Electrotechnical Vocabulary - Chapter 801: Acoustics and electroacoustics.
- International Agency for Research on Cancer. 2006. IARC monographs on the evaluation of carcinogenic risk to humans: Preamble. World Health Organization, International Agency for Research on Cancer: Lyon, France.
- Inukai, Y., N. Nakamura, and H. Taya. 2000. Unpleasantness and Acceptable Limits of Low Frequency Sound. *Journal of Low-frequency Noise and Vibration* 19: 135-140.
- Ising, H. and B. Kruppa. 2004. Health Effects Caused by Noise: Evidence in the Literature from the Past 25 Years. *Noise and Health* 6 (23): 5-13.
- International Standards Organization (ISO). 2003. ISO 226. Acoustics – Normal equal-loudness contours.
- Jakobsen, J. 2004. Infrasound Emission from Wind Turbines. *Proceedings of the 11th International Meeting on Low Frequency Noise and Vibration and its Control*. Maastricht: MultiScience Publishing Company.
- Kalveram, K. T. 2000. How Acoustical Noise Can Cause Physiological and Psychological Reactions. *Proceedings of the 5th International Symposium of Transport Noise and Vibration*. St. Petersburg, Russia: East European Acoustical Society.
- Kalveram, K Th, Dassow, J & Vogt, J (1999) How information about the source influences noise annoyance. *Proceedings of the 137th meeting of the Acoustical Society of America*. Seattle, Washington: Acoustical Society of America.
- Kamperman G.W. and R. R. James. 2009. Guidelines for selecting wind turbine sites. *Sound and Vibration*: 8-12. July. <http://www.sandv.com/home.htm>.
- Kamperman, G. W. and R. R. James. 2008. Simple Guidelines for Siting Wind Turbines to Prevent Health Risks. *Proceedings NoiseCon 2008*. Dearborn, Michigan: Institute of Noise Control Engineering.
- Katz, B. 2000. Acoustic Absorption Coefficient of Human Hair and Skin within the Audible Frequency Range. *JASA* 108. pp. 2238-2242.
- Kryter K.D. 1980. Physiological Acoustics and Health. *Journal of the Acoustical Society of America* 68: 10-14.

- Kurakata, K., and T. Mizunami. 2008. The statistical distribution of normal hearing thresholds for low frequency tones. *Journal of Low Frequency Noise, Vibration and Active Control* 27: 97-104.
- Leventhall, H.G. 2006. Somatic Responses to Low Frequency Noise. *Proceedings of the 12th International Meeting: Low Frequency Noise and Vibration and its Control*. Bristol: Journal of Low Frequency Noise, Vibration and its Control, INCE/Europe, and EAA.
- Leventhall, H.G. 2004. Low Frequency Noise and Annoyance. *Noise and Health* 6 923: 59-72.
- Leventhall, H.G. 2002. 35 Years of Low Frequency Noise – Stephens Medal Lecture. *Proceedings of Institute of Acoustics*. Stratford, UK: Institute of Acoustics.
- Leventhall, H. G., S. Benton, and P. Pelmear. 2003. *A Review of Published Research on Low Frequency Noise and its Effects*.
<http://www.defra.gov.uk/environment/noise/research/lowfrequency/pdf/lowfrequencynoise.pdf>. Accessed 2003.
- Leventhall, H. G., S. Benton, and D. Robertson. 2008. Coping Strategies for Low Frequency Noise. *Journal of Low Frequency Noise and Vibration* 27: 35-52.
- Levine M, Walter S, Lee H, Haines T, Holbrook Am Moyer V. 1994. How to use an article about harm. *Journal of the American Medical Association* 271: 1615-1619.
- Maschke C. 2004. Introduction to the special issue of low frequency noise. *Noise and Health* 6: 1-2.
- McCunney, R.J. and J. Meyer. 2007. Occupational Exposure to Noise. *Environmental and Occupational Medicine, 4th Edition*. W. M. Rom, ed. Baltimore: Lippincott Williams and Wilkins. pp. 1295-1238.
- McLaughlin J.K. 2003. Epidemiology and Biostatistics. McCunney R.J. (ed) *A Practical Approach to Occupational and Environmental Medicine*. Baltimore.
- Mendes, J., J. Martins dos Santos, P. Oliveira, J. da Fonseca, A. Aguas, and N.A.A. Castelo Branco. 2007. Low frequency noise effects on the periodontium of the Wistar rat - a light microscopy study. *European Journal of Anatomy* 11 (1): 27-30
- Mirowska, M., and E. Mroz. 2000. Effect of low frequency noise at low levels on human health in light of questionnaire investigation. *Proceedings of the Inter-Noise 2000 Conference*. 5: 2809 - 2812.
- Mittelstaedt, H. 1996. Somatic graviception. *Biological Psychology* 42: 53-74.
- Møller, H., and M. Lydolf. 2002. A questionnaire survey of complaints of infrasound and low frequency noise. *Journal of Low Frequency Noise and Vibration* 21: 53-65.
- Moorhouse, A., M. Hayes, S. von Hunerbein, B. Piper, and M. Adams. 2007. Research into Aerodynamic Modulation of Wind Turbine Noise. *Report: Department of Business Enterprise and Regulatory Reform*. www.berr.gov.uk/files/file40570.pdf.
- Nagai, N., M. Matsumoto, Y. Yamsumi, T. Shiraishi, K. Nishimura, K. Matsumoto, K. Myashita, and S. Takeda. 1989. Process and emergence of the effects of infrasonic

- and low frequency noise on inhabitants. *Journal of Low Frequency Noise and Vibration* 8: 87-89.
- National Institute for Occupational Safety and Health (NIOSH). 1998. Criteria for a Recommended Standard: Occupational Noise Exposure. NIOSH, Cincinnati OH.
- National Research Council (NRC). 2007. Environmental Impacts of Wind-Energy Projects NRC, Washington, DC.
- National Toxicology Program (NTP). National Institute of Environmental Health Sciences (NIEHS). 2001. Infrasound: brief review of the toxicological literature. Prepared in part by Integrated Laboratory systems (NIEHS contract N01-E3 -65402 (Haneke K.E. and B.C. Carson, authors).
- New York Department of Environmental Conservation. 2001. Assessing and Mitigating Noise Impacts. Available at http://www.dec.ny.gov/docs/permits_ej_operations_pdf/noise2000.pdf.
- Occupational Safety and Health Administration (OSHA). 1983. Occupational Noise Exposure: Hearing Conservation Amendment; Final Rule. Federal Register 48 (46): 9738-9784.
- Oerlemans, S. and G. Schepers. 2009. Prediction of wind turbine noise directivity and swish. *Proceedings of the 3rd International Conference on Wind Turbine Noise*. Aalborg, Denmark. June 17-19, 2009. INCE/Europe.
- Ontario Ministry of Environment. 2008. Noise Guidelines for Wind Farms. Interpretation for Applying MOE NPC Publications to Wind Power Generation Facilities. <http://www.ene.gov.on.ca/publications/4709e.pdf>
- Pearsons K.S., R.L. Bennett, and S. Fidell. 1977. Speech levels in various noise environments. Report No. EPA-600/1-77-025. Washington DC, Environmental Protection Agency, 1977.
- Pedersen, E., R. Bakker, J. Bouma, and F. van den Berg. 2009. Response to noise from modern wind farms in The Netherlands. *Journal of the Acoustical Society of America* August 126: 634-643
- Pedersen, and H. Högskolan. 2003. *Noise Annoyance from Wind Turbines*. Report 5308. Swedish Environmental Protection Agency.
- Pedersen, E. and K. Persson Waye. 2008. Wind turbines-low level noise sources interfering with restoration. *Environmental Research Letters* 3: 1-5
- Pedersen, E. and K. Persson Waye. 2007. Wind turbine noise, annoyance and self-reported health and wellbeing in different living environments, *Occupational and Environmental Medicine* 64: 480-486.
- Pedersen, E. and K. Persson Waye. 2004. Perception and annoyance due to wind turbine noise: A dose-response relationship, *Journal of the Acoustical Society of America* 116: 3460-3470.

00003870

- Pedersen, E., L. R.-M. Hallberg, and K. Persson Waye. 2007. Living in the vicinity of wind turbines—A grounded theory study. *Qualitative Research in Psychology* 4: 49–63.
- Pedersen, T. H. 2008. Low frequency noise from large Wind Turbines - A procedure for evaluation of the audibility for low frequency sound and a literature study. *DELTA Report EP- 06*.
- Persson Waye, K. 2004. Effects of low frequency noise on sleep. *Noise and Health* 6 (23): 87-91.
- Persson Waye, K. and E. Öhrström 2002. Psycho-acoustic characters of relevance for annoyance of wind turbine noise. *J. Sound & Vibration* 250 (1): 65-73.
- Persson R. M. Albin, J. Ardö, J. Björk, and K. Jakobsson. 2007. Trait anxiety and modeled exposure determinants of self reported annoyance to sound, air pollution and other environmental factors in the home. *International Archives of Occupational and Environmental Health* 18: 179-191
- Peters, A. J. M., R.M. Abrams, K.J. Gerhardt, and S.K. Griffiths. 1993. Transmission of airborne sound from 50 to 20,000 Hz into the abdomen of sheep. *Journal of Low Frequency Noise and Vibration* 12: 16-24.
- Pierpont, N. 2009, pre-publication draft. *Wind Turbine Syndrome: a report on a natural experiment*. <http://www.windturbinesyndrome.com/wp-content/uploads/2009/03/ms-ready-for-posting-on-wtscom-3-7-09.pdf>.
- Porter, N.D., I.H. Flindell, and B.F. Berry. 1998. Health-Based Noise Assessment Methods—A Review and Feasibility Study. NPL Report CMAM 16.
- Sadock, B. J., and V.A. Sadock, Eds. 2005. *Kaplan & Sadock's Comprehensive Textbook of Psychiatry*, 8th Edition. Philadelphia, PA: Lippincott Williams & Wilkins.
- Sakai, A. L.P. Feigen and A.A. Luisada. 1971. Frequency distribution of the heart sounds in normal man. *Cardiovascular Research* 5 (3): 358-363.
- Sasser, S.M., R.W. Sattin, R.C. Hunt, and J. Krohmer. 2006. Blast lung injury. *Prehospital Emergency Care* 10: 165-72.
- Schust, M. 2004. Effects of low frequency noise up to 100 Hz. *Noise & Health* 6 (23): 73-85.
- Smith, S.D. 2002. Characterizing the effect of airborne vibration on human body vibration response. *Aviation, Space and Environmental Medicine* 73: 36 - 45.
- Spiegel, H. 1997. 1997. Nocebo: The power of suggestibility. *Preventive Medicine* 26: 616.
- Suter, AH. 1991. Noise and its Effects. Report to the Administrative Conference of the United States. <http://www.nonoise.org/library/suter/suter.htm>.
- Takahashi, Y., K. Kanada, Y. Yonekawa, and N. Harada. 2005. A study on the relationship between subjective unpleasantness and body surface vibrations induced by high-level low-frequency pure tones. *Industrial Health* 43: 580-587.
- Takahashi, Y., Y. Yonekawa, K. Kanada, and S. Maeda. 1999. A pilot study on human body vibration induced by low frequency noise. *Industrial Health* 37: 28-35.

- Todd, N., S.M. Rosengren, and J.G. Colebatch. 2008a. Tuning and sensitivity of the human vestibular system to low frequency vibration. *Neuroscience Letters* 444: 36-41.
- Todd, N.P., S.M. Rosengren, and J.G. Colebatch. 2008b. A source analysis of short-latency evoked potentials produced by air- and bone-conducted sound. *Journal of Clinical Neurophysiology* 119: 1881-94.
- Truax, Barry, ed. 1999. Handbook for Acoustic Ecology, Second Edition. Originally published by the World Soundscape Project, Simon Fraser University, and ARC Publications, 1978
- U.S. Environmental Protection Agency (EPA). 1974. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*. EPA/ONAC 550/9-74-004, March 1974.
<http://www.nonoise.org/library/levels/levels.htm>.
- U.S. Environmental Protection Agency (EPA). 1975. Model Noise Control Ordinance.
<http://www.nonoise.org/epa/Roll16/roll16doc6.pdf>.
- van den Berg, G. P. 2004: Do Wind Turbines produce significant low frequency sound levels? *Proc 11th International Meeting on Low Frequency Noise and Vibration and its Control, Maastricht August 2004*, 367-376.
- van den Berg, G. P. 2003. Effects of the wind profile at night on wind turbine noise. *Journal of Sound and Vibration*. <http://www.nowap.co.uk/docs/windnoise.pdf>.
- Van Dijk F.J.H., J.H. Ettema, and R.L. Zielhuis. 1987. Non-auditory effects of noise: VII. Evaluation, conclusions, and recommendations. *International Archives of Occupational and Environmental Health* 59: 147 – 152.
- van Kamp, M. Haines, J. Hatfield, R.F. Job, S.A. Stanfield and R.K. Stellato. 2004. The role of noise sensitivity in the noise response relation: A comparison of three international airport studies. *Journal of the Acoustical Society of America* 116: 3471-79.
- Webster, J.C. 1978. Speech interference aspects of noise. In *Noise and Audiology*, ed. Lipscomb DL, Baltimore: University Park Press.
- Wilder D.G., D.E. Wasserman, and J. Wasserman. 2002. Occupational vibration exposure. In *Physical and Biological Hazards of the Workplace*, ed. Wald PH, Stave GM. John Wiley and Sons, New York.
- Wolsink, M., M. Sprengers, A. Keuper, T.H. Pedersen, and C.A. Westra. 1993. Annoyance from wind turbine noise on sixteen sites in three countries. *Proceedings of the European Community Wind Energy Conference*. Lübeck, Travemünde. 273-276.
- World Health Organization (WHO). 1999. Guidelines for Community Noise (edited by B. Berglund, T. Lindvall, D. Schwela, K-T. Goh). The World Health Organization, Geneva, Switzerland. ISBN: 9971: 9971-88-770-3
<http://whqlibdoc.who.int/hq/1999/a68672.pdf>.

00003872

- World Health Organization (WHO). 1993. International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10), *Classification of Mental and Behavioural Disorders*. Geneva.
- Yamada, S., 1980. Hearing of low frequency sound and influence on the body. Conference on Low Frequency Noise and Hearing. Aalborg, Denmark. 95-102. (Eds. H Møller and P Rubak).
- Yamada, S., M. Ikuji, S. Fujikata, T. Watanabe, and T. Kosaka. 1983. Body sensations of low frequency noise of ordinary persons and profoundly deaf persons. *Journal of Low Frequency Noise and Vibration* 2: 32-36.
- Young, E.D., C. Fernandez, and J.M. Goldberg. 1977. Responses of squirrel monkey vestibular neurons to audio-frequency sound and head vibration. *Acta Otolaryngol* 84: 352-60.

Additional References

- Alberts, D. 2006. Primer for Addressing Wind Turbine Noise.
<http://www.maine.gov/doc/mfs/windpower/pubs/pdf/AddressingWindTurbineNoise.pdf>.
- American National Standards Institute. 1996. *American National Standard Specification for Audiometers*, ANSI S3.6-1996. New York: Acoustical Society of America.
- Chatham-Kent Public Health Unit. 2008. The Health Impact of Wind Turbines: a Review of the Current White, Grey and Published Literature 2008. <http://www.wind-works.org/LargeTurbines/Health%20and%20Wind%20by%20C-K%20Health%20Unit.pdf>.
- Copes, R. and K. Rideout. Wind Turbines and Health: A Review of Evidence. Ontario Agency for Health Protection and Promotion 2009.
<http://www.oahpp.ca/Documents/Wind%20Turbines%20-%20Sept%2010%202009.pdf>.
- Draft New Zealand standard for wind turbine sound.
<http://shop.standards.co.nz/drafts/DZ6808-DZ6808Publiccommentdraft.pdf>.
- Hellwig, R. and Lampeter, R. 2009. Critiques on Kamperman and James paper on wind turbine noise. March. http://www.dekalbcounty.org/Planning/Exhibit_M.pdf.
- Stelling, K. and D. Phyt. 2009. Summary of recent research on adverse health effects of wind turbines. <http://windconcernsontario.files.wordpress.com/2009/08/adverse-health-effects-of-wind-turbines1.pdf>.
- Fox Business. 2009. Ontario citizen takes legal aim at government of Ontario's flagship Green Energy Act.
<http://www.foxbusiness.com/story/markets/industries/energy/ontario-citizen-takes-legal-aim-government-ontarios-flagship-green-energy-act/>.

- Industrial Wind Action Group. 2009. Maine Osteopathic Association Resolution: Wind Energy and Public Health. <http://www.windaction.org/documents/23515>.
- Kamperman, G. and R. James. 2008. Why noise criteria are necessary for proper siting of wind turbines. <http://www.windturbinesyndrome.com/wp-content/uploads/2008/11/kamperman-and-james-9-pp.pdf>.
- Kamperman, G., and R. James. 2008. The how to guide to siting wind turbines to prevent health risks from sound. <http://www.savethebluffs.ca/archives/files/kamperman-james-8-26-08-report.pdf>.
- Klug, H. Noise from wind turbines—standards and noise reduction procedures. <http://www.sea-acustica.es/Sevilla02/envgen013.pdf>.
- Keith, S. E., D. S. Michaud, and S. H. P. Bly. 2008. A proposal for evaluating the potential health effects of wind turbine noise for projects under the Canadian Environmental Assessment Act. *Journal of Low Frequency Noise, Vibration and Active Control*, 27 (4):253-265.
- Ramakrishnan, R. 2007. Acoustic Consulting Report Prepared for the Ontario Ministry of the Environment: Wind Turbine Facilities Noise Issues. Aiolos Engineering Corporation. <https://ospace.scholarsportal.info/bitstream/1873/13073/1/283287.pdf>.
- Regan, B. and T.G. Casey. 2006. Wind Turbine Noise Primer, *Canadian Acoustics Journal* 34 (2).
- Rogers, A. and J. Manwell . Wright, S. 2002. Wind turbine acoustic noise. http://www.ceere.org/rerl/publications/whitepapers/Wind_Turbine_Acoustic_Noise_Rev2006.pdf/
- Soysai, H., and O. Soysai. Wind farm noise and regulations in the eastern United States. 2007. *Proceedings of the Second International Meeting on Wind Turbine Noise*. Lyon, France: September 20-21, 2007. INCE/Europe.
- State of Rhode Island, Department of Environmental Management. 2009. *Terrestrial Wind Turbine Siting Report*. <http://www.dem.ri.gov/cleanrg/pdf/terrwind.pdf>.
- Ward, W.D, L.H. Royster, and J.D. Royster. 2003. Anatomy and Physiology of the Ear: Normal and Damaged Hearing. In *The Noise Manual*, Eds. Berger EH, Royster LH, Royster JD, Driscoll DP, Layne M. AIHA Press, Fairfax VA.
- Welgampola, M.S., S.M. Rosengren, G.M. Halmagyi, and J.G. Colebatch. 2003. Vestibular activation by bone conducted sound. *Journal of Neurology, Neurosurgery and Psychiatry* 74: 771-778.
- Wilder, D.G., D.E. Wasserman, and J. Wasserman. 2002. Occupational Vibration Exposure. In *Physical and Biological Hazards of the Workplace*, Ed. Wald PH, Stave GM. John Wiley and Sons, New York.
- World Health Organization (WHO). 2009. Night Noise Guidelines for Europe. The World Health Organization, Geneva, Switzerland. <http://www.euro.who.int/document/e92845.pdf>.

APPENDIX A

Fundamentals of Sound

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Fundamentals of Sound

The following appendix provides additional background information on sound and how it is defined.

One atmospheric pressure is given by 100,000 pascals (Pa), where one pascal is one Newton per square meter (N/m^2), and a sound pressure of 94 dB re 20 μPa is given by 1 Pa (See later for decibels). The frequency of the fluctuations may be between 20 times a second (20 Hz), and up to 20,000 times a second (20,000 Hz) for the “audible” noise. Frequencies below 20 Hz are commonly called “infrasound,” although there is a very fuzzy boundary between infrasound and low frequency noise. Infrasound at high levels is audible. Low frequency noise might be from about 10 Hz to about 200 Hz.

In addition to frequency, the quantities which define a sound wave include:

- Pressure, P
- Wavelength, λ
- Velocity, $c = 340\text{m/s}$ approx, depending on temperature

The velocity and wavelength are related by: velocity = wavelength \times frequency,

Relating frequency and wavelength by velocity gives

Freq Hz	16	31.5	63	125	250	500	1000	2000	4000
Wavelength m	21	11	5.4	2.7	1.4	0.68	0.34	0.17	0.085

Low frequencies have long wavelengths. It is useful to develop an appreciation of frequencies and related wavelengths, since this helps an understanding of noise propagation and control.

Sound pressure in a wave is force per unit of area of the wave and has units of N/m^2 , which is abbreviated to Pa. The sound pressure fluctuates above and below atmospheric pressure by a very small amount.

The sound power is a characteristic of the source, and is its rate of production of energy, expressed in watts. The sound power is the fundamental property of the source, whilst the sound pressure at a measurement location depends on the transmission path from source to receiver. Most sound sources, including wind turbines, are specified in terms of their sound power. The sound power of a wind turbine is typically in the 100-105 dBA range, which is similar to that of a leaf blower. The sound power is used to predict propagation of the sound, where the source is assumed to be at the hub.

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Sound Levels

The decibel is the logarithm of the ratio between two values of a quantity such as power, pressure or intensity, with a multiplying constant to give convenient numerical factors. Logarithms are useful for compressing a wide range of quantities into a smaller range. For example:

$$\begin{aligned}\log_{10}10 &= 1 \\ \log_{10}100 &= 2 \\ \log_{10}1000 &= 3\end{aligned}$$

The ratio of 1000:10 is compressed into a ratio of 3:1.

This approach is advantageous for handling sound levels, where the ratio of the highest to the lowest sound which we are likely to encounter is as high as 1,000,000 to 1. A useful development, many years ago, was to take the ratios with respect to the quietest sound which we can hear. This is the threshold of hearing at 1,000 Hz, which is 20 microPascals (μPa) ($2 \times 10^{-5} \text{Pa}$) of pressure for the average young healthy person. Sound powers in decibels are taken with respect to a reference level of 10^{-12} watts.

When the word "level" is added to the word for a physical quantity, decibel levels are implied, denoted by L_x , where x is the symbol for the quantity.

$$\text{Pressure level } L_p = 20 \log_{10} \left[\frac{P}{P_0} \right] \text{ dB}$$

where P is the measured pressure and P_0 is the reference pressure level of $2 \times 10^{-5} \text{ Pa}$

A little calculation allows us to express the sound pressure level at a distance from a source of known sound power level as

$$\text{Sound pressure level, } L_p = L_w - 20 \log[r] - 11 \text{ dB}$$

Where L_p is the sound pressure level
 L_w is the sound power level of the source
 r is the distance from the source

This is the basic equation for spherical sound propagation. It is used in prediction of wind turbine sound but, in a real calculation, has many additions to it, to take into account the atmospheric, ground and topographic conditions. However, as a simple calculation, the sound level at a distance of 500m from a source of sound power 100 dBA is 35 dBA.

Equivalent level (L_{eq}): This is a steady level over a period of time, which has the same energy as that of the fluctuating level actually occurring during that time. A-weighted equivalent level, designated L_{Aeq} , is used for many legislative purposes, including for assessment of wind turbine sound.

Percentiles (L_N) These are a statistical measure of the fluctuations in overall noise level, that is, in the envelope of the noise, which is usually sampled a number of times per second, typically ten times. The most used percentiles are L_{90} and L_{10} . The L_{90} is the level exceeded for 90 percent of the time and represents a low level in the noise. It is often used to assess

background noise. The L10 is the level exceeded for 10 percent of the time and is a measure of the higher levels in a noise. Modern computing sound level meters give a range of percentiles. Note that the percentile is a statistical measure over a specified time interval.

Frequency Analysis

This gives more detail of the frequency components of a noise. Frequency analysis normally uses one of three approaches: octave band, one-third octave band or narrow band.

Narrow band analysis is most useful for complex tonal noises. It could be used, for example, to determine a fan tone frequency, to find the frequencies of vibration transmission from machinery or to detect system resonances. All analyses require an averaging over time, so that the detail of fluctuations in the noise is normally lost.

Criteria for assessment of noise are based on dBA, octave bands, or 1/3-octave band measurements. These measures clearly give increasingly detailed information about the noise.

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APPENDIX B
The Human Ear

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The Human Ear

Humans have ears with three general regions:

1. An *outer ear*, including an ear (auditory) canal
2. An air-containing *middle ear* that includes an eardrum and small bones called ossicles (three in mammals, one in other animals)
3. An *inner ear* that includes organs of hearing (in mammals, this is the organ of Corti in the cochlea) and balance (vestibular labyrinth)

Airborne sound passes thorough the ear canal, making the eardrum and ossicles vibrate, and this vibration then sets the fluids of the cochlea into motion. Specialized "hair cells" convert this fluid movement into nerve impulses that travel to the brain along the auditory nerve. The hair cells, nerve cells, and other cells in the cochlea can be damaged by excessive noise, trauma, toxins, ear diseases, and as part of the aging process. Damage to the cochlea causes "sensorineural hearing loss," the most common type of hearing loss in the United States.

It is essential to understand the role of the middle ear, as well as the difference between air conduction and bone conduction. The middle ear performs the essential task of converting airborne sound into inner ear fluid movement, a process known as impedance matching (air is a low-impedance medium, meaning that its molecules move easily in response to sound pressure, while water is a high-impedance medium). Without impedance matching, over 99.9 percent of airborne sound energy is reflected away from the body. The middle ear enables animals living in air to hear very soft sounds that would otherwise be inaudible, but it is unnecessary for animals that live in water, because sound traveling in water passes easily into the body (which is mostly water). When a child has an ear infection, or an adult places earplugs in his ears, a "conductive hearing loss" dramatically reduces the transmission of airborne sound into the inner ear. People with conductive hearing loss can still hear sounds presented directly to the skull by "bone conduction." This is how both humans and fishes hear underwater or when a vibrating tuning fork is applied to the head, but it requires much more acoustic energy than air conduction hearing.

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APPENDIX C

Measuring Sound

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Measuring Sound

A sound level meter is the standard way of measuring sound. Environmental sound is normally assessed by the A-weighting. Although hand-held instruments appear to be easy to use, lack of understanding of their operation and limitations, and the meaning of the varied measurements which they can give, may result in misleading readings.

The weighting network and electrical filters are an important part of the sound level meter, as they give an indication of the frequency components of the sound. The filters are as follows:

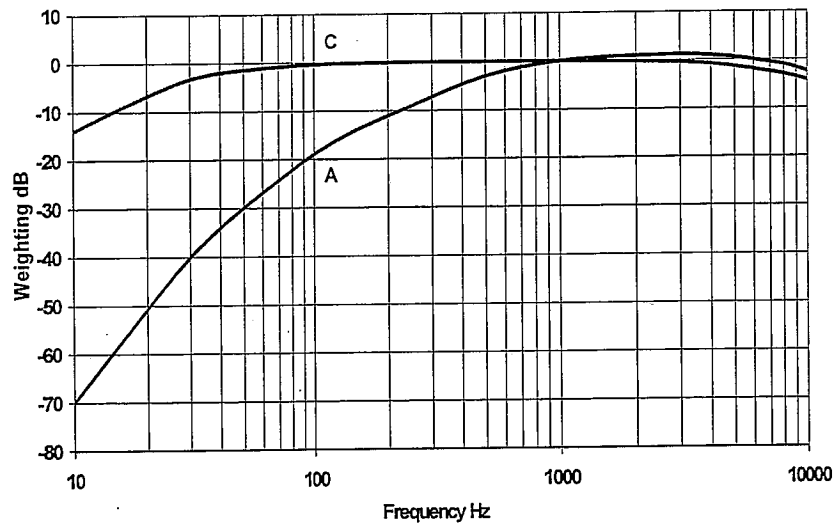
- A-weighting: on all meters
- C-weighting: on most meters
- Linear (Z-weighting): on many meters
- Octave filters: on some meters
- Third octave filters: on some meters
- Narrow band: on a few meters

Sound level meter weighting networks are shown in Figure C-1. Originally, the A-weighting was intended for low levels of noise. C-weighting was intended for higher levels of noise. The weighting networks were based on human hearing contours at low and high levels and it was hoped that their use would mimic the response of the ear. This concept, which did not work out in practice, has now been abandoned and A- and C-weighting are used at all levels. Linear weighting is used to detect low frequencies. A specialist G-weighting is used for infrasound below 20 Hz.

Figure C-1 shows that the A-weighting depresses the levels of the low frequencies, as the ear is less sensitive to these. There is general consensus that A-weighting is appropriate for estimation of the hazard of NIHL. With respect to other effects, such as annoyance, A-weighting is acceptable if there is largely middle and high frequency noise present, but if the noise is unusually high at low frequencies, or contains prominent low frequency tones, the A-weighting may not give a valid measure. Compared with other noise sources, wind turbine spectra, as heard indoors at typical separation distances, have less low frequency content than most other sources (Pedersen, 2008).

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FIGURE C-1
Weighting Networks



APPENDIX D

Propagation of Sound

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Propagation of Sound

The propagation of noise from wind turbines is determined by a number of factors, including:

- Geometrical spreading, given by $K = 20\log[r] - 11$ dB, at a distance r
- Molecular absorption. This is conversion of acoustic energy to heat and is frequency dependent
- Turbulent scattering from local variations in wind velocity and air temperature and is moderately frequency dependent
- Ground effects – reflection, topography and absorption are frequency dependent; their effects increasing as the frequency increases
- Near surface effects – temperature and wind gradients.

The sound pressure at a point, distant from source, is given by

$$L_P = L_W - K - D - A_A - A_G \quad (\text{dB})$$

In which:

L_P is the sound pressure at the receiving point

L_W is the sound power of the turbine in decibels re 10^{-12} watts

K is the geometrical spreading term, which is inherent in all sources

D is a directivity index, which takes non-uniform spreading into account

A_A is an atmospheric absorption and other near surface effects term

A_G is a ground absorption and other surface effects term

Near surface meteorological effects are complex, as wind and temperature gradients affect propagation through the air.

APPENDIX E

Expert Panel Members

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APPENDIX E

Expert Panel Members

Members of the expert panel are listed below. Biographies of each member are provided following the list.

Expert Panel Members

W. David Colby, M.D.

Chatham-Kent Medical Officer of Health (Acting)
Associate Professor, Schulich School of Medicine & Dentistry, University of Western Ontario

Robert Dobie, M.D.

Clinical Professor, University of Texas, San Antonio
Clinical Professor, University of California, Davis

Geoff Leventhall, Ph.D.

Consultant in Noise Vibration and Acoustics, UK

David M. Lipscomb, Ph.D.

President, Correct Service, Inc.

Robert J. McCunney, M.D.

Research Scientist, Massachusetts Institute of Technology Department of Biological Engineering,
Staff Physician, Massachusetts General Hospital Pulmonary Division; Harvard Medical School

Michael T. Seilo, Ph.D.

Professor of Audiology, Western Washington University

Bo Søndergaard, M.Sc. (Physics)

Senior Consultant, Danish Electronics Light and Acoustics (DELTA)

Technical Advisor

Mark Bastasch

Acoustical Engineer, CH2M HILL

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Panel Member Biographies

W. David Colby, M.D.

W. David Colby M.Sc., M.D., FRCPC, is a fellow of the Royal College of Physicians and Surgeons of Canada in Medical Microbiology. Dr Colby is the Acting Medical Officer of Health in Chatham-Kent, Ontario and Associate Professor of Medicine, Microbiology/Immunology and Physiology/Pharmacology at the Schulich School of Medicine and Dentistry at the University of Western Ontario. He received his M.D. from the University of Toronto and completed his residency at University Hospital, London, Ontario. While still a resident he was given a faculty appointment and later was appointed Chief of Microbiology and Consultant in Infectious Diseases at University Hospital. Dr Colby lectures extensively on antimicrobial chemotherapy, resistance and fungal infections in addition to a busy clinical practice in Travel Medicine and is a Coroner for the province of Ontario. He has received numerous awards for his teaching. Dr. Colby has a number of articles in peer-reviewed journals and is the author of the textbook *Optimizing Antimicrobial Therapy: A Pharmacometric Approach*. He is a Past President of the Canadian Association of Medical Microbiologists. On the basis of his expertise in Public Health, Dr Colby was asked by his municipality to assess the health impacts of wind turbines. The report, titled *The Health Impact of Wind Turbines: A Review of the Current White, Grey, and Published Literature* is widely cited internationally.

Robert Dobie, M.D.

Robert Dobie, M.D., is clinical professor of otolaryngology at both the University of Texas Health Science Center at San Antonio and the University of California-Davis. He is also a partner in Dobie Associates, a consulting practice specializing in hearing and balance, hearing conservation, and ear disorders. The author of over 175 publications, his research interests include age-related and noise-induced hearing loss, as well as tinnitus and other inner ear disorders. He is past president of the Association for Research in Otolaryngology, past chair of the Hearing and Equilibrium Committee of the American Academy of Otolaryngology-Head and Neck Surgery, and has served on the boards and councils of many other professional organizations and scholarly journals.

Geoff Leventhall, Ph.D.

Geoff is a UK-based noise and vibration consultant who works internationally. His academic and professional qualifications include Ph.D. in Acoustics, Fellow of the UK Institute of Physics, Honorary Fellow of the UK Institute of Acoustics (of which he is a former President), Distinguished International Member of the USA Institute of Noise Control Engineering, Member of the Acoustical Society of America.

He was formerly an academic, during which time he supervised 30 research students to completion of their doctoral studies in acoustics. Much of his academic and consultancy work has been on problems of infrasound and low frequency noise and control of low frequency noise by active attenuation

He has been a member of a number of National and International committees on noise and acoustics and was recently a member of two committees producing reports on effects of noise on health: the UK Health Protection Agency Committee on the Health Effects of

Ultrasound and Infrasound and the UK Department of Health Committee on the Effects of Environmental Noise on Health.

David M. Lipscomb, Ph.D.

Dr. David M. Lipscomb received a Ph. D. in Hearing Science from the University of Washington (Seattle) in 1966. Dr. Lipscomb taught at the University of Tennessee for more than two decades in the Department of Audiology and Speech Pathology. While he was on the faculty, Dr. Lipscomb developed and directed the department's Noise Research Laboratory. During his tenure at Tennessee and after he moved to the Pacific Northwest in 1988, Dr. Lipscomb has served as a consultant to many entities including communities, governmental agencies, industries, and legal organizations.

Dr. Lipscomb has qualified in courts of law as an expert in Audiology since 1966. Currently, he investigates incidents to determine whether an acoustical warning signal provided warning to individuals in harms way, and, if so, at how many seconds before an incident. With his background in clinical and research audiology, he undertakes the evaluation of hearing impairment claims for industrial settings and product liability.

Dr. Lipscomb was a bioacoustical consultant to the U. S. Environmental Protection Agency Office of Noise Abatement and Control (ONAC) at the time the agency was responding to Congressional mandates contained in the Noise Control Act of 1972. He was one of the original authors of the Criteria Document produced by ONAC, and he served as a reviewer for the ONAC document titled *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*. Dr. Lipscomb's experience in writing and reviewing bioacoustical documentation has been particularly useful in his review of materials for AWEA regarding wind farm noise concerns.

Robert J. McCunney, M.D.

Robert J. McCunney, M.D., M.P.H., M.S., is board certified by the American Board of Preventive Medicine as a specialist in occupational and environmental medicine. Dr. McCunney is a staff physician at Massachusetts General Hospital's pulmonary division, where he evaluates and treats occupational and environmental illnesses, including lung disorders ranging from asbestosis to asthma to mold related health concerns, among others. He is also a clinical faculty member of Harvard Medical School and a research scientist at the Massachusetts Institute of Technology Department of Biological Engineering, where he participates in epidemiological research pertaining to occupational and environmental health hazards.

Dr. McCunney received his B.S. in chemical engineering from Drexel University, his M.S. in environmental health from the University of Minnesota, his M.D. from the Thomas Jefferson University Medical School and his M.P.H. from the Harvard School of Public Health. He completed training in internal medicine at Northwestern University Medical Center in Chicago. Dr. McCunney is past president of the American College of Occupational and Environmental Medicine (ACOEM) and an accomplished author. He has edited numerous occupational and environmental medicine textbooks and over 80 published articles and book chapters. He is the Editor of all three editions of the text book, *A Practical Approach to Occupational and Environmental Medicine*, the most recent edition of which was published in 2003. Dr. McCunney received the Health Achievement Award from ACOEM in 2004.

Dr. McCunney has extensive experience in evaluating the effects of noise on hearing via reviewing audiometric tests. He has written book chapters on the topic and regularly lectures at the Harvard School of Public Health on "Noise and Health."

Michael T. Seilo, Ph.D.

Dr. Michael T. Seilo received his Ph.D. in Audiology from Ohio University in 1970. He is currently a professor of audiology in the Department of Communication Sciences and Disorders at Western Washington University in Bellingham, Washington where he served as department chair for a total of more than twenty years. Dr. Seilo is clinically certified by the American Speech-Language-Hearing Association (ASHA) in both audiology and speech-language pathology and is a long-time member of ASHA, the American Academy of Audiology, and the Washington Speech and Hearing Association.

For many years Dr. Seilo has taught courses in hearing conservation at both the graduate and undergraduate level. His special interest areas include speech perception and the impact of noise on human hearing sensitivity including tinnitus.

Dr. Seilo has consulted with industries on the prevention of NIHL and he has collaborated with other professionals in the assessment of hearing-loss related claims pertaining to noise.

Bo Søndergaard, M.Sc. (Physics)

Bo Søndergaard has more than 20 years of experience in consultancy in environmental noise measurements, predictions and assessment. The last 15 years with an emphasis on wind turbine noise. Mr. Søndergaard is the convenor of the MT11 work group under IEC TC88 working with revision of the measurement standard for wind turbines IEC 61400-11. He has also worked as project manager for the following research projects: Low Frequency Noise from Large Wind Turbines for the Danish Energy Authority, Noise and Energy optimization of Wind Farms, and Noise from Wind Turbines in Wake for Energinet.dk.

Technical Advisor Biography

Mark Bastasch

Mr. Bastasch is a registered acoustical engineer with CH2M HILL. Mr. Bastasch assisted AWEA and CanWEA in the establishment of the panel and provided technical assistance to the panel throughout the review process. Mr. Bastasch's acoustical experience includes preliminary siting studies, regulatory development and assessments, ambient noise measurements, industrial measurements for model development and compliance purposes, mitigation analysis, and modeling of industrial and transportation noise. His wind turbine experience includes some of the first major wind developments including the Stateline project, which when built in 2001 was the largest in the world. He also serves on the organizing committee of the biannual International Wind Turbine Noise Conference, first held in Berlin, Germany, in 2005.

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Acknowledgements

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The final responsibility for the content remains with the authors.

Richard K. Jennings, M.D. —Psychiatrist, Retired

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Reviewing the Facts on Wind Turbine Sound Impact:

While the environmental benefits of generating clean power from wind are well known, there have also been some concerns expressed regarding alleged health effects of wind turbine sound. Despite numerous peer-reviewed scientific studies clearly showing that wind turbine sound does not create extraordinary levels of sound or risks, the issue is still a concern for opponents of wind power.

Renewable Northwest Project has been actively following the research on this important issue since the early 1990's and will continue to do so. We have compiled the following to help separate the myth from the fact.

Wind Turbine Sound

Just like almost anything in life—cars, stereos, your coworkers or the wind itself—wind turbines do make noise. Wind turbine noise can be mechanical (such as from the gearbox) or aerodynamic (from air moving past the blades). Modern wind turbine designs have greatly reduced the mechanical sounds to the point where normally what you hear at a wind farm is the "whooshing" sound of the blades passing through the air. Other factors do play a part, such as distance from the turbines, topography, vegetation, and wind conditions, but overall wind farms are very quiet compared to other noise sources. In fact, because the wind is blowing whenever the turbines are spinning that "whooshing" sound is often lost in the sound of the wind itself.

Some Basic Comparisons

Sounds are often hard to describe, which is why the best way to form your own opinion is to visit a wind farm. Getting to a wind farm isn't easy for most of us, here are a few comparisons of noise levels measured in decibels (dB) for common activities¹:

- Jet engine at takeoff 140db
- Ambulance siren 120 db
- Chainsaw 110 db
- Power Hand Drill 98 db
- Tractor 96 db
- Hair Dryer / Power Lawn Mower 90 db
- Normal conversation 60 db
- Wind turbine 50 db
- Whisper in ear 30 db

The Myth of "Wind Turbine Syndrome"

Opponents of wind talk a lot about "wind turbine syndrome," but what they don't tell you is that it is *not* a real condition or disease of any kind. The term comes from a self-published book by Dr. Nina Pierpont. Her conclusions have been refuted by independent scientific studies from government research bodies around the world. Following are some quotes from scientists that have reviewed her work:

"While opponents of wind energy have attempted to use self-published reports to block progress, the scientific evidence is clear. Independent studies conducted around the world consistently find that wind farms have no impact on physical health. In fact, with no air or water pollution emissions, wind energy is a clean source of power that is reducing public health impacts from the energy sector."^{2,3}

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David
and Rob

"In my review I found no evidence in peer-reviewed medical and public health literature of health effects from the kinds of noise and vibrations heard by wind turbines other than occasional annoyances, and these are mitigated or disappear with proper placement of the turbines near residences. Most studies showing some health effects of noise have been done using thresholds much higher outdoors, much higher than what is seen in wind turbines."⁴

- Dr. Dora Anne Mills, MD, MPH

Several studies have looked at various pieces of the issues involved, both with wind turbines specifically and related noise issues in general. A good summary of the issues can be found in a review done by the Australian National Health and Medical Research Council. That publication found that, "Based on current evidence, it is concluded that wind turbines do not pose a threat to health if planning guidelines are followed."

How Do Turbine Noise Rules in the Northwest Compare?

RNP has been an advocate for *responsible* renewable energy development in the Northwest since our economy, environment, and quality of life depend on making sure that harvesting our natural, renewable resources is done right. We were part of a group of interested parties that worked with the Oregon Department of Energy and Forestry for nearly a year that culminated in new noise rules being set in 1994 for wind development in the state. The rules set a noise limit from a wind turbine project at 50 dBA for participating landowners and typically 36 dBA for non-participating landowners. A maximum project level of 36 dBA for a non-participating landowner is one of the most robust standards in the Northwest.

While RNP is confident that the current siting regulations are good, RNP will continue to monitor the scientific literature on the issue to ensure that wind energy development in the region adheres to safe standards.

Sources:

1) Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. Publication No. 2001-104.

<http://www.cdc.gov/niosh/docs/2001-104/>

2) The Oregonian editorial. *There's no evidence of health impacts from wind energy*. November 11, 2010.

http://www.oregonlive.com/opinion/index.ssf/2010/11/theres_no_evidence_of_health_i.html

3) Robert Dobie, M.D., is a clinical professor of otolaryngology at University of Texas - San Antonio, San Antonio, Texas. David M. Lipscomb, Ph.D., is president of Correct Service Inc. in Stanwood, Washington. J. McCunney, M.D., is a research scientist in occupational and environmental medicine at the Montana State University's Department of Biological Engineering.

4) Maine Center for Disease Control & Prevention. *Wind Turbine Neuro-Acoustical Issues*, June 2009. <http://www.maine.gov/dhhs/boh/documents/wind-turbine-fact-sheet-june-2009.pdf>

5) Australian National Health and Medical Research Council. *Wind Turbines and Health: A Rapid Evidence Review*, p. 6.

http://www.nhmrc.gov.au/_files_nhmrc/file/publications/synopses/evidence_review_wind_turbines.pdf

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Wind Energy: Clean and Reliable

Can we rely on wind power?

Yes. Wind energy is already helping the nation meet America's electricity demand by powering the equivalent of over 9.7 million American homes. Today's wind farms produce enough electricity to power all of Virginia, Oklahoma or Tennessee.

Wind power is an important part of the electric utility generation portfolios. Yet some question whether wind power, being a variable resource (meaning it generates electricity when the wind is blowing) can be relied upon as part of a system that provides reliable electricity to consumers without interruption. Based on a growing body of analytical and operational experience, the answer is a resounding "yes".

According to many utilities and reliability authorities, wind power can readily be accommodated into electric system operations reliably and economically.

High Wind Penetration and Reliable Operation

In Europe, Denmark receives over 20% of its electricity from wind energy, and in 2009, Germany received 7% of its electricity from the wind. Spain, which received 14.5% of its electricity from wind in 2009, has had periods when wind energy provided over 40% of its electricity. In the U.S., existing wind projects could produce 20% of Iowa's electricity, and Minnesota, North Dakota, Oregon, Colorado, and Kansas all receive more than 5% of their electricity from wind energy. These examples show that high penetrations of wind power can be a valuable part of a utility generation mix that supplies reliable electrical service to consumers without interruption.

Accommodating the Variable Nature of Wind Power

When wind energy output decreases, reliable electrical service is maintained by turning up the output of other generators on the electric power system. Electric utility companies serve as "system operators" which can be thought of as air traffic controllers of the power system. System operators can control, or dispatch, generators on their system such as natural gas-fired and hydroelectric generators. They have always actively dispatched their systems in response to electrical demand, or load, which varies randomly over the course of an hour or day. Wind energy output behaves similar to load in that it is "variable," meaning its output rises and falls within hourly and daily time periods; and it is "non-dispatchable," meaning its output can be controlled only to a limited extent. Reliable electrical service can be maintained by system operators dispatching generators up and down in response to variation in load and wind generation. System operators also keep generation in reserve, called "operating reserves," which can be called on in case of a shortfall.

According to Paul Bonavia, former Chief Operating Officer of Xcel Energy, one of the nation's largest electric utility companies:

"Wind energy is an integral piece of our power supply portfolio. It provides a hedge against fuel price volatility associated with other forms of electric generation. Our studies and experiences show that wind energy integrates effectively and reliably into our power systems with regional market operations to mitigate the impact of wind variability. In these cases even with 25 percent of the electricity on our system from wind we forecast cost for operating system reserves of approximately \$5 per megawatt-hour, or roughly ten percent of the cost of the wind energy. As we gain experience with wind we keep seeking ways to achieve low integration costs."



Wind Energy: Clean and Reliable

Is energy storage needed?

No, while it is natural to think that batteries or other storage systems might be needed to supply steady power, they are not needed to integrate wind energy into electric power systems. The power system essentially already has storage in the form of hydroelectric reservoirs, gas pipelines, gas storage facilities, and coal piles that can provide energy when needed. Storing electricity is currently significantly more expensive than using dispatchable generation. In the future, through technological advances such as batteries and compressed air, energy storage may become cost-effective. The prospect of plug-in hybrid electric vehicles holds great promise because the expense of their batteries would be covered by their fuel cost savings and they could provide many megawatts of storage for the overall electrical power system. This would also allow wind power and other renewable energy resources to displace consumption of foreign oil. Still, energy storage will best be used as a resource for the overall power system. It would not be cost effective or efficient to couple energy storage resources exclusively to individual wind plants.

Is wind less "reliable" than conventional generation?

No. Conventional resources occasionally shut down with no notice, and these "forced outages" require operating reserves. For example, a power system that has a 1000 megawatt (MW) nuclear or coal plant will typically keep 1000 MW of other generation available, to be ready to quickly supply electricity if a plant unexpectedly shuts down. The power system can still be operated perfectly reliably in this fashion. Thus, "reliability" is not specific to any single generation facility; rather it is measured on a system-wide basis. Because significant generation reserves are already required to accommodate unexpected changes in electricity supply and demand, in many regions large amounts of wind power can be added to the grid without increasing the total amount of reserves that are needed.

As noted by Jon Brekke, Vice President of Member Services for Great River Energy, a utility that operates in Minnesota and Wisconsin, "Wind energy is a valuable part of our diverse and growing energy portfolio. When partnered with other traditional generation resources, wind energy is an effective way to provide reliable, clean and affordable power to our member cooperatives. Geographic diversity of wind energy helps even out the variability of wind energy in the regional market. In addition, wind farms are typically made up of many individual turbines which reduce the impact of outages. For instance, there are 67 1.5 -MW turbines at our Trimont Wind Farm, so if one is down for maintenance, only 1.5% of the total wind farm's generating capacity is lost."

Changes in wind energy output are not instantaneous, as are conventional generator failures. Because of the geographic diversity inherent with large numbers of wind turbine installations, it typically takes over an hour for even a rapid change in wind speeds to shut down a large amount of wind generation. This is a significant benefit when compared with the instantaneous forced outages of conventional units. In addition, wind forecasting tools that warn system operators of upcoming wind output variations are becoming widely used and better integrated into system operations.

What is the cost of wind integration?

When large amounts of wind energy are added to the grid, modest amounts of additional generation may be required to accommodate wind energy's variability. The exact costs of these incremental reserves depend on the mix of generation on a given system and various other factors, but they are generally quite small. In a document prepared by the Utility Wind Integration Group (UWIG) in coordination with the trade associations of all three utility sectors (investor-owned, public, and cooperative) the studies and experiences with utility wind integration are summarized as follows:

- ✓ "Wind resources have impacts that can be managed through proper plant interconnection, integration, transmission planning and system and market operations.
- ✓ System operating cost increases arising from wind variability and uncertainty amounted to only about 10% or less of the wholesale value of the wind energy.
- ✓ A variety of means – such as commercially available wind forecasting – can be employed to reduce these costs.
- ✓ In many cases, customer payments for electricity can be decreased when wind is added to the system, because the operating-cost increases are offset by savings from displacing fossil fuel generation."



Utility Scale Wind Energy and Sound

Virtually everything with moving parts will make some sound; wind turbines are no exception. However, well-designed utility scale wind turbines are generally quiet in operation.¹ It is possible to have a normal conversation at the very base of an operating wind turbine.

The sound heard from wind turbines at a distance, as with other local sources of sound, is affected by many factors – including the wind direction, meteorological conditions, vegetation and other barriers. Site-specific acoustic models can anticipate sound levels at nearby receptors for consideration during project siting.²

FOR MORE INFORMATION,
PLEASE CONTACT:

Jen Banks
Offshore Wind and
Siting Specialist

jbanks@awea.org
202-383-2500

Wind Energy, Sound, and Science

In 2009, the American Wind Energy Association (AWEA) and the Canadian Wind Energy Association (CanWEA) established a multidisciplinary scientific advisory panel comprising medical doctors, audiologists, and acoustical professionals to review current literature available on the perceived health effects of wind turbines. The panel, whose findings were published at the end of 2009, concluded that wind turbine sounds are not unique. Based on the levels and frequencies of the sounds, the panel found no reason to believe that turbines could plausibly have direct adverse physiological effects. An executive summary of the report is at http://www.awea.org/newsroom/releases/AWEA_CanWEA_SoundWhitePaper_ExecSummary.pdf.

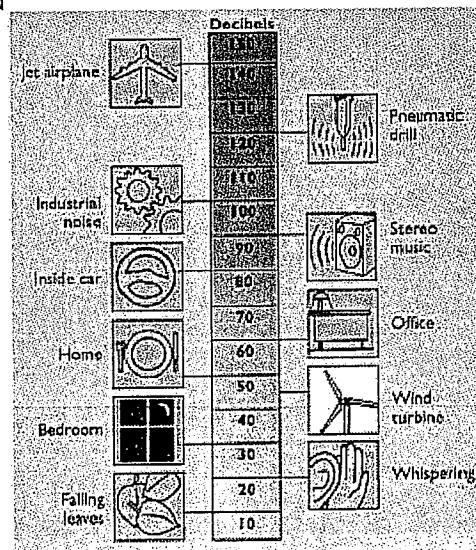
Wind plants are generally quiet

Wind plants are always located where the wind speed is higher than average, and the background sound of the wind itself will often "mask" any sounds that might be produced by operating wind turbines - especially because the turbines only run when the wind is blowing.

The basics of sound

People perceive sounds through sensations in the ear that are caused by pressure variations. Sounds can be distinguished by a loudness (sound pressure) component, measured in decibels, and a frequency component, measured in Hertz. Sound pressure measurements that are weighted to how humans perceive them are called A-weighted and are denoted by the unit dB (A).

The graph shows the decibel level of common sounds, including wind turbines. In the range of 35 to 45 dB (A), at a distance of 350 meters, sound produced by wind turbines is similar to the background sound found in a typical home.





Continued...

Utility Scale Wind Energy and Sound

The source of wind turbine sounds

The sounds emitted from wind turbines can be mechanical, from internal equipment such as the gearbox or yaw drive, or aerodynamic, from air moving past the rotor blades. Current turbine designs effectively reduce mechanical sound through sound proofing; therefore, the aerodynamic sound, often described as a "whooshing" sound, is what can normally be heard. The aerodynamic noise is present at all frequencies, from the infrasound range over low frequency sound to the normal audible range.

Advisory Panel Findings

The scientific advisory panel that addressed wind turbine human health concerns, came to the following conclusions:

- Subaudible, low frequency sound and infrasound from wind turbines do not present a risk to human health.
- Sound from wind turbines does not pose a risk of hearing loss or any other adverse health effect in humans.
- Some people may be annoyed at the presence of sound from wind turbines. Annoyance is not a pathological entity.
- A major cause of concern about wind turbine sound is its fluctuating nature. Some may find this sound annoying, a reaction that depends primarily on personal characteristics as opposed to the intensity of the sound level.²

Other sounds associated with wind farms

Along with the minimal operational sounds produced by wind turbines, the actual construction of a wind farm can create sounds. The turbine components are brought to the site on large trucks, and heavy equipment is required to install the turbines. Cranes are used to assemble the turbine components, cement mixers are required to lay the foundation and some earth moving activities may also be required for the turbine foundations. However, the construction phase of a wind farm generally only lasts a few months and these activities can be performed during regular business hours to prevent unnecessary disturbance.

The level of sound allowed from a wind farm is determined by local ordinance

Permitted sound levels are determined at the local level. All wind farms must comply with sound ordinances of applicable local governments prior to project approval. Further, the federal Bureau of Land Management recommends initial comparisons of the existing ambient sound at the site to the expected sound levels generated by a wind project. Expected sound levels are dependent on many factors, such as topography and vegetation, and therefore will vary for each project.³ Thousands of wind turbines have been installed around the world, many in close proximity to other types of land use, with minimal sound issues. The wind industry seeks to be a good neighbor and continues to address concerns regarding wind turbines and sound. Properly sited wind farms benefit communities as a local and renewable energy source and any sound concerns can usually be satisfactorily resolved.

¹ The Scottish Office, Environment Department, Planning Advice Note, PAN 45, Annex A: Wind Power, A.27. Renewable Energy Technologies, August 1994. Cited in "Noise from Wind Turbines," British Wind Energy Association, <http://www.bwea.com/pdf/noise.pdf>.

² Wind Turbine Sound and Health Effects – An Expert Panel Review. 2009, http://www.awea.org/policy/regulatory_policy/documents/AWEA_and_CanWEA_Sound_White_Paper.pdf

³ Bureau of Land Management. (2005). Final programmatic impact statement on wind energy development on BLM-administered lands in the western United States.



Wind Turbines and Health

The American Lung Association's agenda for the new administration, **Protect the Air We Breathe: An Agenda for Clean Air**, states

"Climate, energy and clean air are inexorably linked. Solutions that lead to cleaner air must be included in any approach to cleaner, more efficient energy use and reductions in global warming."¹

Wind energy is one such solution - a clean energy source that can provide communities with decreased greenhouse gas emissions, along with air quality improvements and corresponding human health benefits.

FOR MORE INFORMATION,
PLEASE CONTACT:

Jen Banks
Offshore Wind and
Siting Specialist

jbanks@awea.org
202-383-2516

20% Wind Energy and Climate Change

As America and the world grapple with the immense problem of climate change, one energy source stands out as an abundant, affordable and readily available supply option: wind power. The U.S. Department of Energy's 20% Wind Energy by 2030 Technical Report (www.20percentwind.org) finds that wind power can supply 20 percent of America's electricity by 2030 and reduce projected emissions of carbon dioxide (CO₂), the leading greenhouse gas, by 25 percent. Additionally, each megawatt-hour of wind generation can prevent the loss of up to 600 gallons of water from fossil fuel power plant cooling.² This equals over 20 billion gallons of water conserved by the 35,000 Megawatts of wind energy installed and operating at the end of 2009.³

Wind energy can help improve air quality

Air quality has a direct impact on human health. Particulate matter in the air, often as a result of power plant emissions, has been shown to affect cardiovascular and respiratory health. Unhealthy levels of particle pollution can even cause otherwise healthy people to get sick.⁴ The generation of electricity from the wind does not result in any air emissions. By offsetting more polluting forms of energy generation, wind energy can actually improve air quality and our health. The U.S.'s total 2009 wind turbine fleet prevents the emission of

- 200,000 metric tons of sulfur dioxide annually
- 80,000 metric tons of nitrogen oxides annually⁵

Wind energy can help reduce global warming pollutants

The entire fleet of wind turbines operating in the United States as of the end of 2009 will prevent the emission of over 57 million tons of carbon dioxide – a greenhouse gas that contributes to climate change – each year.⁶ Human health can be adversely affected by rising global temperatures. Fewer frost events and longer warm seasons could result in stronger and more widespread allergens and fungal spores, as well as an increase in the spread of exotic diseases. Health experts also raise concerns of an increased incidence of heat waves and resulting deaths.⁷ Wind energy produces less than two percent of the emissions from coal combustion per megawatt-hour, even when the manufacturing process of wind turbines is accounted for,⁸ giving it one of the lowest greenhouse gas lifecycle emissions levels of any power technology.



Continued...

Wind Turbines and Health

The wind industry takes health concerns seriously

Any concern that wind turbines may impact someone negatively should be explored. Therefore, in 2009, the American Wind Energy Association and the Canadian Wind Energy Association (CanWEA) established a multidisciplinary scientific advisory panel to review current literature on the perceived health effects of wind turbines. The panel's conclusions are

- o Subaudible, low frequency sound and infrasound from wind turbines do not present a risk to human health.
- o Sound from wind turbines does not pose a risk of hearing loss or any other adverse health effect in humans.
- o Some people may be annoyed at the presence of sound from wind turbines. Annoyance is not a pathological entity.
- o A major cause of concern about wind turbine sound is its fluctuating nature. Some may find this sound annoying, a reaction that depends primarily on personal characteristics as opposed to the intensity of the sound level.⁹

Wind plants are generally quiet:

It is often possible to have a normal conversation at the very base of an operating wind turbine. The sound heard from wind turbines at a distance, as with other local sources of sound, is affected by many factors – including the wind direction, meteorological conditions, vegetation and other barriers. Site-specific acoustic models can anticipate sound levels at nearby receptors for consideration during project siting. The sounds emitted from wind turbines can be mechanical, from internal equipment such as the gearbox or yaw drive, or aerodynamic, from air moving past the rotor blades. Current turbine designs effectively reduce mechanical sound through sound proofing; therefore, the aerodynamic sound, often described as a “whooshing” sound, is generally heard.

Shadow flicker occurrence is easily calculated

Shadow flicker occurs when the blades of a turbine pass in front of the sun to create a recurring shadow on an object. Computer models in wind development software can determine the days and times during the year that specific buildings in close proximity to turbines may experience shadow flicker. Mitigation measures can be taken based on this knowledge and may include setbacks or vegetative buffers. Issues with shadow flicker are less common in the United States than in Europe due to the lower latitudes and the higher sun angles in the United States.

Shadow flicker is not harmful to persons with epilepsy

The allegation is sometimes made that shadow flicker from wind turbines can cause epileptic seizures. This is not true—shadow flicker from wind turbines occurs much more slowly than the light “strobing” associated with seizures. The strobe rates generally necessary to cause seizures in people with photosensitive epilepsy are 5 to 30 flashes per second¹⁰ and large wind turbine blades cannot rotate this quickly.

Sources:

¹ An Agenda for Clean Air: Protect the Air We Breathe. (2009). http://www.npca.org/cleanair/agenda/Protect_the_Air_We_Breathe.pdf

² Department of Energy. (2008). 20% Wind Energy by 2030 www.20percentwind.org

³ American Wind Energy Association. WINDPOWER OUTLOOK 2010.

⁴ American Lung Association. (2010). State of the Air: 2010. <http://www.stateoftheair.org/2010/health-risks/health-risks-particle.html>

⁵ WINDPOWER OUTLOOK 2010

⁶ WINDPOWER OUTLOOK 2010

⁷ U.S. News and World Report. (2008). 10 Ways Global Warming Could Hurt Your Health. <http://health.usnews.com/articles/health/2008/09/15/10-ways-global-warming-could-hurt-your-health.html>

⁸ Kempton, W. & Levy, J. (2007). Harvard School of Public Health. <http://www.ocean.udel.edu/windpower/DE-Qs/IRP-KempLevy-Health.pdf>

⁹ Wind Turbine Sound and Health Effects – An Expert Panel Review. 2009, http://www.awea.org/policy/regulatory_policy/documents/AWEA_and_CanWEA_Sound_White_Paper.pdf

¹⁰ Epilepsy Foundation. (n.d.). Photosensitivity and Epilepsy. <http://www.epilepsyfoundation.org/about/photosensitivity/>



Wind Energy and Wildlife

Did you know...?

A single 1-MW turbine displaces 1,800 tons of carbon dioxide, the primary global warming pollutant, each year (equivalent to planting a square mile of forest), based on the current average U.S. utility fuel mix.

To generate the same amount of electricity as today's U.S. wind turbine fleet (25,170 MW as of the end of 2008) would require burning 34.4 million tons of coal (a line of 10-ton trucks over 13,700 miles long) or 112 million barrels of oil *each year*.

FOR MORE INFORMATION,
PLEASE CONTACT:

Laurie Jodziewicz
Manager of Siting Policy
ljodziewicz@awea.org
202-383-2516

As America and the world grapple with the immense problem of climate change, one energy source stands out as an abundant, affordable and readily available supply option: wind power. In May 2008, the U.S. Department of Energy released the *20% Wind Energy by 2030 Technical Report* (www.20percentwind.org), finding that wind power can supply 20 percent of America's electricity by 2030 and reduce projected emissions of carbon dioxide (CO₂), the leading greenhouse gas, by 25 percent.

This fact sheet is one in a series aimed at informing decision-makers and the public about this critically important option for America's energy future.

Wind, a 100% clean energy source, is one of the healthiest energy options, and one of the most compatible with animals and humans. While birds do collide with wind turbines at some sites, modern wind power plants are collectively far less harmful to birds than are radio towers, tall buildings, airplanes, vehicles and numerous other manmade objects. Bird deaths due to wind development will never be more than a very small fraction of those caused by other commonly-accepted human activities, no matter how extensively wind is used in the future.

Avian studies have been carried out at many wind farm sites. They show that bird kills per megawatt (MW) average one to six per year or less, with the exception of a single 3-turbine plant in Tennessee that has recorded 11 per MW per year. These include sites passed by millions of migrating birds each year. At a few sites, no kills have been found at all.

A reasonable, conservative estimate is that of every 10,000 human-related bird deaths in the U.S. today, wind plants cause less than one. The National Academy of Sciences estimated in 2006 that wind energy is responsible for less than 0.003% of (3 of every 100,000) bird deaths caused by human (and feline) activities.

Individual bird deaths due to wind development will never be more than a very small fraction of those caused by other commonly accepted human activities and structures--house cats kill an estimated 1 billion birds annually in the U.S. alone, buildings 100 million to 1 billion, automobiles 60-80 million, power lines hundreds of thousands to as many as 175 million, according to the U.S. Fish & Wildlife Service (<http://birds.fws.gov/mortality-fact-sheet.pdf>) and other sources.



Wind Energy and Wildlife

Despite the minimal impact wind development has on bird populations generally, the industry takes potential wildlife impacts seriously and continues to assess ways in which impacts can be lessened. Since the first concerns about wind energy and wildlife were raised, the wind industry has taken numerous steps to address legitimate concerns and ensure problems are not repeated at other wind projects.

National Wind Coordinating Collaborative

In 1994, shortly after raptor deaths in the Altamont Pass became a general concern, the wind energy industry joined with other stakeholders (government officials, environmental groups, utilities) to form the National Wind Coordinating Collaborative (NWCC), a multi-stakeholder collaborative aimed at addressing the wind/avian issue as well as other issues affecting the industry's future. NWCC has sponsored numerous meetings and academic papers to better understand wind energy's wildlife impacts - including updates to the environmental community about the latest wind-related research, events related to the biological significance of wind's impacts and a wind project permitting handbook. More information on NWCC activities is available at <http://www.nationalwind.org>.

Altamont Pass

The Altamont Pass was one of the first wind projects installed, and it remains the only wind development area in the U.S. that experiences significant bird deaths, specifically those of raptors or birds of prey (with "significant" defined as deaths of individuals of particular species that are numerous enough to possibly impact local populations of those species). While the industry recognizes that this situation is a real problem, it is largely limited to this one area and is not widespread. The Altamont Pass is unique - no other wind project combines a similar topography, very high raptor population, and old turbine technologies - and even at Altamont, the total number of bird collisions is quite low. Unfortunately, media coverage about Altamont often gives the impression that all wind power projects have a significant effect on birds, despite overwhelming evidence to the contrary.

Wind businesses have implemented many strategies to attempt to reduce bird impacts at Altamont Pass. Over the years, wind companies have painted wind turbine rotor blades, reduced rodent populations, added "perch guards" to prevent perching on turbine towers, and tested raptors' hearing, vision and avoidance capabilities to learn how to reduce bird impacts. One particularly successful strategy greatly reduced raptor electrocutions--based on earlier research, project owners modified their equipment by insulating wires, covering some exposed electric components on poles, and relocating overhead power lines to protect raptors. New projects that are built today have virtually all power lines within the project area buried. The industry is continuing to test new measures to reduce bird kills and to put into effect those that are helpful.

Even sites with high use by protected species need not necessarily be off limits to wind. At Foote Creek Rim in Wyoming, pre-construction surveys found that golden eagles frequently used the mesa's edge for hunting. The wind farm developer voluntarily redesigned the site to move the planned turbines 50 meters away from the rim, and the subsequent number of eagle deaths at the site was so small that the technical advisory committee was discontinued. A baseline and final mortality study for this project can be found at http://www.west-inc.com/wind_reports.php.

Following the realization that a problem existed with raptor kills in Altamont Pass, the wind industry has gone on to establish a record of building projects across the U.S. that are safe for birds. The industry has now responded rapidly to the discovery of a similar problem with bats in Appalachia.



Continued...

Wind Energy and Wildlife

Bats and Wind Energy Cooperative

Bats can also collide with wind turbines. Before 2003, bat fatalities at wind farms were also generally low. However, in 2003, avian studies at a new wind power plant in West Virginia discovered bat kills in numbers much larger than previously known. Since then, fatalities have been documented at higher than expected rates in Pennsylvania, Alberta, New York State and some other locations. After the initial 2003 discoveries, supporters of wind energy and bats reacted quickly, forming a new organization, the Bats & Wind Energy Cooperative (BWEC), in late 2003. BWEC includes AWEA, Bat Conservation International, the U.S. Fish and Wildlife Service and the U.S. Department of Energy's National Renewable Energy Laboratory. This initiative raises millions of dollars to fund studies designed to reduce bat mortality. BWEC is focused on finding good site screening tools and testing mitigation measures, including ultrasonic deterrent devices to warn bats away from turbines. More information on the research efforts of the Bats and Wind Energy Cooperative can be found on its website: <http://www.batsandwind.org/>.

AWEA's Siting Handbook

AWEA's Siting Handbook (www.awea.org/sitinghandbook) is an online resource with extensive links to additional information. The Siting Handbook is designed to provide technical information and useful tools based on the industry's collective experience in siting wind energy projects. Information on the types of possible project impacts, the various studies a developer can commission to understand those impacts and methods to mitigate them are also included.

Environmental Impacts

New wind projects are carefully planned to minimize environmental impact, even though wind is already one of the cleanest, most environmentally friendly energy sources because it emits no air or water pollutants or greenhouse gases, requires no mining or drilling for fuel, uses no water and produces no toxic waste.

The wind industry welcomes scrutiny of, and comparison with, all of the impacts of all sources of electricity generation. Many extensive studies of bird collisions at wind farms have been carried out, a practice that stands in marked contrast to the lack of any systematic effort to monitor direct impacts on avian species from mining and drilling, power plant emissions or pollution, or habitat loss brought on by these activities. Any public or private research effort, regulatory effort or legislative proposal designed to quantify the impact of power generation on birds, bats and other wildlife should encompass all electricity sources - not just wind.

Environmental Impacts of Electricity Sources

	Wind	Nuclear	Coal	Natural Gas
Global Warming Pollution	None	None	Yes	Yes
Air Pollution	None	None	Yes	Limited
Mercury	None	None	Yes	None
Mining/Extraction	None	Yes	Yes	Yes
Waste	None	Yes	Yes	None
Water Use	None	Yes	Yes	Yes
Habitat Impacts	Yes	Yes	Yes	Yes



Wind Energy and Wildlife

The list of environmental and wildlife impacts of other energy sources is long and varied, including:

- Habitat impacts from mining (coal, uranium), drilling (natural gas, oil), and compressing fuel (natural gas). Some of these effects are local, while others can extend over fairly broad areas.
- Habitat impacts from air and water pollution: acid rain, smog, mercury, drilling wastewater disposal (fossil fuels).
- Habitat impacts from global warming (fossil fuels). Significant changes in some species' ranges are already occurring, particularly in northern latitudes.
- Habitat impacts from thermal pollution of water (nuclear and fossil power plants).
- Habitat impacts from flooding of land and streamflow changes (hydro).
- Habitat impacts from waste disposal (coal).

While wind plants and their construction definitely have local impacts, the use of wind energy largely avoids these more far-reaching effects. The picture with human health impacts is similar. Air pollution in particular has been linked to a number of human ailments, including heart and lung problems. Greater use of wind energy will reduce these concerns.

Commitment to Wildlife Protection

The industry has been conducting avian studies at wind sites across the country for more than 20 years. Pre-construction wildlife surveys are common practice throughout the industry. Typically a wildlife consultant is retained, and efforts are made to contact state and federal fish and wildlife agencies and local wildlife groups (e.g., Audubon chapters, Izaak Walton League chapters) to identify any issues of possible concern. The consultant examines the proposed site and prepares a detailed report on impacts for review by the developer. Post-construction monitoring of bird kills at several wind sites in a wide variety of geographic locations (Vansycle Ridge, Oregon; Ponnequin, Colorado; Foote Creek Rim, Wyoming; Buffalo Ridge, Minnesota; Searsburg, Vermont; Garrett, Pennsylvania) has validated the industry's ability to assess risk to birds and build safe projects.

Land Use and Wildlife Habitat

All fuel extraction and energy generation activities affect habitat and land use. Mining, drilling, fuel transportation and waste treatment for fossil fuels can all be land-intensive activities, while pollution from fossil fuel combustion can affect broad geographic areas. A wind energy project can also be land-intensive, but the land is used quite differently. The "fuel extraction" and electricity generation take place at the same site year after year. Wind projects occupy anywhere from 28-83 acres per megawatt depending on local terrain, but only 2-5% of the project area is needed for turbine foundations, roads or other infrastructure.

Habitat fragmentation can occur at projects in relatively pristine areas due to trees being removed around turbines; also, new "edges" created in a forest (when parts of it are cleared for turbines or service roads) are detrimental to some species, and the presence of turbines causes some species or individual animals to avoid previously viable habitats. The wind energy industry is partnering with conservation groups and government agencies to avoid, minimize and mitigate these impacts where possible.

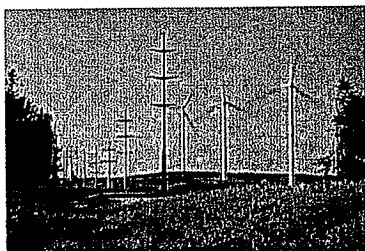
Given wind energy's very low environmental impact (no air or water pollution, no global warming pollutants, no waste) compared with other energy sources, it should remain the energy source of choice for anyone concerned about preserving the natural environment.



Building a Green Power Superhighway

What is a green power superhighway?

"Green power superhighway" is a term used to describe the power lines that would be carrying electricity from remote to populated areas. A national green power superhighway would allow plentiful domestic sources of renewable energy to be put to use powering homes and even vehicles, reducing carbon dioxide emissions as well as energy prices. It would cultivate economic development and create jobs in regions where they are most needed.



FOR MORE INFORMATION, PLEASE CONTACT:

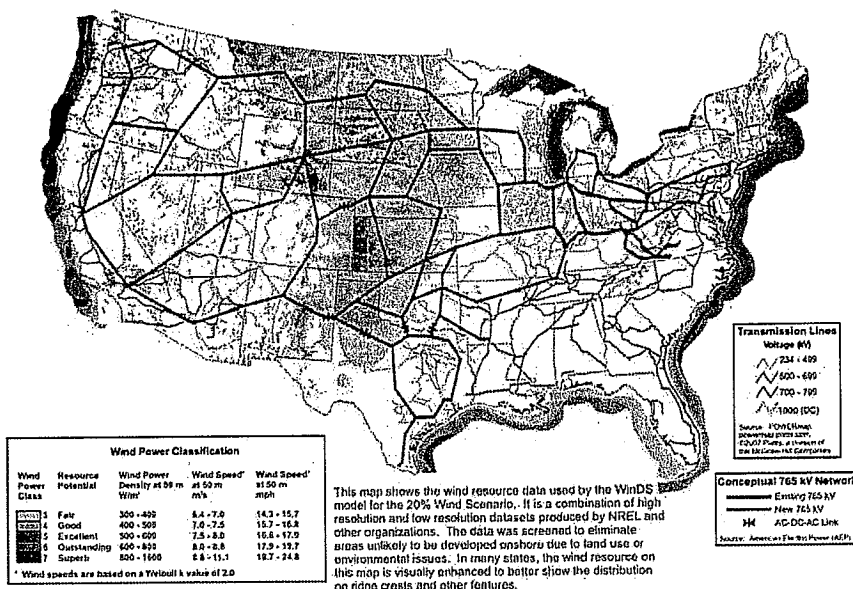
Rob Gramlich,
Senior Vice President of Public Policy

Michael Goggin,
Electric Industry Analyst

Aaron Severn,
Energy Legislation Manager

What could a green power superhighway look like?

Conceptual Transmission Expansion Plan to Accommodate 400 Gigawatts (GW) of Wind Power



Source: American Electric Power

Why do we need to build a new infrastructure?

The U.S. Department of Energy has identified transmission limitations as the largest obstacle to realizing the economic, environmental, and energy security benefits of obtaining 20% of the nation's electricity from wind power.

Currently, almost 300,000 megawatts (MW) of proposed wind projects, more than enough to meet 20% of the country's electricity needs, are waiting in line to connect to the grid because there is not enough transmission capacity to carry the electricity they would produce.

Outdated policies – not technical or economic barriers – are the chief factors holding up the construction of green power superhighways.

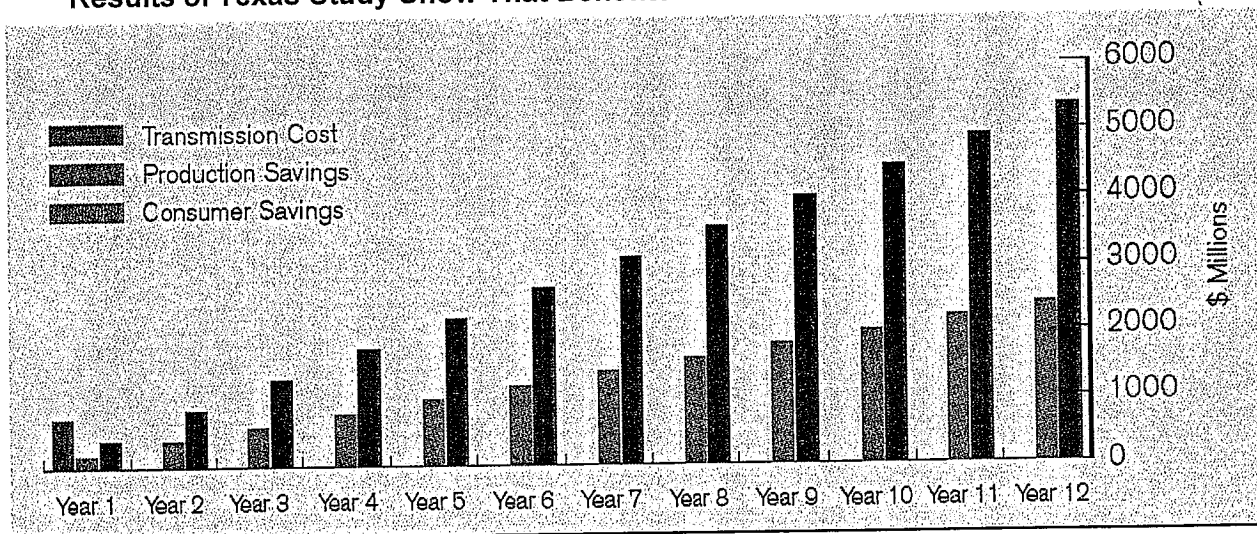


What are the costs and benefits of building green power superhighways?

Studies have found that the costs of transmission investments needed to integrate wind power and other renewables are significantly outweighed by the consumer savings that those investments produce, and that the new power lines would pay for themselves within three to seven years.

Benefits to consumers include providing consumers with access to lower-cost electricity, protecting consumers against volatility in the price of fuels, increasing competition in wholesale power markets, and eliminating costly blackouts.

Results of Texas Study Show That Benefits of Transmission Exceed Wind Costs



Source: Electric Reliability Council of Texas

What action is needed?

Planning: Congress should give the Federal Energy Regulatory Commission (FERC) authority to oversee the creation of an interconnection-wide plan that includes both extra-high-voltage transmission lines and the lower-voltage feeder lines that are necessary to facilitate the development of green power superhighways.

Paying: Congress should direct FERC to allocate, on an interconnection-wide basis, the costs of these transmission lines across all entities that provide retail electricity. These costs should be allocated based on an entity's electricity usage.

Permitting: Substantial reform of the transmission siting process is required. The most effective model for siting is the full siting authority that is given to FERC over interstate natural gas pipelines. For green power superhighways, the extra-high-voltage facilities defined in the regional plans should be subject to FERC approval and permitting.



The Hidden Costs of Energy: National Academy of Sciences

Study Excerpts

» Burning fossil fuels for transportation and for electricity generation costs the U.S. \$120 billion a year, primarily in health damages.

» Coal plants are the biggest source of such external, or "hidden" costs, with non-climate damages alone averaging \$62 billion annually, equivalent to 3.2 cents per kWh.

» Climate-related damages from coal power plants are estimated to range from 0.1 cents to 10 cents per kWh. All models indicate that damages caused by each ton of CO₂ will be far worse in 2030 than now.

See the NAS release and study on the Web at:

<http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=12794>

Contact:

Elizabeth Salerno
Director of Industry Data and Analysis

www.awea.org

The Hidden Costs of Energy: Study by the National Academy of Sciences

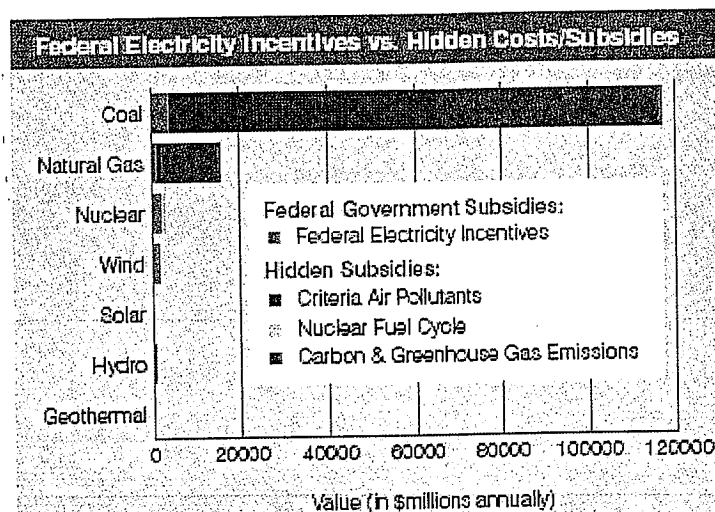
What are hidden costs?

On October 20, 2009, the National Academy of Sciences (NAS) issued an important study on the "Hidden Costs of Energy" to society. Such hidden costs, sometimes called "externalities," include such things as lung damage, asthma and premature deaths from air pollution; birth defects from mercury fallout; damage to buildings, timber harvests and ecosystem services from acid rain. While very real, they are not reflected, or "internalized," in market prices. In effect, they are a hidden subsidy for polluting energy sources.

Why this study?

As the NAS explains, "external effects associated with energy production and use are generally not taken into account into decision-making" and therefore, "when market failures like this occur, there may be a case for government interventions."

The NAS notes its study ran into time and funding limitations. Even so, the study pinpoints how large these hidden costs are. The graph below for the electricity sector shows how existing government subsidies/incentives are dwarfed by the hidden costs of pollution, largely from fossil fuels.



Data Source: National Academy of Sciences and Energy Information Administration

AMERICAN WIND ENERGY ASSOCIATION | www.awea.org | 202.383.2500



The Hidden Costs of Energy: National Academy of Sciences

What does the NAS study analyze?

The study reviews the impacts of energy technologies (electricity generation, transportation, heating) and calculates the following:

- Monetized cost impacts of emissions of "criteria" (regulated) air pollutants on public health. The primary criteria pollutants examined are sulfur dioxide (SO₂), nitrogen oxides (NO_x), and particulate matter (PM).
- Monetized cost impacts of emissions of criteria air pollutants on a few non-health categories, such as grain and timber yield and buildings.
- Ranges of potential damages from climate change—the wide range of possibilities made it impossible to develop precise estimates of cost, according to NAS.

What does the NAS study not provide?

The study does not calculate or "monetize" *all* externalities, because of the complex calculations required and limitations in time and funding for the study. Mentioned but not monetized are the following:

- Impacts of climate change (the study instead provides a broad range of cost estimates)
- Impacts of criteria air pollutants on ecosystem services (for example, acid rain impacts from sulfur dioxide on forests and water habitat)
- Impacts of "hazardous" air pollutants
- Impacts from fuel mining, drilling, and transportation
- Impacts from waste (spills, water contamination, soil contamination, disposal of pollutants caught by scrubbers)
- Potential damages associated with waste from nuclear power, or operational risk
- Risks to national security, or the military cost of protecting fuel imports
- Impacts of wind and other renewable energy sources, although the NAS finds these are "small compared with those from coal and natural gas."

Comparable studies

Country	Coal & lignite	Peat	Oil	Gas	Nuclear	Biomass	Hydro	PV	Wind
AUT				1-3		2-3	0.1		
BE	4-15			1-2	0.5				
DE	3-6		5-8	1-2	0.2	3		0.8	0.05
DK	4-7			2-3		1			0.1
EE	5-8			1-2		3-5*			0.2
FI	2-4	2-5				1			
FR	7-10		8-11	2-4	0.3	1	1		
GR	5-8		3-5	1		0-0.8	1		0.25
IE	8-8	3-4							
IT			3-8	2-3			0.3		
NL	3-4			1-2	0.7	0.5			
NO				1-2		0.2	0.2		0-0.25
PT	4-7			1-2		1-2	0.03		
SE	2-4					0.3	0-0.7		
UK	4-7		3-5	1-2	0.25	1			0.15

* : biomass co-fired with lignites

** : sub-total of quantifiable externalities (such as global warming, public health, occupational health, material damage)

A study of the European Commission on the hidden costs of electricity generation, ExternE, has findings similar to those of the NAS, with fossil fuels causing the heaviest hidden costs.

The ExternE study (<http://www.externe.info/>) looked at the external impacts, or "externalities," of electricity generation, including on human health, on materials and crops, and from climate change. Estimates are shown at left, in EUR-cents per kWh. .

Presidential Documents

Executive Order 13212 of May 18, 2001

Actions To Expedite Energy-Related Projects

By the authority vested in me as President by the Constitution and the laws of the United States of America, and in order to take additional steps to expedite the increased supply and availability of energy to our Nation, it is hereby ordered as follows:

Section 1. Policy. The increased production and transmission of energy in a safe and environmentally sound manner is essential to the well-being of the American people. In general, it is the policy of this Administration that executive departments and agencies (agencies) shall take appropriate actions, to the extent consistent with applicable law, to expedite projects that will increase the production, transmission, or conservation of energy.

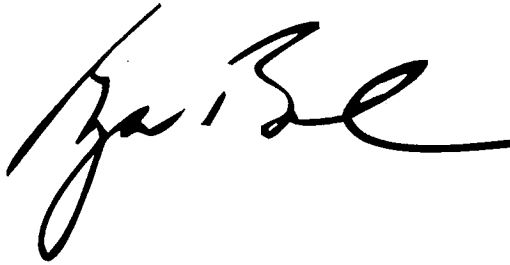
Sec. 2. Actions to Expedite Energy-Related Projects. For energy-related projects, agencies shall expedite their review of permits or take other actions as necessary to accelerate the completion of such projects, while maintaining safety, public health, and environmental protections. The agencies shall take such actions to the extent permitted by law and regulation, and where appropriate.

Sec. 3. Interagency Task Force. There is established an interagency task force (Task Force) to monitor and assist the agencies in their efforts to expedite their review of permits or similar actions, as necessary, to accelerate the completion of energy-related projects, increase energy production and conservation, and improve transmission of energy. The Task Force also shall monitor and assist agencies in setting up appropriate mechanisms to coordinate Federal, State, tribal, and local permitting in geographic areas where increased permitting activity is expected. The Task Force shall be composed of representatives from the Departments of State, the Treasury, Defense, Agriculture, Housing and Urban Development, Justice, Commerce, Transportation, the Interior, Labor, Education, Health and Human Services, Energy, Veterans Affairs, the Environmental Protection Agency, Central Intelligence Agency, General Services Administration, Office of Management and Budget, Council of Economic Advisers, Domestic Policy Council, National Economic Council, and such other representatives as may be determined by the Chairman of the Council on Environmental Quality. The Task Force shall be chaired by the Chairman of the Council on Environmental Quality and housed at the Department of Energy for administrative purposes.

Sec. 4. Judicial Review. Nothing in this order shall affect any otherwise available judicial review of agency action. This order is intended only to improve the internal management of the Federal Government and does not create any right or benefit, substantive or procedural, enforceable at law

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or equity by a party against the United States, its agencies or instrumentalities, its officers or employees, or any other person.



THE WHITE HOUSE,
May 18, 2001.

[FR Doc. 01-13117
Filed 5-21-01; 10:19 am]
Billing code 3195-01-P

00003309

74th OREGON LEGISLATIVE ASSEMBLY--2007 Regular Session

Enrolled Senate Bill 838

Sponsored by Senator AVAKIAN; Senators ATKINSON, BATES, BROWN, BURDICK, CARTER, COURTNEY, DEVLIN, GORDLY, METSGER, MONNES ANDERSON, MONROE, MORRISETTE, PROZANSKI, STARR, WALKER, WESTLUND, Representatives DINGFELDER, ROSENBAUM (at the request of Governor Theodore R. Kulongoski)

CHAPTER

AN ACT

Relating to electricity; creating new provisions; amending ORS 261.010, 261.030, 261.050, 261.235, 261.250, 261.253, 261.305, 261.335, 261.348, 261.355, 262.005, 262.015, 262.075, 757.612 and 757.687; and declaring an emergency.

Whereas the Legislative Assembly finds that it is in the interest of the state to promote research and development of new renewable energy sources in Oregon; and

Whereas the Legislative Assembly finds that it is necessary for Oregon's electric utilities to decrease their reliance on fossil fuels for electricity generation and to increase their use of renewable energy sources; and

Whereas this 2007 Act may be cited as the Oregon Renewable Energy Act; and

Whereas the Oregon Renewable Energy Act provides a comprehensive renewable energy policy for Oregon, enabling industry, government and all Oregonians to accelerate the transition to a more reliable and more affordable energy system; now, therefore,

Be It Enacted by the People of the State of Oregon:

DEFINITIONS

SECTION 1. Definitions. As used in sections 1 to 24 of this 2007 Act:

(1) "Banked renewable energy certificate" means a bundled or unbundled renewable energy certificate that is not used by an electric utility or electricity service supplier to comply with a renewable portfolio standard in a calendar year and that is carried forward for the purpose of compliance with a renewable portfolio standard in a subsequent year.

(2) "BPA electricity" means electricity provided by the Bonneville Power Administration, including all electricity from the Federal Columbia River Power System hydroelectric projects and other electricity acquired by the Bonneville Power Administration by contract.

(3) "Bundled renewable energy certificate" means a renewable energy certificate for qualifying electricity that is acquired:

(a) By an electric utility or electricity service supplier by a trade, purchase or other transfer of electricity that includes the certificate that was issued for the electricity; or

(b) By an electric utility by generation of the electricity for which the certificate was issued.

00003810

(4) "Compliance year" means the calendar year for which the electric utility or electricity service supplier seeks to establish compliance with the renewable portfolio standard applicable to the utility or supplier in the compliance report submitted under section 19 of this 2007 Act.

(5) "Consumer-owned utility" means a municipal electric utility, a people's utility district organized under ORS chapter 261 that sells electricity or an electric cooperative organized under ORS chapter 62.

(6) "Electric company" has the meaning given that term in ORS 757.600.

(7) "Electric utility" has the meaning given that term in ORS 757.600.

(8) "Electricity service supplier" has the meaning given that term in ORS 757.600.

(9) "Qualifying electricity" means electricity described in section 2 of this 2007 Act.

(10) "Renewable energy source" means a source of electricity described in section 4 of this 2007 Act.

(11) "Retail electricity consumer" means a retail electricity consumer, as defined in ORS 757.600, that is located in Oregon.

(12) "Unbundled renewable energy certificate" means a renewable energy certificate for qualifying electricity that is acquired by an electric utility or electricity service supplier by trade, purchase or other transfer without acquiring the electricity for which the certificate was issued.

QUALIFYING ELECTRICITY

SECTION 2. Qualifying electricity. (1) Except as provided in this section, and subject to section 15 of this 2007 Act, electricity generated from a renewable energy source may be used to comply with a renewable portfolio standard only if the facility that generates the electricity meets the requirements of section 3 of this 2007 Act.

(2) Any electricity that the Bonneville Power Administration has designated as environmentally preferred power, or has given a similar designation for electricity generated from a renewable resource, may be used to comply with a renewable portfolio standard.

(3) The Legislative Assembly finds that hydroelectric energy is an important renewable energy source and electricity from hydroelectric generators may be used to comply with a renewable portfolio standard as provided in sections 1 to 24 of this 2007 Act.

SECTION 3. Qualifying electricity; age of generating facility. (1) Except as provided in this section, electricity may be used to comply with a renewable portfolio standard only if the electricity is generated by a facility that becomes operational on or after January 1, 1995.

(2) Electricity from a generating facility, other than a hydroelectric facility, that became operational before January 1, 1995, may be used to comply with a renewable portfolio standard if the electricity is attributable to capacity or efficiency upgrades made on or after January 1, 1995.

(3) Electricity from a hydroelectric facility that became operational before January 1, 1995, may be used to comply with a renewable portfolio standard if the electricity is attributable to efficiency upgrades made on or after January 1, 1995. If an efficiency upgrade is made to a Bonneville Power Administration facility, only that portion of the electricity generation attributable to Oregon's share of the electricity may be used to comply with a renewable portfolio standard.

(4) Subject to the limit imposed by section 4 (5) of this 2007 Act, electricity from a hydroelectric facility that is owned by an electric utility and that became operational before January 1, 1995, may be used to comply with a renewable portfolio standard if the facility is certified as a low-impact hydroelectric facility on or after January 1, 1995, by a national certification organization recognized by the State Department of Energy by rule.

SECTION 4. Renewable energy sources. (1) Electricity generated utilizing the following types of energy may be used to comply with a renewable portfolio standard:

- (a) Wind energy.
 - (b) Solar photovoltaic and solar thermal energy.
 - (c) Wave, tidal and ocean thermal energy.
 - (d) Geothermal energy.
- (2) Except as provided in subsection (3) of this section, electricity generated from biomass and biomass byproducts may be used to comply with a renewable portfolio standard, including but not limited to electricity generated from:
- (a) Organic human or animal waste;
 - (b) Spent pulping liquor;
 - (c) Forest or rangeland woody debris from harvesting or thinning conducted to improve forest or rangeland ecological health and to reduce uncharacteristic stand replacing wildfire risk;
 - (d) Wood material from hardwood timber grown on land described in ORS 321.267 (3);
 - (e) Agricultural residues;
 - (f) Dedicated energy crops; and
 - (g) Landfill gas or biogas produced from organic matter, wastewater, anaerobic digesters or municipal solid waste.
- (3) Electricity generated from the direct combustion of biomass may not be used to comply with a renewable portfolio standard if any of the biomass combusted to generate the electricity includes:
- (a) Municipal solid waste; or
 - (b) Wood that has been treated with chemical preservatives such as creosote, pentachlorophenol or chromated copper arsenate.
- (4) Electricity generated by a hydroelectric facility may be used to comply with a renewable portfolio standard only if:
- (a) The facility is located outside any protected area designated by the Pacific Northwest Electric Power and Conservation Planning Council as of July 23, 1999, or any area protected under the federal Wild and Scenic Rivers Act, Public Law 90-542, or the Oregon Scenic Waterways Act, ORS 390.805 to 390.925; or
 - (b) The electricity is attributable to efficiency upgrades made to the facility on or after January 1, 1995.
- (5) Up to 50 average megawatts of electricity per year generated by an electric utility from certified low-impact hydroelectric facilities described in section 3 (4) of this 2007 Act may be used to comply with a renewable portfolio standard, without regard to the number of certified facilities operated by the electric utility or the generating capacity of those facilities. A hydroelectric facility described in this subsection is not subject to the requirements of subsection (4) of this section.
- (6) Electricity generated from hydrogen gas derived from any source of energy described in subsections (1) to (5) of this section may be used to comply with a renewable portfolio standard.
- (7) If electricity generation employs multiple energy sources, that portion of the electricity generated that is attributable to energy sources described in subsections (1) to (6) of this section may be used to comply with a renewable portfolio standard.
- (8) The State Department of Energy by rule may approve energy sources other than those described in this section that may be used to comply with a renewable portfolio standard. The department may not approve petroleum, natural gas, coal or nuclear fission as an energy source that may be used to comply with a renewable portfolio standard.

RENEWABLE PORTFOLIO STANDARDS

SECTION 5. Applicable standard. (1) Electric utilities must comply with the applicable renewable portfolio standard described in section 6 or 7 of this 2007 Act.

(2) Electricity service suppliers must comply with the renewable portfolio standard established under section 9 of this 2007 Act.

SECTION 6. Large utility renewable portfolio standard. (1) The large utility renewable portfolio standard imposes the following requirements on an electric utility that makes sales of electricity to retail electricity consumers in an amount that equals three percent or more of all electricity sold to retail electricity consumers:

(a) At least five percent of the electricity sold by the utility to retail electricity consumers in each of the calendar years 2011, 2012, 2013 and 2014 must be qualifying electricity;

(b) At least 15 percent of the electricity sold by the utility to retail electricity consumers in each of the calendar years 2015, 2016, 2017, 2018 and 2019 must be qualifying electricity;

(c) At least 20 percent of the electricity sold by the utility to retail electricity consumers in each of the calendar years 2020, 2021, 2022, 2023 and 2024 must be qualifying electricity; and

(d) At least 25 percent of the electricity sold by the utility to retail electricity consumers in calendar year 2025 and subsequent calendar years must be qualifying electricity.

(2) If, on the effective date of this 2007 Act, an electric utility makes sales of electricity to retail electricity consumers in an amount that equals less than three percent of all electricity sold to retail electricity consumers, but in any three consecutive calendar years thereafter makes sales of electricity to retail electricity consumers in amounts that average three percent or more of all electricity sold to retail electricity consumers, the utility is subject to the renewable portfolio standard described in subsection (3) of this section. The utility becomes subject to the standard described in subsection (3) of this section in the calendar year following the three-year period during which the utility makes sales of electricity to retail electricity consumers in amounts that average three percent or more of all electricity sold to retail electricity consumers.

(3) An electric utility described in subsection (2) of this section must comply with the following renewable portfolio standard:

(a) Beginning in the fourth calendar year after the calendar year in which the utility becomes subject to the standard described in this subsection, at least five percent of the electricity sold by the utility to retail electricity consumers in a calendar year must be qualifying electricity;

(b) Beginning in the 10th calendar year after the calendar year in which the utility becomes subject to the standard described in this subsection, at least 15 percent of the electricity sold by the utility to retail electricity consumers in a calendar year must be qualifying electricity;

(c) Beginning in the 15th calendar year after the calendar year in which the utility becomes subject to the standard described in this subsection, at least 20 percent of the electricity sold by the utility to retail electricity consumers in a calendar year must be qualifying electricity; and

(d) Beginning in the 20th calendar year after the calendar year in which the utility becomes subject to the standard described in this subsection, at least 25 percent of the electricity sold by the utility to retail electricity consumers in a calendar year must be qualifying electricity.

SECTION 7. Small electric utilities. (1) Except as provided in this section, an electric utility that makes sales of electricity to retail electricity consumers in an amount that equals less than three percent of all electricity sold to retail electricity consumers is not subject to sections 1 to 24 of this 2007 Act.

(2) Beginning in calendar year 2025, at least five percent of the electricity sold to retail electricity consumers in a calendar year by an electric utility must be qualifying electricity if the electric utility makes sales of electricity to retail electricity consumers in an amount that equals less than one and one-half percent of all electricity sold to retail electricity consumers.

(3) Beginning in calendar year 2025, at least 10 percent of the electricity sold to retail electricity consumers in a calendar year by an electric utility must be qualifying electricity if the electric utility makes sales of electricity to retail electricity consumers in an amount that equals or is more than one and one-half percent, and less than three percent, of all electricity sold to retail electricity consumers.

(4) The exemption provided by subsection (1) of this section terminates if an electric utility, or a joint operating entity that includes the utility as a member, acquires electricity from an electricity generating facility that uses coal as an energy source or makes an investment on or after the effective date of this 2007 Act in an electricity generating facility that uses coal as an energy source. This subsection does not apply to:

(a) A wholesale market purchase by an electric utility for which the energy source for the electricity is not known;

(b) BPA electricity;

(c) Acquisition of electricity under a contract entered into before the effective date of this 2007 Act;

(d) A renewal or replacement contract for a contract for purchase of electricity described in paragraph (c) of this subsection;

(e) A purchase of electricity if the electricity is included in a contract for the purchase of qualifying electricity and is necessary to shape, firm or integrate the qualifying electricity;

(f) Electricity provided to an electric utility under a contract for the acquisition of an interest in an electricity generating facility that was entered into by the utility before the effective date of this 2007 Act or entered into before the effective date of this 2007 Act by an electric cooperative organized under ORS chapter 62 of which the electric utility is a member, without regard to whether the electricity is being used to serve the load of the electric utility on the effective date of this 2007 Act; or

(g) Investments in an electricity generating facility that uses coal as an energy source if the investments are for the purpose of improving the facility's pollution mitigation equipment or the facility's efficiency or are necessary to comply with requirements or standards imposed by governmental entities.

(5) The exemption provided by subsection (1) of this section terminates for a consumer-owned utility if at any time after the effective date of this 2007 Act the utility acquires service territory of an electric company without the consent of the electric company.

(6) Beginning in the calendar year following the year in which an electric utility's exemption terminates under subsection (4) or (5) of this section, the utility is subject to the renewable portfolio standard described in section 6 (3) of this 2007 Act and related provisions of sections 1 to 24 of this 2007 Act.

(7) The provisions of this section do not affect the requirement that electric utilities offer a green power rate under section 23 of this 2007 Act.

SECTION 8. Exemptions from compliance with renewable portfolio standard. (1) Electric utilities are not required to comply with the renewable portfolio standards described in sections 6 and 7 of this 2007 Act to the extent that:

(a) Compliance with the standard would require the utility to acquire electricity in excess of the utility's projected load requirements in any calendar year; and

(b) Acquiring the additional electricity would require the utility to substitute qualifying electricity for electricity derived from an energy source other than coal, natural gas or petroleum.

(2)(a) Electric utilities are not required to comply with a renewable portfolio standard to the extent that compliance would require the utility to substitute qualifying electricity for electricity available to the utility under contracts for electricity from dams that are owned by Washington public utility districts and are located between the Grand Coulee Dam and the Columbia River's junction with the Snake River. The provisions of this subsection apply

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only to contracts entered into before the effective date of this 2007 Act and to renewal or replacement contracts for contracts entered into before the effective date of this 2007 Act.

(b) If a contract described in paragraph (a) of this subsection expires and is not renewed or replaced, the utility must comply, in the calendar year following the expiration of the contract, with the renewable portfolio standard applicable to the utility.

(3) A consumer-owned utility is not required to comply with a renewable portfolio standard to the extent that compliance would require the utility to reduce the utility's purchases of the lowest priced electricity from the Bonneville Power Administration pursuant to section 5 of the Pacific Northwest Electric Power Planning and Conservation Act of 1980, P.L. 96-501, as in effect on the effective date of this 2007 Act. The exemption provided by this subsection applies only to firm commitments for BPA electricity that the Bonneville Power Administration has assured will be available to a utility to meet agreed portions of the utility's load requirements for a defined period of time.

SECTION 9. Renewable portfolio standard for electricity service suppliers. An electricity service supplier must meet the requirements of the renewable portfolio standards that are applicable to the electric utilities that serve the territories in which the electricity service supplier sells electricity to retail electricity consumers. The Public Utility Commission shall establish procedures for implementation of the renewable portfolio standards for electricity service suppliers that sell electricity in the service territory of an electric company. If an electricity service supplier sells electricity in territories served by more than one electric company, the commission may provide for an aggregate standard based on the amount of electricity sold by the electricity service supplier in each territory. Pursuant to ORS 757.676, a consumer-owned utility may establish procedures for the implementation of the renewable portfolio standards for electricity service suppliers that sell electricity in the territory served by the consumer-owned utility.

SECTION 10. Manner of complying with renewable portfolio standards. (1) Except as provided in subsection (2) of this section, an electric utility or electricity service supplier must comply with the renewable portfolio standard applicable to the utility or supplier in each calendar year by:

(a) Using bundled renewable energy certificates issued or acquired during the compliance year;

(b) Subject to the limitations described in sections 16 and 17 of this 2007 Act, using unbundled or banked renewable energy certificates; or

(c) Making alternative compliance payments as described in section 20 of this 2007 Act.

(2) Bundled or unbundled renewable energy certificates that are issued or acquired by an electric utility or electricity service supplier on or before March 31 in a calendar year may be used by the utility or supplier to comply with the renewable portfolio standard applicable to the utility or supplier for the preceding calendar year.

SECTION 11. Implementation plan for electric companies; annual reports. (1) An electric company that is subject to a renewable portfolio standard shall develop an implementation plan for meeting the requirements of the standard and file the plan with the Public Utility Commission. Implementation plans must be revised and updated at least once every two years.

(2) An implementation plan must at a minimum contain:

(a) Annual targets for acquisition and use of qualifying electricity; and

(b) The estimated cost of meeting the annual targets, including the cost of transmission, the cost of firming, shaping and integrating qualifying electricity, the cost of alternative compliance payments and the cost of acquiring renewable energy certificates.

(3) The commission shall acknowledge the implementation plan no later than six months after the plan is filed with the commission. The commission may acknowledge the plan subject to conditions specified by the commission.

(4) The commission shall adopt rules:

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(a) Establishing requirements for the content of implementation plans;
(b) Establishing the procedure for acknowledgement of implementation plans under this section, including provisions for public comment; and

(c) Providing for the integration of the implementation plan with the integrated resource planning guidelines established by the commission and in effect on the effective date of this 2007 Act.

(5) The implementation plan filed under this section may include procedures that will be used by the electric company to determine whether the costs of constructing a facility that generates electricity from a renewable energy source, or the costs of acquiring bundled or unbundled renewable energy certificates, are consistent with the standards of the commission relating to least-cost, least-risk planning for acquisition of resources.

SECTION 11a. An electric company shall develop and file with the Public Utility Commission an initial implementation plan under section 11 of this 2007 Act no later than January 1, 2010.

COST LIMITATION

SECTION 12. Limits on cost of compliance with renewable portfolio standard. (1) Electric utilities are not required to comply with a renewable portfolio standard during a compliance year to the extent that the incremental cost of compliance, the cost of unbundled renewable energy certificates and the cost of alternative compliance payments under section 20 of this 2007 Act exceeds four percent of the utility's annual revenue requirement for the compliance year.

(2) For each electric company, the Public Utility Commission shall establish the annual revenue requirement for a compliance year no later than January 1 of the compliance year. The governing body of a consumer-owned utility shall establish the annual revenue requirement for the consumer-owned utility.

(3) The annual revenue requirement for an electric utility shall be calculated based only on the operations of the utility relating to electricity. The annual revenue requirement does not include any amount expended by the utility for energy efficiency programs for customers of the utility or for low income energy assistance, the incremental cost of compliance with a renewable portfolio standard, the cost of unbundled renewable energy certificates or the cost of alternative compliance payments under section 20 of this 2007 Act. The annual revenue requirement does include:

(a) All operating expenses of the utility during the compliance year, including depreciation and taxes; and

(b) For electric companies, an amount equal to the total rate base of the company for the compliance year multiplied by the rate of return established by the commission for debt and equity of the company.

(4) For the purposes of this section, the incremental cost of compliance with a renewable portfolio standard is the difference between the levelized annual delivered cost of the qualifying electricity and the levelized annual delivered cost of an equivalent amount of reasonably available electricity that is not qualifying electricity. For the purpose of this subsection, the commission or governing body of a consumer-owned utility shall use the net present value of delivered cost, including:

(a) Capital, operating and maintenance costs of generating facilities;

(b) Financing costs attributable to capital, operating and maintenance expenditures for generating facilities;

(c) Transmission and substation costs;

(d) Load following and ancillary services costs; and

(e) Costs associated with using other assets, physical or financial, to integrate, firm or shape renewable energy sources on a firm annual basis to meet retail electricity needs.

(5) For the purposes of this section, the governing body of a consumer-owned utility may include in the incremental cost of compliance with a renewable portfolio standard all expenses associated with research, development and demonstration projects related to the generation of qualifying electricity by the consumer-owned utility.

(6) The commission shall establish limits on the incremental cost of compliance with the renewable portfolio standard for electricity service suppliers under section 9 of this 2007 Act that are the equivalent of the cost limits applicable to the electric companies that serve the territories in which the electricity service supplier sells electricity to retail electricity consumers. If an electricity service supplier sells electricity in territories served by more than one electric company, the commission may provide for an aggregate cost limit based on the amount of electricity sold by the electricity service supplier in each territory. Pursuant to ORS 757.676, a consumer-owned utility may establish limits on the cost of compliance with the renewable portfolio standard for electricity service suppliers that sell electricity in the territory served by the consumer-owned utility.

SECTION 12a. The Public Utility Commission shall establish the methodology for determining the annual revenue requirement of an electric company for purposes of section 12 of this 2007 Act no later than July 1, 2008.

COST RECOVERY

SECTION 13. Cost recovery by electric companies. (1) Except as provided in section 20 (5) of this 2007 Act, all prudently incurred costs associated with compliance with a renewable portfolio standard are recoverable in the rates of an electric company, including interconnection costs, costs associated with using physical or financial assets to integrate, firm or shape renewable energy sources on a firm annual basis to meet retail electricity needs and other costs associated with transmission and delivery of qualifying electricity to retail electricity consumers.

(2) Costs associated with compliance with a renewable portfolio standard are not an above-market cost for the purposes of ORS 757.600 to 757.687.

(3) The Public Utility Commission shall establish an automatic adjustment clause as defined in ORS 757.210 or another method that allows timely recovery of costs prudently incurred by an electric company to construct or otherwise acquire facilities that generate electricity from renewable energy sources and for associated electricity transmission. Notwithstanding any other provision of law, upon the request of any interested person the commission shall conduct a proceeding to establish the terms of the automatic adjustment clause or other method for timely recovery of costs. The commission shall provide parties to the proceeding with the procedural rights described in ORS 756.500 to 756.610, including but not limited to the opportunity to develop an evidentiary record, conduct discovery, introduce evidence, conduct cross-examination and submit written briefs and oral argument. The commission shall issue a written order with findings on the evidentiary record developed in the proceeding.

(4) An electric company must file with the commission for approval of a proposed rate change to recover costs under the terms of an automatic adjustment clause or other method for timely recovery of costs established under subsection (3) of this section. Notwithstanding any other provision of law, upon the request of any interested person the commission shall conduct a proceeding to determine whether to approve a proposed change in rates under the automatic adjustment clause or other method for timely recovery of costs. The commission shall provide parties to the proceeding with the procedural rights described in ORS 756.500 to 756.610, including but not limited to the opportunity to develop an evidentiary record, conduct discovery, introduce evidence, conduct cross-examination and submit written briefs and oral argument. The commission shall issue a written order with findings on the evidentiary record developed in the proceeding. A filing made under this subsection is subject

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to the commission's authority under ORS 757.215 to suspend a rate, or schedule of rates, for investigation.

SECTION 13a. The Public Utility Commission shall establish the automatic adjustment clause or another method for timely recovery of costs as required by section 13 (3) of this 2007 Act no later than January 1, 2008. The clause or method shall apply to all prudently incurred costs described in section 13 (3) of this 2007 Act incurred by an electric company since the date of the company's last general rate case that was decided by the commission before the effective date of this 2007 Act.

RENEWABLE ENERGY CERTIFICATES

SECTION 14. Renewable energy certificates system. (1) The State Department of Energy shall establish a system of renewable energy certificates that can be used by an electric utility or electricity service supplier to establish compliance with the applicable renewable portfolio standard. The department shall consult with the Public Utility Commission before establishing a system of renewable energy certificates under this section. The department may allow use of renewable energy certificates that are issued, monitored, accounted for or transferred by or through a regional system or trading program, including but not limited to the Western Renewable Energy Generation Information System. The system established by the department shall allow issuance, transfer and use of renewable energy certificates in electronic form.

(2) The validity of a bundled renewable energy certificate for purposes of compliance with the applicable renewable portfolio standard is not affected by the substitution of any other electricity for the qualifying electricity at any point after the time of generation.

SECTION 15. Renewable energy certificates that may be used to comply with standards.

(1) A bundled renewable energy certificate may be used to comply with a renewable portfolio standard if:

(a) The facility that generates the qualifying electricity for which the certificate is issued is located in the United States and within the geographic boundary of the Western Electricity Coordinating Council; and

(b) The qualifying electricity for which the certificate is issued is delivered to the Bonneville Power Administration, to the transmission system of an electric utility or to another delivery point designated by an electric utility for the purpose of subsequent delivery to the electric utility.

(2) An unbundled renewable energy certificate may be used to comply with a renewable portfolio standard if the facility that generates the qualifying electricity for which the certificate is issued is located within the geographic boundary of the Western Electricity Coordinating Council.

(3) Renewable energy certificates issued for any electricity that the Bonneville Power Administration has designated as environmentally preferred power, or has given a similar designation for electricity generated from a renewable resource, may be used to comply with a renewable portfolio standard without regard to the location of the generating facility.

SECTION 16. Use, transfer and banking of certificates. (1) Renewable energy certificates may be traded, sold or otherwise transferred.

(2) Renewable energy certificates that are not used by an electric utility or electricity service supplier to comply with a renewable portfolio standard in a calendar year may be banked and carried forward indefinitely for the purpose of complying with a renewable portfolio standard in a subsequent year. For the purpose of complying with a renewable portfolio standard in any calendar year:

(a) Banked renewable energy certificates must be used, up to the limit imposed by section 17 of this 2007 Act, before other certificates are used; and

(b) Banked renewable energy certificates with the oldest issuance date must be used to comply with the standard before banked renewable energy certificates with more recent issuance dates are used.

(3) An electric utility or electricity service supplier is responsible for demonstrating that a renewable energy certificate used to comply with a renewable portfolio standard is derived from a renewable energy source and that the utility or supplier has not used, traded, sold or otherwise transferred the certificate.

(4) The same renewable energy certificate may be used by an electric utility or electricity service supplier to comply with a federal renewable portfolio standard and a renewable portfolio standard established under sections 1 to 24 of this 2007 Act. An electric utility or electricity service supplier that uses a renewable energy certificate to comply with a renewable portfolio standard imposed by any other state may not use the same certificate to comply with a renewable portfolio standard established under sections 1 to 24 of this 2007 Act.

SECTION 17. Limitations on use of unbundled certificates to meet renewable portfolio standard. (1) Except as otherwise provided in this section, unbundled renewable energy certificates, including banked unbundled renewable energy certificates, may not be used to meet more than 20 percent of the requirements of the large utility renewable portfolio standard described in section 6 of this 2007 Act for any compliance year.

(2) The limitation imposed by subsection (1) of this section does not apply to renewable energy certificates issued for electricity generated in Oregon from a renewable energy source by a net metering facility as defined in ORS 757.300, or another generating facility that is not directly connected to a distribution or transmission system.

(3) The limitation imposed by subsection (1) of this section does not apply to renewable energy certificates issued for electricity generated in Oregon by a qualifying facility under ORS 758.505 to 758.555.

(4) The limitation imposed by subsection (1) of this section does not apply to an electricity service supplier.

SECTION 17a. Notwithstanding section 17 (1) of this 2007 Act, for compliance years before 2020, a consumer-owned utility subject to the large utility renewable portfolio standard described in section 6 of this 2007 Act may use unbundled renewable energy certificates, including banked unbundled renewable energy certificates, to meet up to 50 percent of the requirements of the standard.

SECTION 18. Multistate electric companies. The Public Utility Commission by rule shall establish a process for allocating the use of renewable energy certificates by an electric company that makes sales of electricity to retail customers in more than one state.

COMPLIANCE REPORTS

SECTION 19. Compliance reports. (1) Each electric utility and electricity service supplier that is subject to a renewable portfolio standard shall make an annual compliance report for the purpose of detailing compliance, or failure to comply, with the renewable portfolio standard applicable in the compliance year. An electric company or electricity service supplier shall make the report to the Public Utility Commission. A consumer-owned utility shall make the report to the members or customers of the utility.

(2) The commission shall review each compliance report filed under this section by an electric company or electricity service supplier for the purposes of determining whether the company or supplier has complied with the renewable portfolio standard applicable to the company or supplier and the manner in which the company or supplier has complied. In reviewing the reports, the commission shall consider:

(a) The relative amounts of renewable energy certificates and other payments used by the company or supplier to meet the applicable renewable portfolio standard, including:

- (A) Bundled renewable energy certificates;
- (B) Unbundled renewable energy certificates;
- (C) Banked renewable energy certificates; and
- (D) Alternative compliance payments under section 20 of this 2007 Act.
- (b) The timing of electricity purchases.
- (c) The market prices for electricity purchases and unbundled renewable energy certificates.
- (d) Whether the actions taken by the company or supplier are contributing to long term development of generating capacity using renewable energy sources.
- (e) The effect of the actions taken by the company or supplier on the rates payable by retail electricity consumers.
- (f) Good faith forecasting differences associated with the projected number of retail electricity consumers served and the availability of electricity from renewable energy sources.
- (g) For electric companies, consistency with the implementation plan filed under section 11 of this 2007 Act, as acknowledged by the commission.
- (h) Any other factors deemed reasonable by the commission.
- (3) The commission by rule may establish requirements for compliance reports submitted by an electric company or electricity service supplier.

ALTERNATIVE COMPLIANCE PAYMENTS

SECTION 20. Electric companies; electricity service suppliers. (1) The Public Utility Commission shall establish an alternative compliance rate for each compliance year for each electric company or electricity service supplier that is subject to a renewable portfolio standard. The rate shall be expressed in dollars per megawatt-hour.

(2) The commission shall establish an alternative compliance rate based on the cost of qualifying electricity, contracts that the electric company or electricity service supplier has acquired for future delivery of qualifying electricity and the number of unbundled renewable energy certificates that the company or supplier anticipates using in the compliance year to meet the renewable portfolio standard applicable to the company or supplier. The commission shall also consider any determinations made under section 19 of this 2007 Act in reviewing the compliance report made by the electric company or electricity service supplier for the previous compliance year. In establishing an alternative compliance rate, the commission shall set the rate to provide adequate incentive for the electric company or electricity service supplier to purchase or generate qualifying electricity in lieu of using alternative compliance payments to meet the renewable portfolio standard applicable to the company or supplier.

(3) An electric company or electricity service supplier may elect to use, or may be required by the commission to use, alternative compliance payments to comply with the renewable portfolio standard applicable to the company or supplier. Any election by an electric company or electricity service supplier to use alternative compliance payments is subject to review by the commission under section 19 of this 2007 Act. An electric company or electricity service supplier may not be required to make alternative compliance payments that would result in the company or supplier exceeding the cost limitation established under section 12 of this 2007 Act.

(4) The commission shall determine for each electric company the extent to which alternative compliance payments may be recovered in the rates of the company. Each electric company shall deposit any amounts recovered in the rates of the company for alternative compliance payments in a holding account established by the company. Amounts in the holding account shall accrue interest at the rate of return authorized by the commission for the electric company.

(5) Amounts in holding accounts established under subsection (4) of this section may be expended by an electric company only for costs of acquiring new generating capacity from renewable energy sources, investments in efficiency upgrades to electricity generating facilities owned by the company and energy conservation programs within the company's service area. The commission must approve expenditures by an electric company from a holding account established under subsection (4) of this section. Amounts that are collected from customers and spent by an electric company under this subsection may not be included in the company's rate base.

(6) The commission shall require electricity service suppliers to establish holding accounts and make payments to those accounts on a substantially similar basis as provided for electric companies. The commission must approve expenditures by an electricity service supplier from a holding account established under this subsection. The commission may approve expenditures only for energy conservation programs for customers of the electricity service supplier.

SECTION 20a. The Public Utility Commission shall establish initial alternative compliance rates as required by section 20 of this 2007 Act no later than July 1, 2009.

SECTION 21. Consumer-owned utilities. The governing body of a consumer-owned utility shall establish an alternative compliance rate for the utility. To the extent possible, the alternative compliance rate shall be determined by the governing body of the consumer-owned utility in a manner similar to that used by the Public Utility Commission in establishing alternative compliance rates under section 20 of this 2007 Act. Amounts collected as alternative compliance payments by a consumer-owned utility may be used for the purposes specified in section 20 (5) of this 2007 Act and for the purpose of paying expenses associated with research, development and demonstration projects related to the generation of qualifying electricity by the utility.

PENALTY

SECTION 22. Penalty. If an electric company or electricity service supplier that is subject to a renewable portfolio standard under sections 1 to 24 of this 2007 Act fails to comply with the standard in the manner provided by sections 1 to 24 of this 2007 Act, the Public Utility Commission may impose a penalty against the company or supplier in an amount determined by the commission. A penalty under this section is in addition to any alternative compliance payment required or elected under section 20 of this 2007 Act. Moneys paid for penalties under this section shall be transmitted by the commission to the nongovernmental entity receiving moneys under ORS 757.612 (3)(d) and may be used only for the purposes specified in ORS 757.612 (1).

GREEN POWER RATE

SECTION 23. Green power rate. (1) Electric utilities shall allow retail electricity consumers to elect a green power rate. A significant portion of the electricity purchased or generated by a utility that is attributable to moneys paid by retail electricity consumers who elect the green power rate must be qualifying electricity, and the utility must inform consumers of the sources of the electricity purchased or generated by the utility that is attributable to moneys paid by consumers who elect the green power rate. The green power rate shall reasonably reflect the costs of the electricity purchased or generated by the utility that is attributable to moneys paid by retail electricity consumers who elect the green power rate. All prudently incurred costs associated with the green power rate are recoverable in a green power rate offered by an electric company.

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(2) Any qualifying electricity procured by an electric utility to provide electricity under a green power rate under subsection (1) of this section or ORS 757.603 (2)(a) may not be used by the utility to comply with the requirements of a renewable portfolio standard.

(3) The provisions of subsection (1) of this section do not apply to electric companies that are subject to ORS 757.603 (2)(a).

(4) An electric utility may comply with the requirements of subsection (1) of this section by contracting with a third-party provider.

COMMUNITY-BASED RENEWABLE ENERGY PROJECTS

SECTION 24. Goal for community-based renewable energy projects. The Legislative Assembly finds that community-based renewable energy projects are an essential element of Oregon's energy future, and declares that it is the goal of the State of Oregon that by 2025 at least eight percent of Oregon's retail electrical load comes from small-scale renewable energy projects with a generating capacity of 20 megawatts or less. All agencies of the executive department as defined in ORS 174.112 shall establish policies and procedures promoting the goal declared in this section.

JOB IMPACT STUDY

SECTION 25. Job impact study. (1) The State Department of Energy shall periodically conduct a study to evaluate the impact of sections 1 to 24 of this 2007 Act on jobs in this state. The study shall assess the number of new jobs created in the renewable energy sector in this state and the average wage rates and the provision of health care and other benefits for those jobs. In addition, the study shall investigate the extent to which workforce training opportunities are being provided to employees to prepare the employees for jobs in the renewable energy sector.

(2) The department shall conduct the first study under this section not later than two years after the effective date of this 2007 Act.

SECTION 26. Section 25 of this 2007 Act is repealed January 2, 2026.

PUBLIC PURPOSE CHARGE

SECTION 27. ORS 757.612 is amended to read:

757.612. (1) There is established an annual public purpose expenditure standard for electric companies to fund new cost-effective local energy conservation, new market transformation efforts, the above-market costs of new renewable energy resources and new low-income weatherization. The public purpose expenditure standard shall be funded by the public purpose charge described in subsection (2) of this section.

(2)(a) Beginning on the date an electric company offers direct access to its retail electricity consumers, except residential electricity consumers, the electric company shall collect a public purpose charge from all of the retail electricity consumers located within its service area *[for a period of 10 years]* until January 1, 2026. Except as provided in paragraph (b) of this subsection, the public purpose charge shall be equal to three percent of the total revenues collected by the electric company or electricity service supplier from its retail electricity consumers for electricity services, distribution, ancillary services, metering and billing, transition charges and other types of costs included in electric rates on July 23, 1999.

(b) For an aluminum plant that averages more than 100 average megawatts of electricity use per year, beginning on March 1, 2002, the electric company whose territory abuts the greatest percentage of the site of the aluminum plant shall collect from the aluminum company a public purpose charge equal to one percent of the total revenue from the sale of electricity services to the aluminum plant from any source.

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(3)(a) The Public Utility Commission shall establish rules implementing the provisions of this section relating to electric companies.

(b) Subject to paragraph (e) of this subsection, funds collected by an electric company through public purpose charges shall be allocated as follows:

(A) Sixty-three percent for new cost-effective conservation and new market transformation.

(B) Nineteen percent for the above-market costs of *[new renewable energy resources]* **constructing and operating new renewable energy resources with a nominal electric generating capacity, as defined in ORS 469.300, of 20 megawatts or less.**

(C) Thirteen percent for new low-income weatherization.

(D) Five percent shall be transferred to the Housing and Community Services Department Revolving Account created under ORS 456.574 and used for the purpose of providing grants as described in ORS 458.625 (2). Moneys deposited in the account under this subparagraph are continuously appropriated to the Housing and Community Services Department for the purposes of ORS 458.625 (2). Interest on moneys deposited in the account under this subparagraph shall accrue to the account.

(c) The costs of administering subsections (1) to (6) of this section for an electric company shall be paid out of the funds collected through public purpose charges. The commission may require that an electric company direct funds collected through public purpose charges to the state agencies responsible for implementing subsections (1) to (6) of this section in order to pay the costs of administering such responsibilities.

(d) The commission shall direct the manner in which public purpose charges are collected and spent by an electric company and may require an electric company to expend funds through competitive bids or other means designed to encourage competition, except that funds dedicated for low-income weatherization shall be directed to the Housing and Community Services Department as provided in subsection (7) of this section. The commission may also direct that funds collected by an electric company through public purpose charges be paid to a nongovernmental entity for investment in public purposes described in subsection (1) of this section. Notwithstanding any other provision of this subsection, at least 80 percent of the funds allocated for conservation shall be spent within the service area of the electric company that collected the funds.

(e)(A) The first 10 percent of the funds collected annually by an electric company under subsection (2) of this section shall be distributed to education service districts, as described in ORS 334.010, that are located in the service territory of the electric company. The funds shall be distributed to individual education service districts according to the weighted average daily membership (ADMw) of the component school districts of the education service district for the prior fiscal year as calculated under ORS 327.013. The commission shall establish by rule a methodology for distributing a proportionate share of funds under this paragraph to education service districts that are only partially located in the service territory of the electric company.

(B) An education service district that receives funds under this paragraph shall use the funds first to pay for energy audits for school districts located within the education service district. An education service district may not expend additional funds received under this paragraph on a school district facility until an energy audit has been completed for that school district. To the extent practicable, an education service district shall coordinate with the State Department of Energy and incorporate federal funding in complying with this paragraph. Following completion of an energy audit for an individual school district, the education service district may expend funds received under this paragraph to implement the energy audit. Once an energy audit has been conducted and completely implemented for each school district within the education service district, the education service district may expend funds received under this paragraph for any of the following purposes:

(i) Conducting energy audits. A school district shall conduct an energy audit prior to expending funds on any other purpose authorized under this paragraph unless the school district has performed an energy audit within the three years immediately prior to receiving the funds.

(ii) Weatherization and upgrading the energy efficiency of school district facilities.

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(iii) Energy conservation education programs.

(iv) Purchasing electricity from environmentally focused sources and investing in renewable energy resources.

(f) The commission may **not** establish a different public purpose charge than the public purpose charge [otherwise] described in subsection (2) of this section [for an individual retail electricity consumer or any class of retail electricity consumers located within the service area of an electric company, provided that a retail electricity consumer with a load greater than one average megawatt is not required to pay a public purpose charge in excess of three percent of its total cost of electricity services].

[(g) The commission shall remove from the rates of each electric company any costs for public purposes described in subsection (1) of this section that are included in rates. A rate adjustment under this paragraph shall be effective on the date that the electric company begins collecting public purpose charges.]

(4) An electric company that satisfies its obligations under this section shall have no further obligation to invest in conservation, new market transformation[, new renewable energy resources] or new low-income weatherization or to provide a commercial energy conservation services program and is not subject to ORS 469.631 to 469.645[,] and 469.860 to 469.900 [and 758.505 to 758.555].

(5)(a) A retail electricity consumer that uses more than one average megawatt of electricity at any site in the prior year shall receive a credit against public purpose charges billed by an electric company for that site. The amount of the credit shall be equal to the total amount of qualifying expenditures for new energy conservation, not to exceed 68 percent of the annual public purpose charges, and the above-market costs of purchases of new renewable energy resources incurred by the retail electricity consumer, not to exceed 19 percent of the annual public purpose charges, less administration costs incurred under this subsection. The credit may not exceed, on an annual basis, the lesser of:

(A) The amount of the retail electricity consumer's qualifying expenditures; or

(B) The portion of the public purpose charge billed to the retail electricity consumer that is dedicated to new energy conservation, new market transformation or the above-market costs of new renewable energy resources.

(b) To obtain a credit under this subsection, a retail electricity consumer shall file with the State Department of Energy a description of the proposed conservation project or new renewable energy resource and a declaration that the retail electricity consumer plans to incur the qualifying expenditure. The State Department of Energy shall issue a notice of precertification within 30 days of receipt of the filing, if such filing is consistent with this subsection. The credit may be taken after a retail electricity consumer provides a letter from a certified public accountant to the State Department of Energy verifying that the precertified qualifying expenditure has been made.

(c) Credits earned by a retail electricity consumer as a result of qualifying expenditures that are not used in one year may be carried forward for use in subsequent years.

(d)(A) A retail electricity consumer that uses more than one average megawatt of electricity at any site in the prior year may request that the State Department of Energy hire an independent auditor to assess the potential for conservation investments at the site. If the independent auditor determines there is no available conservation measure at the site that would have a simple payback of one to 10 years, the retail electricity consumer shall be relieved of 54 percent of its payment obligation for public purpose charges related to the site. If the independent auditor determines that there are potential conservation measures available at the site, the retail electricity consumer shall be entitled to a credit against public purpose charges related to the site equal to 54 percent of the public purpose charges less the estimated cost of available conservation measures.

(B) A retail electricity consumer shall be entitled each year to the credit described in this subsection unless a subsequent independent audit determines that new conservation investment opportunities are available. The State Department of Energy may require that a new independent audit be performed on the site to determine whether new conservation measures are available, provided that the independent audits shall occur no more than once every two years.

(C) The retail electricity consumer shall pay the cost of the independent audits described in this subsection.

(6) Electric utilities and retail electricity consumers shall receive a fair and reasonable credit for the public purpose expenditures of their energy suppliers. The State Department of Energy shall adopt rules to determine eligible expenditures and the methodology by which such credits are accounted for and used. The rules also shall adopt methods to account for eligible public purpose expenditures made through consortia or collaborative projects.

(7)(a) In addition to the public purpose charge provided under subsection (2) of this section, beginning on October 1, 2001, an electric company shall collect funds for low-income electric bill payment assistance in an amount determined under paragraph (b) of this subsection.

(b) The total amount collected for low-income electric bill payment assistance under this section shall be \$10 million per year. The commission shall determine each electric company's proportionate share of the total amount. The commission shall determine the amount to be collected from a retail electricity consumer, except that a retail electricity consumer is not required to pay more than \$500 per month per site for low-income electric bill payment assistance.

(c) Funds collected by the low-income electric bill payment assistance charge shall be paid into the Housing and Community Services Department Revolving Account created under ORS 456.574. Moneys deposited in the account under this paragraph are continuously appropriated to the Housing and Community Services Department for the purpose of funding low-income electric bill payment assistance. Interest earned on moneys deposited in the account under this paragraph shall accrue to the account. The department's cost of administering this subsection shall be paid out of funds collected by the low-income electric bill payment assistance charge. Moneys deposited in the account under this paragraph shall be expended solely for low-income electric bill payment assistance. Funds collected from an electric company shall be expended in the service area of the electric company from which the funds are collected.

(d) The Housing and Community Services Department, in consultation with the federal Advisory Committee on Energy, shall determine the manner in which funds collected under this subsection will be allocated by the department to energy assistance program providers for the purpose of providing low-income bill payment and crisis assistance, including programs that effectively reduce service disconnections and related costs to retail electricity consumers and electric utilities. Priority assistance shall be directed to low-income electricity consumers who are in danger of having their electricity service disconnected.

(e) Notwithstanding ORS 293.140, interest on moneys deposited in the Housing and Community Services Department Revolving Account under this subsection shall accrue to the account and may be used to provide heating bill payment and crisis assistance to electricity consumers whose primary source of heat is not electricity.

(f) Notwithstanding ORS 757.310, the commission may allow an electric company to provide reduced rates or other payment or crisis assistance or low-income program assistance to a low-income household eligible for assistance under the federal Low Income Home Energy Assistance Act of 1981, as amended and in effect on July 23, 1999.

(8) For purposes of this section, "retail electricity consumers" includes any direct service industrial consumer that purchases electricity without purchasing distribution services from the electric utility.

SECTION 28. The amendments to ORS 757.612 (3)(b)(B) by section 27 of this 2007 Act become operative on January 1, 2008.

SECTION 29. ORS 757.687 is amended to read:
757.687. (1) Beginning on the date a consumer-owned utility provides direct access to any class of retail electric consumers, the consumer-owned utility shall collect from that consumer class a nonbypassable public purpose charge [for a period of 10 years] until January 1, 2026. Except as provided in subsection (8) of this section, the amount of the public purpose charge shall be sufficient to produce revenue of not less than three percent of the total revenue collected by the consumer-owned utility from its retail electricity consumers for electricity services, distribution, ancillary

services, metering and billing, transition charges and any other costs included in rates as of July 23, 1999, except that the consumer-owned utility may exclude from the calculation of such costs any cost related to the public purposes described in subsection (5) of this section. If a consumer-owned utility has fewer than 17 consumers per mile of distribution line, the amount of the public purpose charge shall be sufficient to produce revenue not less than three percent of the total revenue from the sale of electricity services in the utility's service area to the consumer class that is provided direct access, or the utility's consumer class percentage share of state total electricity sales multiplied by three percent of total statewide retail electric revenue, whichever is less.

(2) Except as provided in subsection (9) of this section, the governing body of a consumer-owned utility shall determine the manner of collecting and expending funds for public purposes required by law to be assessed against and paid by the retail electric consumers of the utility. A determination by the governing body shall include:

- (a) The manner for collecting public purpose charges;
- (b) Public purpose programs upon which revenue from the charges may be expended; and
- (c) The allocation of expenditures for each program.

(3) Beginning on the same date two years after July 23, 1999, a consumer-owned utility shall report annually to the State Department of Energy created under ORS 469.030 on the public purpose charges paid to the utility by its retail electric consumers and the public purposes on which the revenue was expended.

(4) A consumer-owned utility may comply with the public purpose requirements of this section by participating in collaborative efforts with other consumer-owned utilities located in this state.

(5) Funds assessed and paid by, and credits or other financial assistance issued or extended to, retail electric consumers for purposes of this section may, in the discretion of the governing body of the consumer-owned utility, be expended to fund programs for energy conservation, renewable resources or low-income energy services otherwise required by the laws of this state, adopted by the governing body pursuant to the National Energy Conservation Policy Act (Public Law 95-619, as amended November 10, 1981), or conducted by the utility pursuant to agreement with the Bonneville Power Administration under the Pacific Northwest Electric Power Planning and Conservation Act (Public Law 96-501). All such funds expended, credits issued and incremental costs incurred in connection with the performance of a consumer-owned utility's obligations under this section shall be credited toward the utility's public purpose funding obligation under this section.

(6) A consumer-owned utility also may credit toward its funding obligations under this section any incremental costs incurred by the utility for capital expenditures made to reduce its distribution system energy losses, existing biomass gas and waste to energy systems, existing hydroelectric generation projects using fish attraction water, for new energy conservation and renewable resource funding costs included in its wholesale power supplier's charges and for electric power generated by renewable or cogeneration resources pursuant to requirements of the Public Utilities Regulatory Policy Act of 1978 (Public Law 95-617), to the extent that such costs exceed the average cost of the utility's other electric power resources.

(7) A consumer-owned utility also may credit toward its public purpose funding obligations under this section any costs incurred in complying with ORS 469.649 to 469.659.

(8) Beginning on March 1, 2002, a consumer-owned utility whose territory abuts the greatest percentage of the site of an aluminum plant that averages more than 100 megawatts of electricity use per year shall collect from the aluminum company a public purpose charge equal to one percent of the total revenue from the sale of electricity services to the aluminum plant from any source.

(9)(a) A retail electricity consumer that uses more than one average megawatt of electricity at any site in the prior year shall receive a credit against public purpose charges billed by a consumer-owned utility for that site. The amount of the credit shall be equal to the total amount of qualifying expenditures for new energy conservation, not to exceed 68 percent of the annual public purpose charges, and the above-market costs of purchases of new renewable energy resources incurred by the retail electricity consumer, less administration costs incurred under this subsection. The credit shall not exceed, on an annual basis, the lesser of:

(A) The amount of the retail electricity consumer's qualifying expenditures; or

(B) The portion of the public purpose charge billed to the retail electricity consumer that is dedicated to new energy conservation, new market transformation or the above-market costs of new renewable resources.

(b) To obtain a credit under this subsection, a retail electricity consumer shall file with the department a description of the proposed conservation project, new market transformation or new renewable energy resource and a declaration that the retail electricity consumer plans to incur the qualifying expenditure. The department shall issue a notice of precertification within 30 days of receipt of the filing, if such filing is consistent with this subsection. Notice shall be issued to the retail electricity consumer and the appropriate consumer-owned utility. The credit may be taken after a retail electricity consumer provides a letter from a certified public accountant to the department verifying that the precertified qualifying expenditure has been made.

(c) Credits earned by a retail electricity consumer as a result of qualifying expenditures that are not used in one year may be carried forward for use in subsequent years.

(d)(A) A retail electricity consumer that uses more than one average megawatt of electricity at any site in the prior year may request that the department hire an independent auditor to assess the potential for conservation measures at the site. If the independent auditor determines there is no available conservation measure at the site that would have a simple payback of one to 10 years, the retail electricity consumer shall be relieved of 54 percent of its payment obligation for public purpose charges related to the site. If the auditor determines that there are potential conservation measures available at the site, the retail electricity consumer shall be entitled to a credit against public purpose charges related to the site equal to 54 percent of the public purpose charges less the estimated cost of available conservation measures.

(B) A retail electricity consumer shall be entitled each year to the credit described in this paragraph unless a subsequent audit determines that new conservation investment opportunities are available. The department may require that a new audit be performed on the site to determine whether new conservation measures are available, provided that the audits occur no more than once every two years.

(C) The retail electricity consumer shall pay the cost of the audits described in this subsection.

(10) A retail electricity consumer with a load greater than one average megawatt shall not be required to pay a public purpose charge in excess of three percent of the consumer's total cost of electricity services unless the charge is established in an agreement between the consumer and the consumer-owned utility.

(11) Beginning on March 1, 2002, a consumer-owned utility shall have in operation a bill assistance program for households that qualify for federal low-income energy assistance in the consumer-owned utility's service area. A consumer-owned utility shall report annually to the Housing and Community Services Department detailing the utility's program and program expenditures.

(12) A consumer-owned utility may require an electricity service supplier to provide information necessary to ensure compliance with this section. The consumer-owned utility shall ensure the privacy and protection of any proprietary information provided.

PEOPLE'S UTILITY DISTRICTS

SECTION 30. ORS 261.010 is amended to read:

261.010. As used in this chapter, unless otherwise required by the context:

(1) "Affected territory" means that territory proposed to be formed into, annexed to or consolidated with a district.

(2) "Board of directors," "directors" or "board" means the governing body of a people's utility district, elected and functioning under the provisions of this chapter.

(3) "County governing body" means either the county court or board of county commissioners and, if the affected territory is composed of portions of two or more counties, the governing body

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of that county having the greatest portion of the assessed value of all taxable property within the affected territory, as shown by the most recent assessment roll of the counties.

(4) "Electors' petition" means a petition addressed to the county governing body and filed with the county clerk, containing the signatures of electors registered in the affected territory, equal to not less than three percent of the total number of votes cast for all candidates for Governor within the affected territory at the most recent election at which a candidate for Governor was elected to a full term, setting forth and particularly describing the boundaries of the parcel of territory, separate parcels of territory, city and district, or any of them, referred to therein, and requesting the county governing body to call an election to be held within the boundaries of the parcel of territory, separate parcels of territory, city and district, or any of them, for the formation of a district, the annexation of a parcel of territory or a city to a district, or the consolidation of two or more districts.

(5) "Electric cooperative" means a cooperative corporation owning and operating an electric distribution system.

(6) "Initial utility system" means a complete operating utility system, including energy efficiency measures and installations within the district or proposed district, capable of supplying the consumers required to be served by the district at the time of acquisition or construction with all of their existing water or electrical energy needs.

(7) "Parcel of territory" means a portion of unincorporated territory, or an area in a city comprised of less than the entire city.

(8) "People's utility district" or "district" means an incorporated people's utility district, created under the provisions of this chapter.

(9) "Replacement value of unreimbursed investment" means original cost new less depreciation of capitalized energy efficiency measures and installations in the premises of customers of an investor owned utility.

(10) "Separate parcel of territory" means unincorporated territory that is not contiguous to other territory that is a part of a district or that is described in a petition filed with the county clerk in pursuance of the provisions of this chapter, but when a proposed district includes territory in more than one county, the contiguous territory in each such county shall be considered as a separate parcel of territory. When a proposed district includes any area in a city comprised of less than the entire city, that area shall be considered as a separate parcel of territory.

(11) "Utility" means a plant, works or other property used for development, generation, storage, distribution or transmission of *[electric energy produced from resources including, but not limited to, hydroelectric, pump storage, wave, tidal, wind, solid waste, wood, straw or other fiber, coal or other thermal generation, geothermal or solar resources]* **electricity**, or development or transmission of water for domestic or municipal purposes, *[waterpower or electric energy,]* but transmission of water shall not include water for irrigation or reclamation purposes, except as secondary to and when used in conjunction with a hydroelectric plant.

SECTION 31. ORS 261.030 is amended to read:

261.030. Nothing contained in this chapter authorizes or empowers the board of directors of any people's utility district to interfere with or exercise any control over any existing utility owned and operated by any electric cooperative or city in the district unless by consent of the governing body of the electric cooperative or of the city council or the governing body of the plant owned by a city, when the control of the plant is vested in a governing body other than the city council or governing body of the city. However a district may participate fully with electric cooperatives and utilities owned by cities **in common facilities under ORS 261.235 to 261.255** and in the formation and operation of joint operating agencies *[for electric power]* under ORS chapter 262.

SECTION 32. ORS 261.050 is amended to read:

261.050. (1) All property, real and personal, owned, used, operated or controlled by any people's utility district, in or for the production, transmission, distribution or furnishing of *[electric power or energy]* **electricity** or electric service for or to the public, shall be assessed and taxed in the same manner and for the same purposes, and the district and the directors and officers thereof shall be

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subject to the same requirements, as are provided by law in respect to assessment and taxation of similar property owned, used, operated or controlled by private corporations or individuals for the purpose of furnishing *[electric power or energy]* electricity or electric service to the public.

(2) If a people's utility district owns property jointly with a tax-exempt governmental or municipal entity, only that portion of the property, or that proportion of the property rights, directly owned, used, operated or controlled by the people's utility district shall be assessed and taxed pursuant to subsection (1) of this section.

SECTION 33. ORS 261.235 is amended to read:

261.235. As used in ORS 261.235 to 261.255, unless the context requires otherwise:

(1) "City" means a city organized under the law of California, Idaho, Montana, Nevada, Oregon or Washington and owning and operating an electric light and power system.

(2) "Common facilities" means any *[works and facilities necessary or incidental to]* property used for the generation, transmission, distribution or marketing of *[electric power]* electricity and related goods and *[commodities]* services that are owned or operated jointly by a people's utility district organized under this chapter and at least one other city, district or electric cooperative.

(3) "District" means a people's utility district organized under this chapter or a similar public utility district organized under the law of California, Idaho, Montana, Nevada or Washington.

(4) "Electric cooperative" means a cooperative corporation organized under the law of California, Idaho, Montana, Nevada, Oregon or Washington and owning and operating an electric distribution system.

SECTION 34. Section 35 of this 2007 Act is added to and made a part of ORS 261.235 to 261.255.

SECTION 35. A people's utility district may become a member of an electric cooperative, or of a limited liability company, for the purposes of planning, financing, constructing, acquiring, operating, owning or maintaining property used for the generation and associated transmission of electricity within or outside this state. A district may not become a stockholder in, or lend the credit of the district to, an electric cooperative or a limited liability company. If a district becomes a member of an electric cooperative or of a limited liability company, the district may not exercise the power of eminent domain for the benefit of the electric cooperative or limited liability company.

SECTION 36. ORS 261.250 is amended to read:

261.250. (1) In carrying out the powers granted in ORS 261.245 and section 35 of this 2007 Act, a district of this state *[shall be]* is liable only for its own acts with regard to the planning, financing, construction, acquisition, operation, ownership or maintenance of common facilities. No moneys or other contributions supplied by a district of this state for the planning, financing, construction, acquisition, operation or maintenance of common facilities shall be credited or applied otherwise to the account of any other participant in the common facilities.

(2) A district shall not exercise its power of eminent domain to acquire a then existing thermal power plant or any part thereof.

SECTION 37. ORS 261.253 is amended to read:

261.253. (1) *[No]* A public contract entered into by a noninvestor-owned electric utility *[shall]* may not contain a clause or condition that imposes an unconditional and unlimited financial obligation on the electric utility that is party to the contract unless the terms and conditions of the contract are subject to approval and are approved by the electors of the people's utility district or city that owns the electric utility.

(2) Nothing in subsection (1) of this section is intended to affect provisions of law requiring approval of electors for any particular type of public contract that are in effect on October 15, 1983, or that are later enacted.

(3) Nothing in subsection (1) of this section is intended to conflict with ORS 279C.650 to 279C.670.

(4) This section does not apply to a public contract executed in connection with:

- (a) The acquisition of renewable energy certificates;
- (b) The acquisition, construction, improvement or equipping of, or the financing of any interest in, a renewable energy facility; or
- (c) The acquisition or financing of any interest in electrical capacity needed to shape, firm or integrate electricity from a renewable energy facility.

[(4)] (5) As used in this section:

(a) "Public contract" includes a contract, note, general obligation bond or revenue bond by which the people's utility district or city or any subdivision of any of them is obligated to pay for or finance the acquisition of goods, services, materials, real property or any interest therein, improvement, betterments or additions from any funds, including receipts from rates or charges assessed to or collected from its customers.

(b) "Unconditional and unlimited financial obligation" means a public contract containing a provision that the people's utility district or city that is party to the contract is obligated to make payments required by the contract whether or not the project to be undertaken thereunder is undertaken, completed, operable or operating notwithstanding the suspension, interruption, interference, reduction or curtailment of the output or product of the project.

SECTION 38. ORS 261.305 is amended to read:

261.305. People's utility districts shall have power:

- (1) To have perpetual succession.
- (2) To adopt a seal and alter it at pleasure.
- (3) To sue and be sued, to plead and be impleaded.
- (4) To acquire and hold, including by lease-purchase agreement, real and other property necessary or incident to the business of the districts, within or without, or partly within or partly without, the district, and to sell or dispose of that property; to acquire, develop and otherwise provide for a supply of water for domestic and municipal purposes, waterpower and electric energy, or electric energy generated from any utility, and to distribute, sell and otherwise dispose of water, waterpower and electric energy, within or without the territory of such districts.

(5) To acquire, own, trade, sell or otherwise transfer renewable energy certificates.

[(5)] (6) To exercise the power of eminent domain for the purpose of acquiring any property, within or without the district, necessary for the carrying out of the provisions of this chapter.

[(6)] (7) To borrow money and incur indebtedness; to issue, sell and assume evidences of indebtedness; to refund and retire any indebtedness that may exist against or be assumed by the district or that may exist against the revenues of the district and to pledge any part of its revenues. Except as provided in ORS 261.355 and 261.380, no revenue or general obligation bonds shall be issued or sold without the approval of the electors. The board of directors may borrow from banks or other financial institutions[*, on notes payable within 12 months,*] such sums as the board of directors deems necessary or advisable[*; however, the amounts so borrowed, together with the principal amounts of other like borrowings then outstanding and unpaid, shall not exceed the amount that the board of directors estimates as the district's net income (determined in accordance with the system of accounts maintained by the board pursuant to ORS 261.470) for the 12 full calendar months following the date of the proposed borrowing, adjusted by adding to the net income an amount equal to the estimated charges to depreciation for the 12-month period.*]. No indebtedness shall be incurred or assumed except [*on account of*] for the development, purchase and operation of [*a utility*] electric utility facilities or for the purchase of electricity, electrical capacity or renewable energy certificates.

[(7)] To enter into rental or lease-purchase agreements to rent, lease or acquire real or personal property, or both, required for district purposes. Except when approved by a majority of the electors of the district voting on the question, a people's utility district shall not enter into rental or leasing agreements when the annual aggregate amount of payment for any and all property directly related to a single transaction exceeds 10 percent of the revenues of the district in the preceding fiscal year.]

(8) To exercise the powers otherwise granted to districts by ORS 271.390.

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[(8)] (9) To levy and collect, or cause to be levied and collected, subject to constitutional limitations, taxes for the purpose of carrying on the operations and paying the obligations of the district as provided in this chapter.

[(9)] (10) To make contracts, to employ labor and professional staff, to set wages in conformance with ORS 261.345, to set salaries and provide compensation for services rendered by employees and by directors, to provide for life insurance, hospitalization, disability, health and welfare and retirement plans for employees, and to do all things necessary and convenient for full exercise of the powers herein granted. The provision for life insurance, hospitalization, disability, health and welfare and retirement plans for employees shall be in addition to any other authority of people's utility districts to participate in those plans and shall not repeal or modify any statutes except those that may be in conflict with the provision for life insurance, hospitalization, disability, health and welfare and retirement plans.

[(10)] (11) To enter into contracts with **any person, any public or private corporation**, the United States Government, *[with]* the State of Oregon, or with any other state, municipality or utility district, and with any department of any of these, for carrying out any provisions of this chapter.

[(11)] (12) To enter into agreements with the State of Oregon or with any local governmental unit, utility, special district or private or public corporation for the purpose of promoting economic growth and the expansion or addition of business and industry within the territory of the people's utility district. Before spending district funds under such an agreement, the board of directors shall enter on the written records of the district a brief statement that clearly indicates the purpose and amount of any proposed expenditure under the agreement.

[(12)] (13) To fix, maintain and collect rates and charges for any water, waterpower, *[electric energy]* **electricity** or other commodity or service furnished, developed or sold by the district.

[(13)] (14) To construct works across or along any street or public highway, or over any lands which are property of this state, or any subdivision thereof, and to have the same rights and privileges appertaining thereto as have been or may be granted to cities within the state, and to construct its works across and along any stream of water or watercourse. Any works across or along any state highway shall be constructed only with the permission of the Department of Transportation. Any works across or along any county highway shall be constructed only with the permission of the appropriate county court. Any works across or along any city street shall be constructed only with the permission of the city governing body and upon compliance with applicable city regulations and payment of any fees called for under applicable franchise agreements, intergovernmental agreements under ORS chapter 190 or contracts providing for payment of such fees. The district shall restore any such street or highway to its former state as near as may be, and shall not use the same in a manner unnecessarily to impair its usefulness.

[(14)] (15) To elect a board of five directors to manage its affairs.

[(15)] (16) To enter into franchise agreements with cities and pay fees under negotiated franchise agreements, intergovernmental agreements under ORS chapter 190 and contracts providing for the payment of such fees.

[(16)] (17) To take any other actions necessary or convenient for the proper exercise of the powers granted to a district by this chapter and by section 12, Article XI of the Oregon Constitution.

SECTION 39. ORS 261.335 is amended to read:

261.335. (1) **Except as provided in subsection (2) of this section**, people's utility districts are subject to the public contracting and purchasing requirements of ORS 279.835 to 279.855, 279C.005, 279C.100 to 279C.125 and 279C.300 to 279C.470 and ORS chapters 279A and 279B, except ORS 279A.140 and 279A.250 to 279A.290.

(2) **The public contracting and purchasing requirements of ORS 279.835 to 279.855, 279C.005, 279C.100 to 279C.125 and 279C.300 to 279C.470 and ORS chapters 279A and 279B do not apply to contracts entered into by districts for the acquisition, construction, improve-**

ment or equipping of a renewable energy facility or for the purchase or sale of electricity, electrical capacity or renewable energy certificates.

SECTION 40. ORS 261.348 is amended to read:

261.348. (1) Notwithstanding any other law, people's utility districts and municipal electric utilities may enter into transactions with other persons or entities for the production, supply or delivery of electricity on an economic, dependable and cost-effective basis, including financial products contracts and other service contracts that reduce the risk of economic losses in the transactions. This [section] subsection does not authorize any transaction that:

[[1]] (a) Constitutes the investment of surplus funds for the purpose of receiving interest or other earnings from the investment; or

[[2]] (b) Is intended or useful for any purpose other than the production, supply or delivery of electricity on a cost-effective basis.

(2) **Nothing in subsection (1) of this section prohibits a people's utility district or a municipal electric utility from entering into any transaction for the acquisition, construction, improvement or equipping of a renewable energy facility or for the purchase or sale of electricity, electrical capacity or renewable energy certificates.**

SECTION 41. ORS 261.355 is amended to read:

261.355. (1) For the purpose of carrying into effect the powers granted in this chapter, any district may issue and sell revenue bonds, when authorized by a majority of its electors voting at any primary election, general election or special election.

(2) All revenue bonds issued and sold under this chapter shall be so conditioned as to be paid solely from that portion of the revenues derived [from] by the district [by] from the sale of water, waterpower and [electric energy] **electricity**, or any of them, or any other service, commodity or facility which may be produced, used or furnished in connection therewith, remaining after paying from those revenues all expenses of operation and maintenance, including taxes.

(3) Notwithstanding subsection (1) of this section and subject to subsection (4) of this section, any district may, by a duly adopted resolution of its board, issue and sell revenue bonds for the purpose of **financing betterments and extensions [within the existing boundaries] of the district, including renewable energy facilities or the purchase or sale of electricity, electrical capacity or renewable energy certificates**, but the amount of revenue bonds so issued shall be limited to the reasonable value of the betterments and extensions plus an amount not to exceed 10 percent thereof for administrative purposes. Revenue bonds shall not be issued and sold for the purpose of acquiring an initial utility system or acquiring property or facilities owned by another entity that provides electric utility service **unless:**

(a) **The acquisition is a voluntary transaction between the district and the other entity that provides electric utility service; or**

(b) [without first obtaining the affirmative vote of] The electors within the district **have approved issuance of the bonds by a vote.**

(4) Not later than the 30th day prior to a board meeting at which adoption of a resolution under subsection (3) of this section will be considered, the district shall:

(a) Provide for and give public notice, reasonably calculated to give actual notice to interested persons including news media which have requested notice, of the time and place of the meeting and of the intent of the board to consider and possibly adopt the resolution; and

(b) Mail to its customers notice of the time and place of the meeting and of the intent of the board to consider and possibly adopt the resolution.

(5) **Except as provided in subsection (3)(a) of this section**, any authorizing resolution adopted for the purposes of subsection (3) of this section shall provide that electors residing within the district may file a petition with the district asking to have the question of whether to issue such bonds referred to a vote.

(6) If within 60 days after adoption of a resolution under subsection (3) of this section the district receives petitions containing valid signatures of not fewer than five percent of the electors of

the district, the question of issuing the bonds shall be placed on the ballot at the next date on which a district election may be held under ORS 255.345 (1).

(7) When petitions containing the number of signatures required under subsection (6) of this section are filed with the district within 60 days after adoption of a resolution under subsection (3) of this section, revenue bonds shall not be sold until the resolution is approved by a majority of the electors of the district voting on the resolution.

(8) Any district issuing revenue bonds may pledge that part of the revenue which the district may derive from its operations as security for payment of principal and interest thereon remaining after payment from such revenues of all expenses of operation and maintenance, including taxes, and consistent with the other provisions of this chapter.

(9) Prior to any district board taking formal action to issue and sell any revenue bonds, the board shall have on file with the secretary of the district a certificate executed by a qualified engineer that the net annual revenues of the district, including the property to be acquired or constructed with the proceeds of the bonds, shall be sufficient to pay the maximum amount that will be due in any one fiscal year for both principal of and interest on both the bonds then proposed to be issued and all bonds of the district then outstanding.

(10) **Except as provided in subsection (3)(a) of this section,** the district shall order an election for the authorization of revenue bonds to finance the acquisition or construction of an initial utility system, including the replacement value of the unreimbursed investment of an investor owned utility in energy efficiency measures and installations within the proposed district, as early as practicable under ORS 255.345 after filing the certificate required under subsection (9) of this section. An election under this subsection shall be held no more than twice in any one calendar year for any district. In even-numbered years no election shall be held on any other date than the date of the primary election or general election.

SECTION 42. ORS 262.005 is amended to read:

262.005. As used in ORS 262.015 to 262.105, unless the context requires otherwise:

(1) "Electric cooperative" means a cooperative corporation owning and operating an electric distribution system.

(2) "Joint operating agency" means an agency organized by three or more cities or people's utility districts under the laws of this state for the purposes and according to ORS 262.005 to 262.105.

(3) "Privately owned electric utility company" means an electric utility operated for profit and subject to regulation by the Public Utility Commission of Oregon or the equivalent officer or commission of any other state.

(4) "Utility properties" means *[plants, systems and facilities, and any enlargement or extension thereof, used for or incidental to the generation and transmission of electric power and energy,]* **a plant, works or other property used for development, generation, storage, distribution or transmission of electricity.** *[provided, however, that it shall not mean]* "Utility properties" **does not include** facilities for uranium refining, processing or reprocessing.

SECTION 43. ORS 262.015 is amended to read:

262.015. (1) Any three or more cities or people's utility districts or combinations thereof, organized under the laws of this state, may form a joint operating agency to plan, acquire, construct, own, operate and otherwise promote the development of utility properties *[in this state]* for the generation, *[and]* transmission **and marketing** of *[electric power and energy]* **electricity, electrical capacity or renewable energy certificates.**

(2) A joint operating agency may participate with other publicly owned utilities, including other joint operating agencies, or with electric cooperatives, or with privately owned electric utility companies, or with any combination thereof, for any purpose set forth in subsection (1) of this section, whether such agencies or utilities are organized or incorporated under the laws of this state or any other jurisdiction. However, no joint operating agency may act alone or as the managing participant to acquire, construct, own or operate utility properties, *nor may a joint operating agency own more than 50 percent of any utility property, except combustion turbines.*

(3) Joint operating agencies, cities, people's utility districts and privately owned utilities, or combinations thereof, may participate in joint ownership of *[thermal generation and transmission]* common facilities in accordance with ORS 225.450 to 225.490 or 261.235 to 261.255.

SECTION 44. ORS 262.075 is amended to read:

262.075. (1) Each joint operating agency shall be a political subdivision of the State of Oregon, and shall be a municipal corporation with the right to sue and be sued in its own name. Except as otherwise provided, a joint operating agency shall have all the powers, rights, privileges and exemptions conferred on people's utility districts.

(2) A joint operating agency shall have the power to acquire, hold, sell and dispose of real and other property, within or without this state, which the board of directors in its discretion finds reasonably necessary or incident to the generation, *[and]* transmission and marketing of *[electric power and energy]* electricity, electrical capacity or renewable energy certificates. However, such an agency shall not acquire or operate any facilities for the distribution of *[electric energy]* electricity.

(3) A joint operating agency shall have the power of eminent domain which it may exercise for the purpose of acquiring property; however, a joint operating agency shall not condemn any properties owned by a publicly or privately owned utility which are being used for the generation or transmission of *[electric energy or power]* electricity or are being developed for such purposes with due diligence, except to acquire a right of way to cross such properties in a manner which will not interfere with the use thereof by the owner.

(4) A joint operating agency shall have the power to enter into contracts, leases and other undertakings considered necessary or proper by its board, including but not limited to contracts for any term relating to the purchase, sale, interchange, assignment, allocation, transfer or wheeling of power with the Government of the United States, or any agency thereof, and with any other municipal corporation or privately owned utility, or any combination thereof, within or without the state, and may purchase, deliver or receive power anywhere.

(5) A joint operating agency shall have the power to borrow money and incur indebtedness, to issue, sell and assume evidences of indebtedness, to refund and retire any indebtedness that may exist against the agency or its revenues, and to pledge any part of its revenues. A joint operating agency may borrow from banks or other financial institutions such sums on such terms as the board considers necessary or advisable. A joint operating agency may also issue, sell and assume bond anticipation notes, refunding bond anticipation notes, or their equivalent, which shall bear such date or dates, mature at such time or times, be in such denominations and in such form, be payable in such medium, at such place or places, and be subject to such terms of redemption, as the board considers necessary or advisable. The issuance and sale of revenue obligations by a joint operating agency shall be governed by ORS 262.085.

(6) The joint operating agency may apply for, accept, receive and expend appropriations, grants, loans, gifts, bequests and devises in carrying out its functions as provided by law.

COST RECOVERY FOR CONSERVATION MEASURES

SECTION 45. Section 46 of this 2007 Act is added to and made a part of ORS 757.600 to 757.687.

SECTION 46. (1) In addition to the public purpose charge established by ORS 757.612, the Public Utility Commission may authorize an electric company to include in its rates the costs of funding or implementing cost-effective energy conservation measures implemented on or after the effective date of this 2007 Act. The costs may include amounts for weatherization programs that conserve energy.

(2) The commission shall ensure that a retail electricity consumer with a load greater than one average megawatt:

(a) Is not required to pay an amount that is more than three percent of the consumer's total cost of electricity service for the public purpose charge under ORS 757.612 and any amounts included in rates under this section; and

(b) Does not receive any direct benefit from energy conservation measures if the costs of the measures are included in rates under this section.

MISCELLANEOUS

SECTION 47. The unit and section captions used in this 2007 Act are provided only for the convenience of the reader and do not become part of the statutory law of this state or express any legislative intent in the enactment of this 2007 Act.

SECTION 48. This 2007 Act being necessary for the immediate preservation of the public peace, health and safety, an emergency is declared to exist, and this 2007 Act takes effect on its passage.

Passed by Senate April 10, 2007

Repassed by Senate May 25, 2007

.....
Secretary of Senate

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President of Senate

Passed by House May 23, 2007

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Speaker of House

Received by Governor:

.....M.,....., 2007

Approved:

.....M.,....., 2007

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Governor

Filed in Office of Secretary of State:

.....M.,....., 2007

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Secretary of State

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Oregon Renewable Energy Standard: Progress Made and Remaining Opportunities

The Renewable Northwest Project (RNP) initiated an analysis in 2008 to estimate progress made towards achievement of the Oregon Renewable Energy Standard (RES) benchmarks. The news is good: many of Oregon's utilities are well on their way to meeting or exceeding the first RES. For most utilities, meeting subsequent RES benchmarks will require securing additional renewable energy. Oregon utilities are estimated to have over 400 average megawatts (MWa) of renewables to-date for RES compliance. The following summarizes RNP's primary findings in greater detail.¹

Oregon

The Oregon RES, signed into law in 2007, applies to all utilities and electricity service suppliers (ESS) serving Oregon load, but the compliance targets vary with the size of the utility. Utilities serving 3% or more of Oregon's total retail electric sales—currently Portland General Electric, PacifiCorp, and Eugene Water and Electric Board—must meet the following targets:

- 5% by 2011
- 15% by 2015
- 20% by 2020
- 25% for 2025 and beyond.

Smaller utilities that represent at least 1.5% but less than 3% of Oregon's total retail electric sales have a target of 10% by 2025 but no interim targets. Utilities in this size category make up the remainder of RNP's Oregon RPS analysis. We did not study the smallest utilities with electric sales below 1.5% that have a 5% target for 2025.

The Oregon RES contains provisions for banking Renewable Energy Certificates (RECs). No more than 20% of any annual target may be met with unbundled RECs for the three largest utilities, but this was not factored into RNP's analysis.

All three of Oregon's largest utilities meet or exceed the 5% by 2011, with or without banking. With banking, the utilities are also on track to exceed the 2015 benchmark. By 2020, the three utilities will need to acquire additional resources. Seven of nine utilities with a 2025 target are projected to need more renewable energy resources than they have currently secured. The projected additional renewable energy needed over the next 16 years for 2025 compliance is 1,143 average megawatts (MWa).

A table summarizing our findings is on the following page.

¹ RNP gathered data about utilities' renewable energy acquisitions (existing or planned), load, and load growth forecasts, all drawn largely from public sources such as integrated resource plans, utility websites, press releases, the Energy Information Administration, and the Bonneville Power Administration. This data was used to calculate renewable energy needs for RES compliance and then compared with known acquisitions. RNP provided each utility studied with a copy of the draft results for their review and feedback. RNP updated its analysis based on utility input received. Utility involvement, however, does not represent endorsement of RNP's analysis and some utilities chose not to respond with any feedback. Further, RNP recognizes that utility plans change and evolve over time, so this analysis is a snapshot in time based on the best available data and only an estimate of what may come to pass.

Oregon Renewable Energy Standard: Progress Made and Remaining Opportunities

Oregon								
Utility	2008 Estimated Annual Load (MWa)	Annual Growth Rate*	Renewables Acquired (MWa)	Renewables Compliance Shortfall / (Surplus) w/ banking (MWa)			10% or 25% by 2025**	
				5% by 2011	15% by 2015	20% by 2020		
EWEB	312	1.2%	18	#	#	55	95	
Central Lincoln	154	1.5%	0	n/a	n/a	n/a	20	
Clatskanie	119	1.5%	1	n/a	n/a	n/a	#	
Idaho Power	91	1.4%	42	n/a	n/a	n/a	#	
PGE	2,406	2.0%	250	#	#	353	583	
McMinnville	100	1.5%	0	n/a	n/a	n/a	13	
Springfield	93	1.5%	3	n/a	n/a	n/a	12	
Umatilla	95	1.5%	0	n/a	n/a	n/a	12	
PacifiCorp OR	1,778	0.6% thru 2016; 1.3% thereafter	117	#	#	276	407	
TOTAL RENEWABLES ACQUIRED TO-DATE:			431 MWa					
ADDITIONAL RENEWABLES NEEDED FOR 2025 COMPLIANCE (w/ Banking) in MWa:				684			1,143	
NOTE: Renewables here encompasses any eligible resources as defined by a state's RES, which in Oregon may include biomass & biomass products, electricity from hydrogen derived by an eligible resource, hydropwer, geothermal, solar, wave, tidal, ocean, & wind. For utilities with only a portion of their service territory in Oregon, assumptions were made about resource allocation based on consultation with utility staff.								
* Annual growth rates taken from utility sources whenever possible; in all other cases, annual growth rate assumed to be 1.5% for smaller PUDs (<200 MWa annual load) or 1.2% for large PUDs (>200 MWa annual load) (assumed values derived from the 2007 BPA White Book, PNW Loads and Resource Study; here applies to Central Lincoln, Clatskanie, McMinnville, Springfield, & Umatilla)								
** Large Utilities' obligation is 25% by 2025 (applies to PGE, PacifiCorp, & EWEB); small utilities' obligation is 10% by 2025 (applies to Central Lincoln, Clatskanie, Idaho Power, McMinnville, Springfield, and Umatilla)								
# This designates a projected surplus. We do not have information on the utilities' plans for projected surpluses, so a specific value is not stated for the final compliance year.								

References

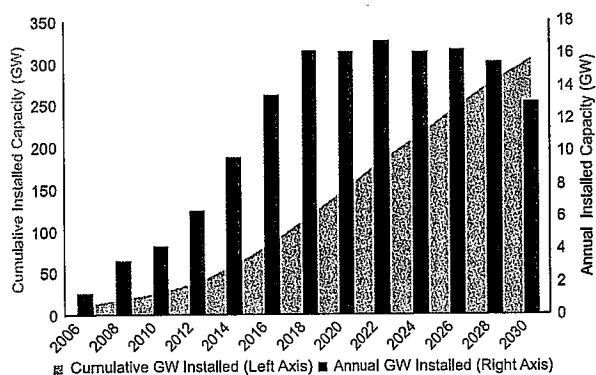
- "2007 Integrated Resource Plan." PacifiCorp (05/30/07).
- "2007 Pacific Northwest Loads and Resources Study (2007 White Book)." Bonneville Power Administration (03/07).
- "2008 Integrated Resource Plan Update." Idaho Power (06/08).
- Communications with Clatskanie PUD staff (12/03/08).
- Communications with Eugene Water and Electric Board staff (12/12/08 & 01/16/09).
- Communications with Idaho Power staff (12/10/08).
- Communications with Portland General Electric staff (09/24/08, 10/22/08, & 12/12/08).
- Communications with PacifiCorp staff (10/20/08 & 11/12/08).
- Communications with Springfield Utility Board staff (11/20/08).
- "eGRID2007 Version 1.0." U.S. Environmental Protection Agency (10/16/08).
- "EIA Electric Sales, Revenue, and Average Price, Table 10: Class of Ownership, Number of Consumers, Revenue, Sales, and Average Retail Price by State and Utility: All Sectors, 2006." Energy Information Administration (11/07).
- "EWEB 2007 Facts and Figures." Eugene Water and Electric Board (2008).
- "Integrated Resource Plan 2009 – 1st Stakeholder Presentation & Discussion." Portland General Electric (06/12/08).
- "Integrated Resource Plan 2009 – Second Stakeholder Presentation & Discussion." Portland General Electric (08/21/08).
- "Power Plants in the Pacific Northwest and System Planning Assumptions table." Northwest Power and Conservation Council (10/21/08 version).
- "Renewable Resource Update – Oregon Public Utility Commission." Pacific Power (06/10/08).
- "The Fifth Northwest Electric Power and Conservation Plan." Northwest Power and Conservation Council (05/05).

20% Wind Energy by 2030

Increasing Wind Energy's Contribution to U.S. Electricity Supply

Wind power can play a major role in meeting America's increasing demand for electricity, according to a groundbreaking technical report, *20% Wind Energy by 2030: Increasing Wind Energy's Contribution to U.S. Electricity Supply*, prepared by the U.S. Department of Energy with contributions from the National Renewable Energy Laboratory, the American Wind Energy Association, Black & Veatch and others from the energy sector.

Figure A. Annual and cumulative wind installations by 2030



The report explores one scenario for reaching 20% wind electricity by 2030 and contrasts it to a scenario in which no new U.S. wind power capacity is installed. It examines costs, major impacts and challenges associated with the 20% Wind Scenario. It investigates requirements and outcomes in the areas of technology, manufacturing, transmission and integration, markets, environment and siting. The report finds that the Nation possesses affordable wind energy resources far in excess of those needed to enable a 20% scenario.

The 20% Wind Scenario

To implement the 20% Wind Scenario, new wind power installations would increase to more than 16,000 MW per year by 2018, and continue at that rate through 2030, as shown in Figure A. Wind plant costs and performance are projected to improve modestly over the next two decades, but no technological breakthroughs are needed. In the 20% wind scenario, 46 states would experience significant wind power development.

Economic Impacts of Wind Power

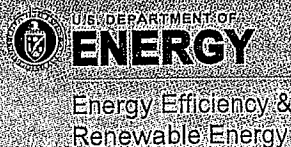
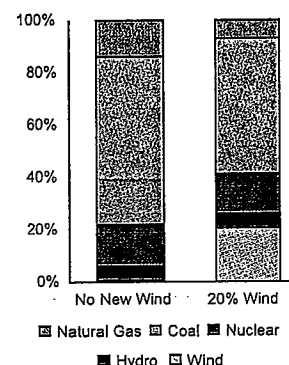
The report finds that, during the decade preceding 2030, the U.S. wind industry could:

- support roughly 500,000 jobs in the U.S., with an annual average of more than 150,000 workers directly employed by the wind industry;
- support more than 100,000 jobs in associated industries (e.g., accountants, lawyers, steel workers, and electrical manufacturing);
- support more than 200,000 jobs through economic expansion based on local spending;
- increase annual property tax revenues to more than \$1.5 billion by 2030; and
- increase annual payments to rural landowners to more than \$600 million in 2030.

Energy Security and Price Stability

Using more domestic wind power will diversify the nation's energy portfolio — adding wind-generated electricity at stable prices not subject to market volatility — and strengthening national energy security through reduced reliance on foreign sources of natural gas. The 20% Wind Scenario would alter U.S. electricity generation as shown in Figure B. In this scenario, wind would supply enough energy to displace about 50% of electric utility natural gas consumption by 2030. This amounts to an 11% reduction in natural gas across all industries. Also, coal consumption would be reduced by 18%. In addition, electric utilities are learning how to accommodate wind's variability while maintaining system reliability.

Figure B. U.S. electrical energy mix



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Significant Reductions of Greenhouse-Gas (GHG) Emissions

Carbon dioxide (CO₂) is the principal GHG in the earth's atmosphere. Approximately 40% of total U.S. CO₂ emissions come from power generation facilities. Since substantial amounts of coal and natural gas fuels would be displaced, the 20% Wind Scenario could reduce CO₂ emissions in 2030 by 825 million metric tons – 25% of the CO₂ emissions from the nation's electric sector in the no-new-wind scenario. As shown in Figure C, this reduction could nearly level projected growth in CO₂ emissions from electricity generation.

Siting Strategies and Environmental Effects

The report examines siting issues and effects that an increase in wind power facilities may have on compatible land uses, water use, aesthetics, and wildlife habitats. Wind energy avoids many of the undesirable environmental impacts from other forms of electricity production, such as impacts from fuel mining, transport and waste management.

Unlike fossil-fuel and nuclear generation, which use significant quantities of water for power plant cooling, wind power generation consumes no water during operations. Generating 20% of U.S. electricity from wind would reduce water consumption in the electric sector in 2030 by 17%.

Incremental Cost of the 20% Wind Scenario

Costs incurred by the 20% Wind Scenario exceed those of the no-new-wind scenario by about 2%. Although the 20% wind scenario would incur higher initial capital costs, a large portion of those costs would be offset by \$155 billion in lower fuel expenditures. The estimated incremental investment would be \$43 billion (net-present-value basis; 2006\$). This corresponds to about 0.06¢/kWh of total generation, or about 50¢ per month for the average household. These monetary costs do not reflect other potential offsetting positive impacts.

Challenges

Major challenges along the 20% Wind Scenario path include these:

- Investment in the nation's transmission system is needed so that the electricity generated is delivered to urban centers that need the increased supply;
- Developing larger electric load balancing areas, in tandem with better regional planning, are needed so that regions can depend on a diversity of generation sources, including wind power;
- Significant growth is needed in the manufacturing supply chain, providing jobs and remedy the current shortage in parts for wind turbines;
- Continued reduction in wind capital cost and improvement in turbine performance through technology advancement and improved manufacturing capabilities is needed; and
- Addressing potential concerns about local siting, wildlife, and environmental issues within the context of generating electricity is needed.

The 20% Wind Scenario is not likely to be realized in a business-as-usual future. Achieving this scenario would involve a major national commitment to clean, domestic energy sources with minimal emissions of GHGs and other environmental pollutants.

More Information on the 20% Wind Scenario

The complete report and related information can be downloaded from the following web links:

www.eere.energy.gov/windandhydro

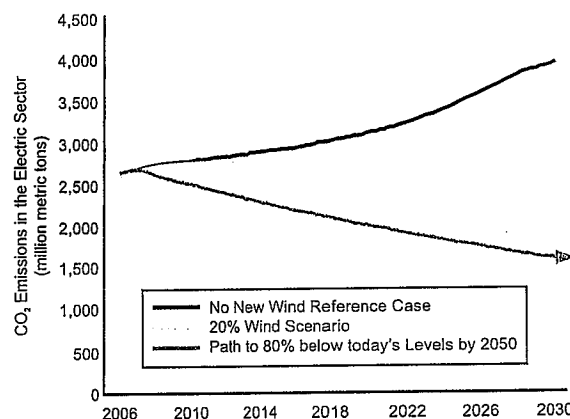
www.nrel.gov/docs/fy08osti/41869.pdf

www.20percentwind.org

More information is available on the web at:

www.eere.energy.gov/windandhydro
www.nrel.gov/docs/fy08osti/41869.pdf
www.20percentwind.org

Figure C. Avoided emissions would nearly level projected growth in CO₂ emissions from the electricity sector



U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy



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May 2008

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Renewable Electricity Standard (RES)

What is a Renewable Electricity Standard?

The Renewable Electricity Standard (RES), also known as a Renewable Portfolio Standard (RPS), sets hard targets for renewable energy in the near- and long-term to diversify our energy, reduce pollution, conserve water and save consumers money.

25% renewable electricity by 2025

A national standard of 25% renewable electricity by the year 2025, with strong near-term targets, ensures that we create jobs, increase American manufacturing, and foster economic development.

Wind works

- Wind is pure: no mining, no drilling, no waste, no pollution, no water use.
- Wind is renewable and will never run out: America has enough wind to power the entire country nine times over.
- Wind is affordable: Wind saves consumers money and protects us from fuel-price risk.

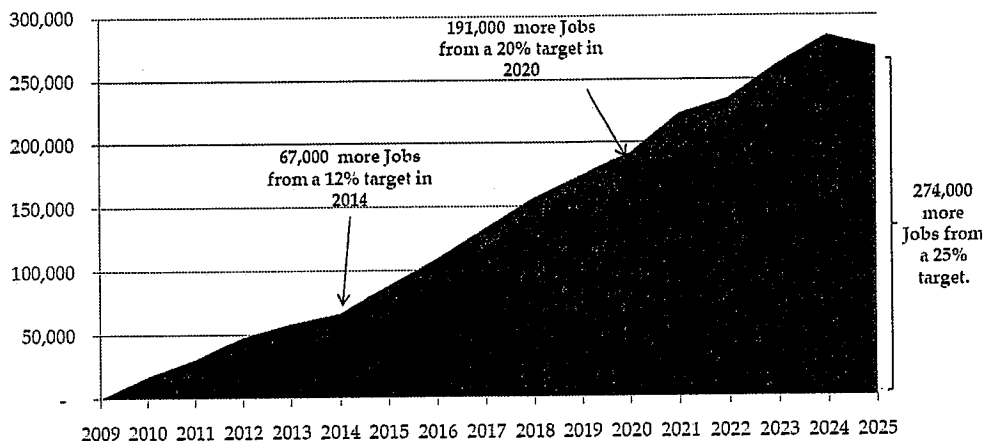
Why does America want a national RES?

✓ America wants economic development:

A national RES of 25% by 2025 would provide \$13.5 billion to landowners in the form of lease payments, according to a study from the Union of Concerned Scientists. An additional \$11.5 billion would flow to communities through new local tax revenues. These revenue streams improve the lives of landowners and revitalize their communities.

✓ America wants jobs, jobs, jobs:

A national RES will create an additional 274,000 jobs in the U.S., in such areas as construction, operations, and engineering. Over 50% of these jobs will be created in the manufacturing sector.



Source: Navigant Consulting, Inc. for RES-Alliance for Jobs, 2010

✓ America should be a leader in new manufacturing:

Stable markets and long-term signals are the easiest way to attract billions of dollars in new manufacturing investment to the U.S. The U.S. is in a foot race with dozens of countries around the world for new wind industry manufacturing and must act soon to become a leader.

✓ American voters are demanding more wind and an RES:

Americans want wind power. A March 2010 poll shows strong bipartisan support for wind and a national RES. An overwhelming 89 percent of voters believe increasing wind energy is a good idea. In addition, 77 percent of voters support passage of a 25% national RES.

From Snack Bars to Rebar: How Project Development Boosted Local Businesses Up and Down the Wind Energy 'Supply Chain' in Lamar, Colorado

**Craig Cox
March 2004**

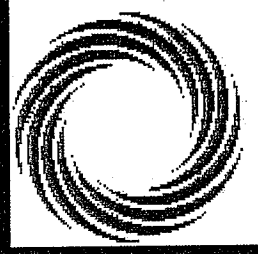
Conducted on behalf of Bob Lawrence & Associates
for U.S. DOE under Grant Number SF22339

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Background: Xcel Energy Rejects Windfarm Proposal

- 1999-2000: Xcel Energy issues RFP for new power generation. Xcel rejects 162MW Enron Wind proposal
 - Xcel opts for all-natural gas portfolio.
- 2001: Advocates take case to Colorado Public Utilities Commission

*Lead plaintiffs: Colorado
Renewable Energy Society
and Land and Water Fund
of the Rockies**



*The Land and Water Fund is now "Western Resource Advocates"

February 2001: PUC Orders Xcel to Negotiate Wind Acquisition

“We find that adding Enron’s Lamar wind energy bid to [Xcel’s] preferred resource plan is in the public interest and comports with the IRP rules, [and will] likely lower the cost of electricity for Colorado’s ratepayers... After a careful analysis of the economics of the wind bid, we find that it is justified on purely economic grounds, without weighing other benefits of wind generation that could be considered under the IRP rules.”

(Colorado PUC, Decision No. C01-295, page 34.)

Important Results from Colorado PUC's 2001 Decision

- New wind generation on Xcel's system is predicted to cost less than new gas-fired generation, assuming that gas costs are more than \$3.50 per million cubic feet (mcf)
- New wind power receives a fair capacity value, based on Xcel's method and data
- Ancillary services to back up new wind power are not a major cost.

From NREL/CP-500-30551, "Colorado Public Utility Commission's Xcel Wind Decision

The PUC was Right: Xcel Energy Says Wind Energy Will Save Consumers \$4.6 Million

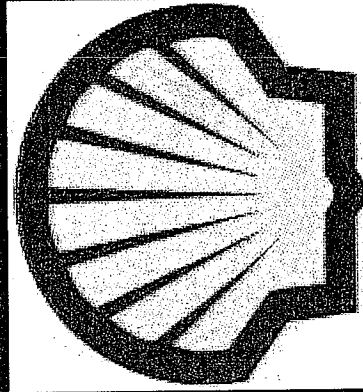
- The new wind farm that Xcel Energy is building near Lamar will save consumers \$4.6 million in their power bills.

– From Xcel Energy testimony by Ronald Darnell to FERC,
16 June 2003

**October 2003: Project Sold by
GE Wind Energy to PPM Energy
and Shell for \$211 Million...
Largest-Ever Capital Investment
in Prowers County**



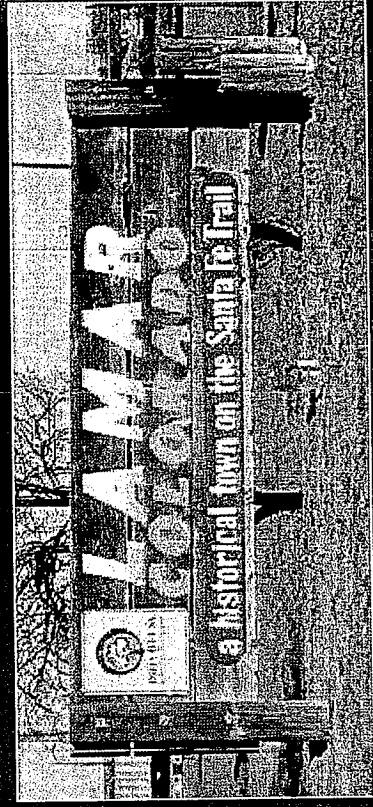
GE Wind Energy



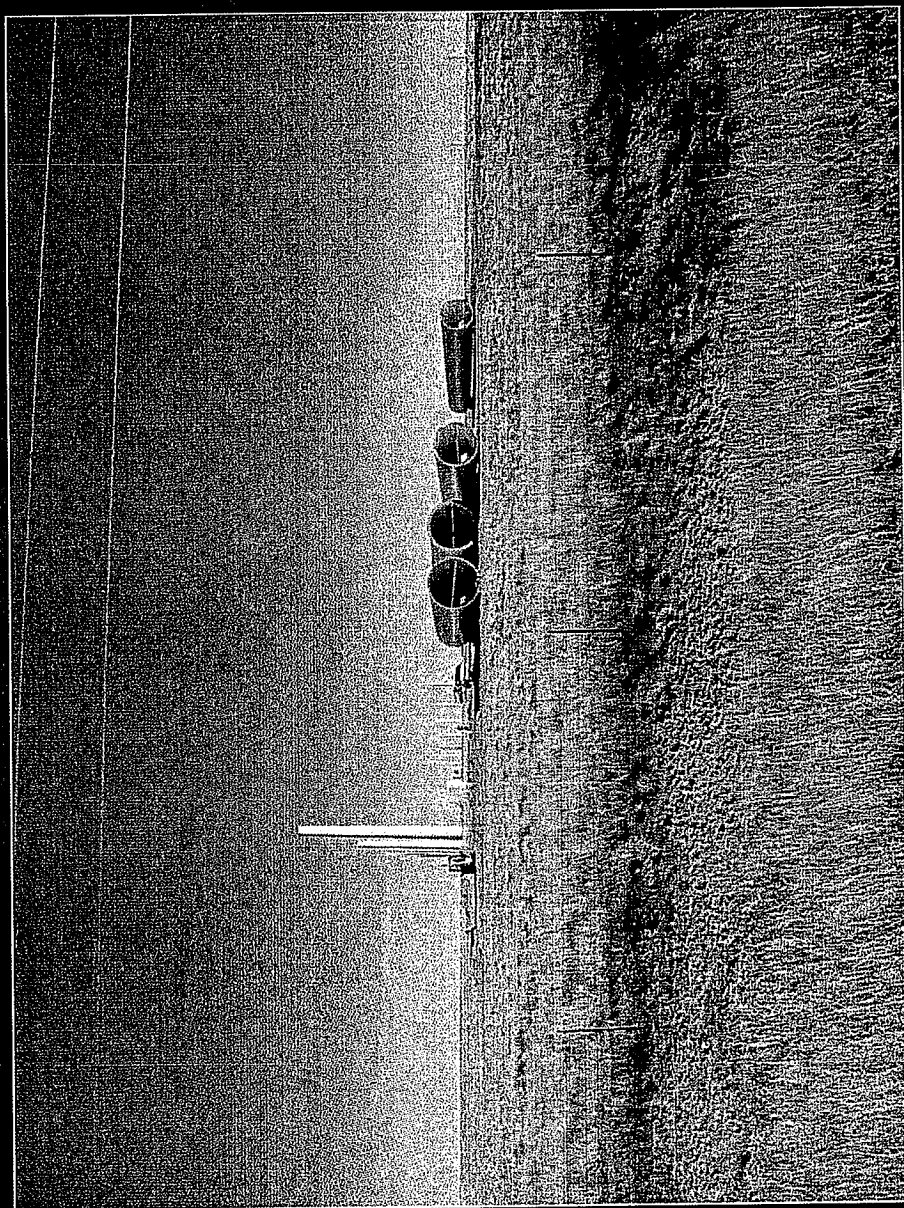
PPM Energy
A SCOUTS POWER COMPANY

Economy of Lamar and Prowers County Colorado, Before Windfarm

- Primarily agricultural
 - Alfalfa, corn for grain, corn for silage, grain sorghum
 - Farm economy has been depressed
- Population and jobs have fallen since 2000
 - Lengthy drought has harmed local economy
 - Retail sales down
 - Sharp drop in oil and gas production



Construction of Windfarm Starts in mid-2003



00003947

Herling Construction

- Built 25 miles of roads
- Excavated the project's 108 foundations

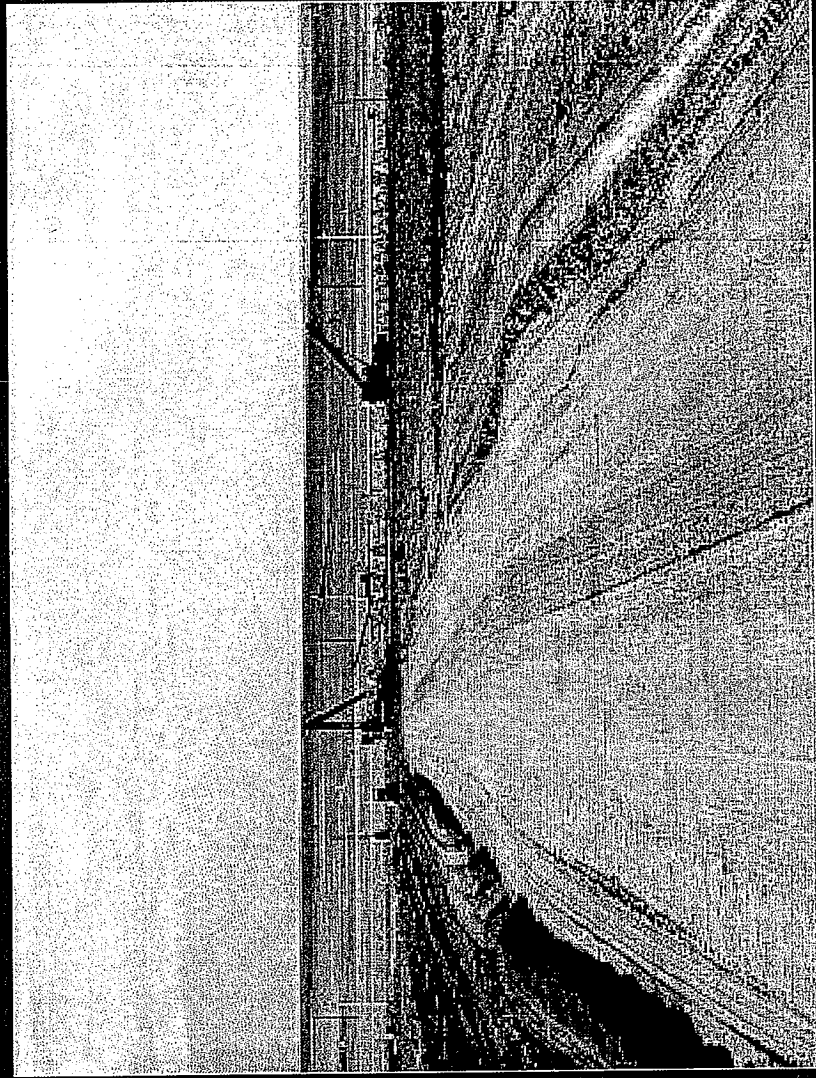
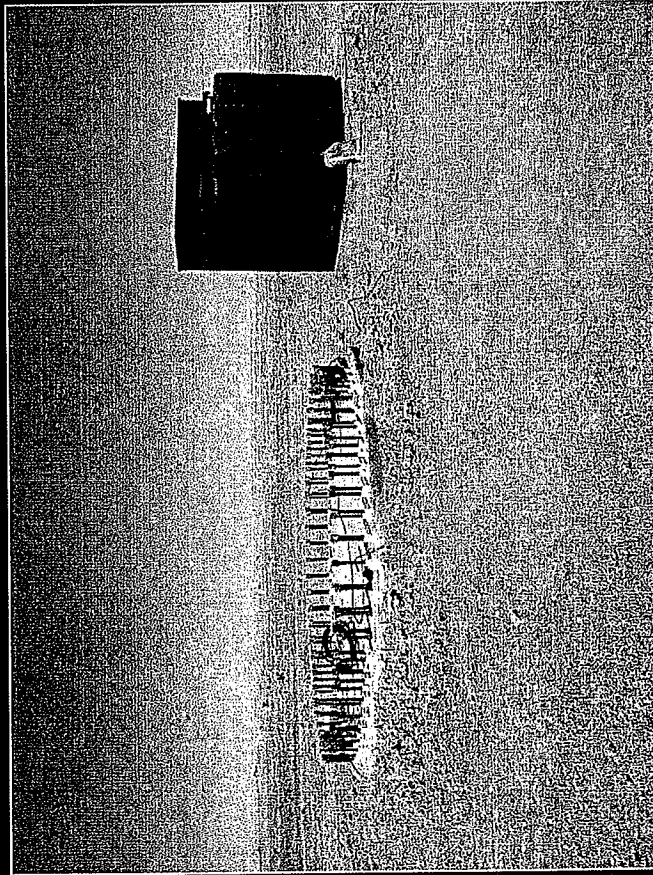


Photo Courtesy John Stulp, Prowers County Commission

00003948

Mortenson

- Poured concrete into the bases: 35,000 yards @ 300 yards per turbine
- Had 87 people pouring concrete, with "a couple" of locals staying on
- Gate City Steel did the rebar: 45,000 pounds of rebar in each foundation
 - 12-14 people did rebar
- Bottom line: 1.25 million pounds of concrete and rebar in each foundation



Christensen

- Installed the backbone of the system: 20 miles of underground cable
- Laid the cable to 105 turbines: 590 V converted to 34kV, then stepped up to 230 kV
- Built the substation
- Had 46 employees at height of construction

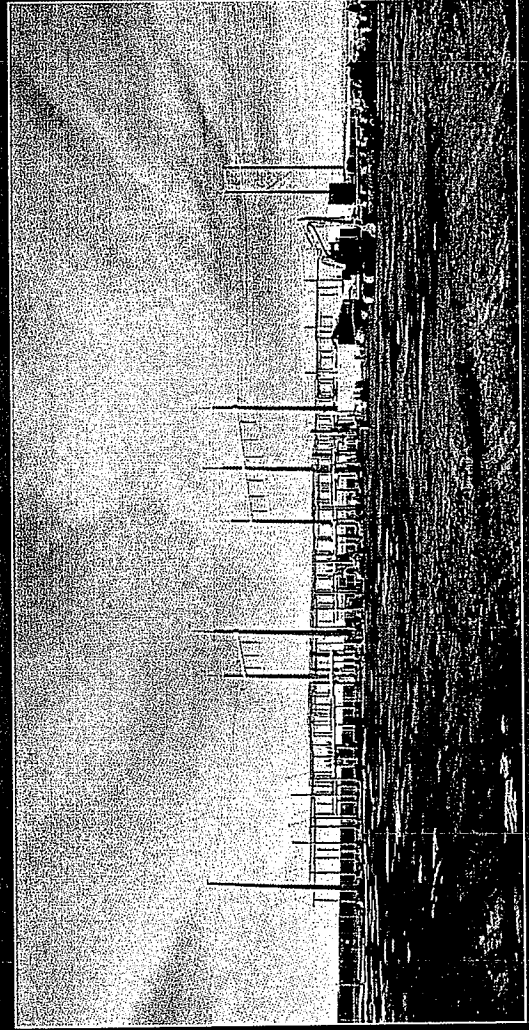


Photo Courtesy
Mary Root,
Southeastern
[Colorado] Land
and Environment

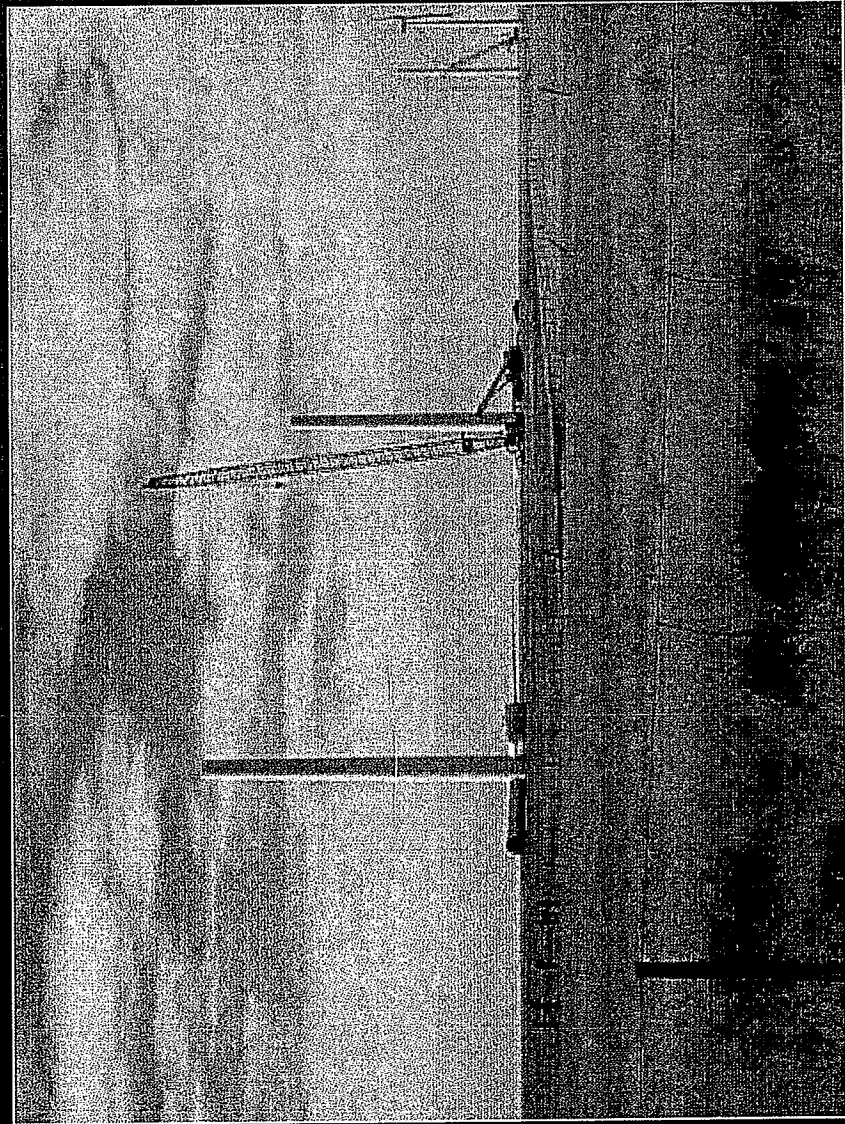
Wilson Construction

- 44 miles of 230 kV poles and transmission lines strung to new Xcel Energy substation
- 50+ miles of direct buried cable laid from the turbines to the substation
- 25 people employed during construction;
IBEW 12



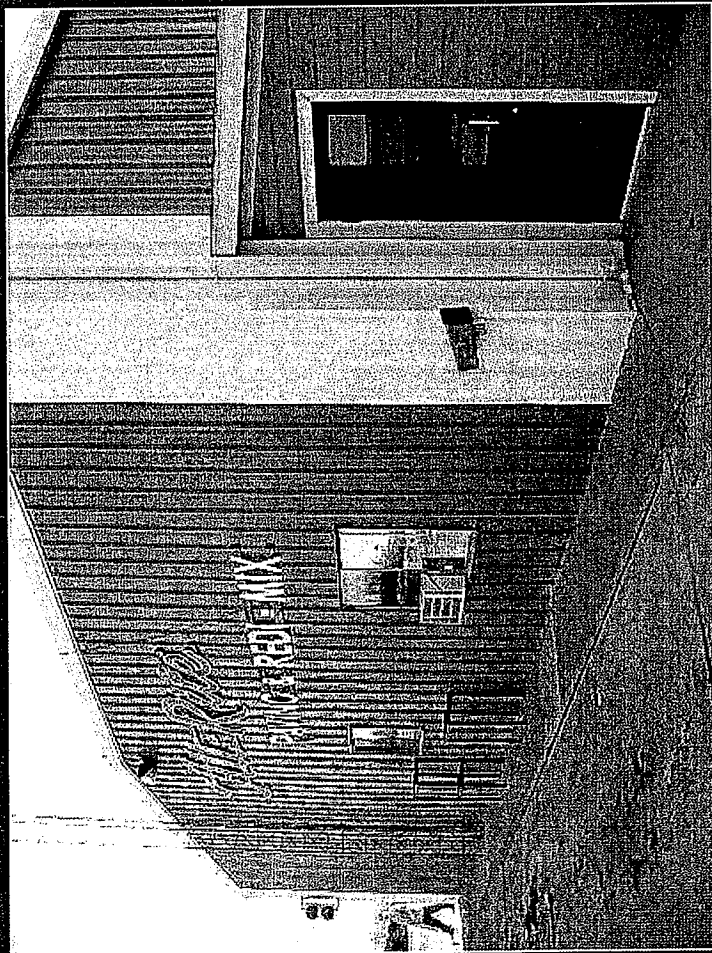
Ridge Crane of Fort Collins

Kevin McDougal of Fort Collins-based company said that the project helped its business "a lot" and provided three months of work for two cranes. Ridge Crane is now expanding its operations.



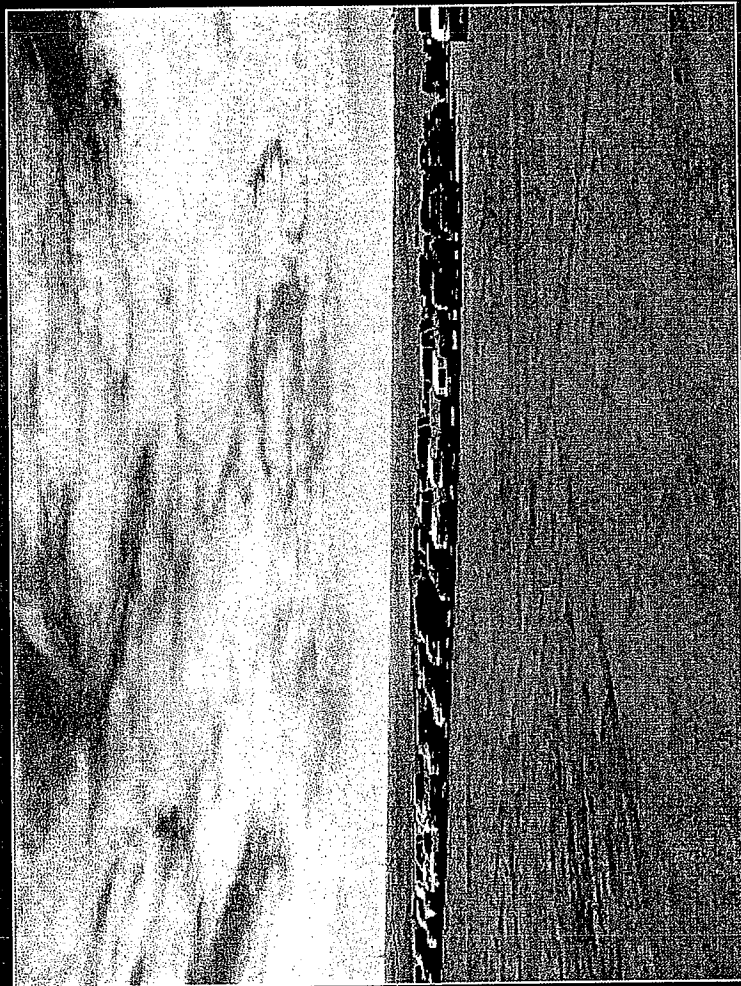
All-Rite Paving & Redi-Mix

"Project has been a lifesaver"

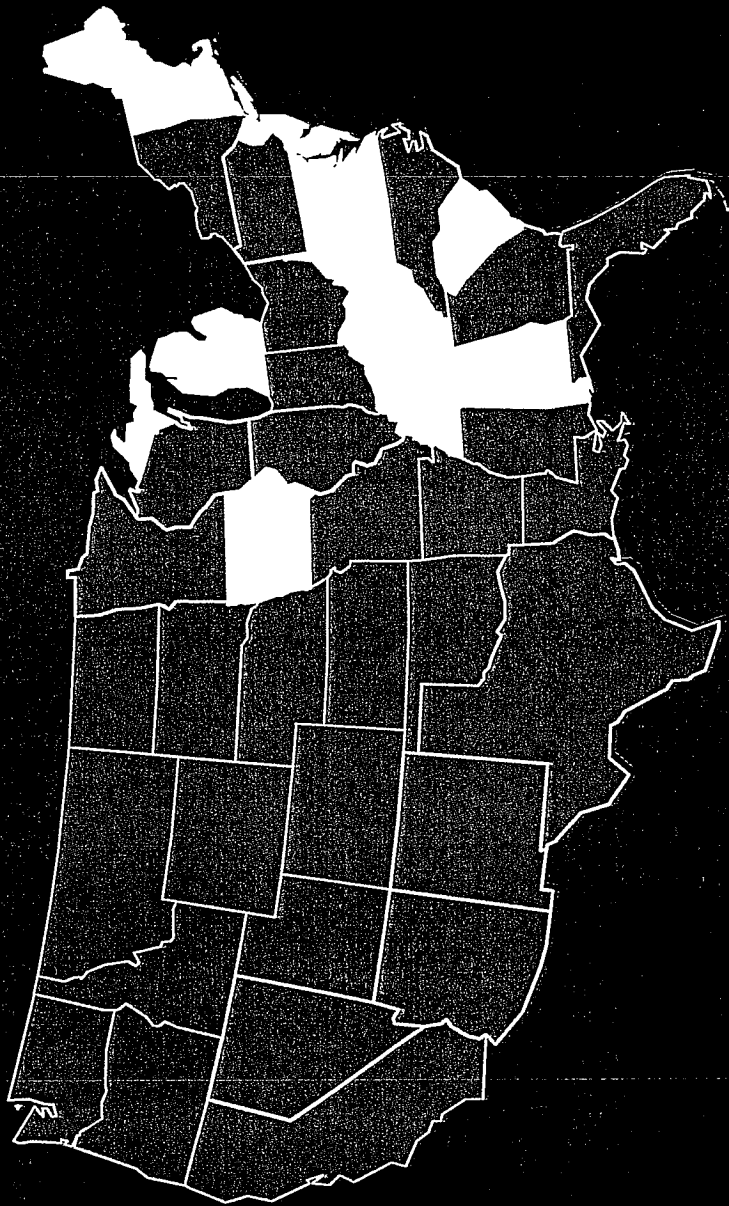


The Lamar (pop. 8,800) All-Rite did more business than the company's Pueblo (pop. 141,472) facility, because of project construction. It laid concrete for 32 miles of poles and for the new substation.

At Height of Construction, Subcontractors at Colorado Green Employed Nearly 400 Workers...

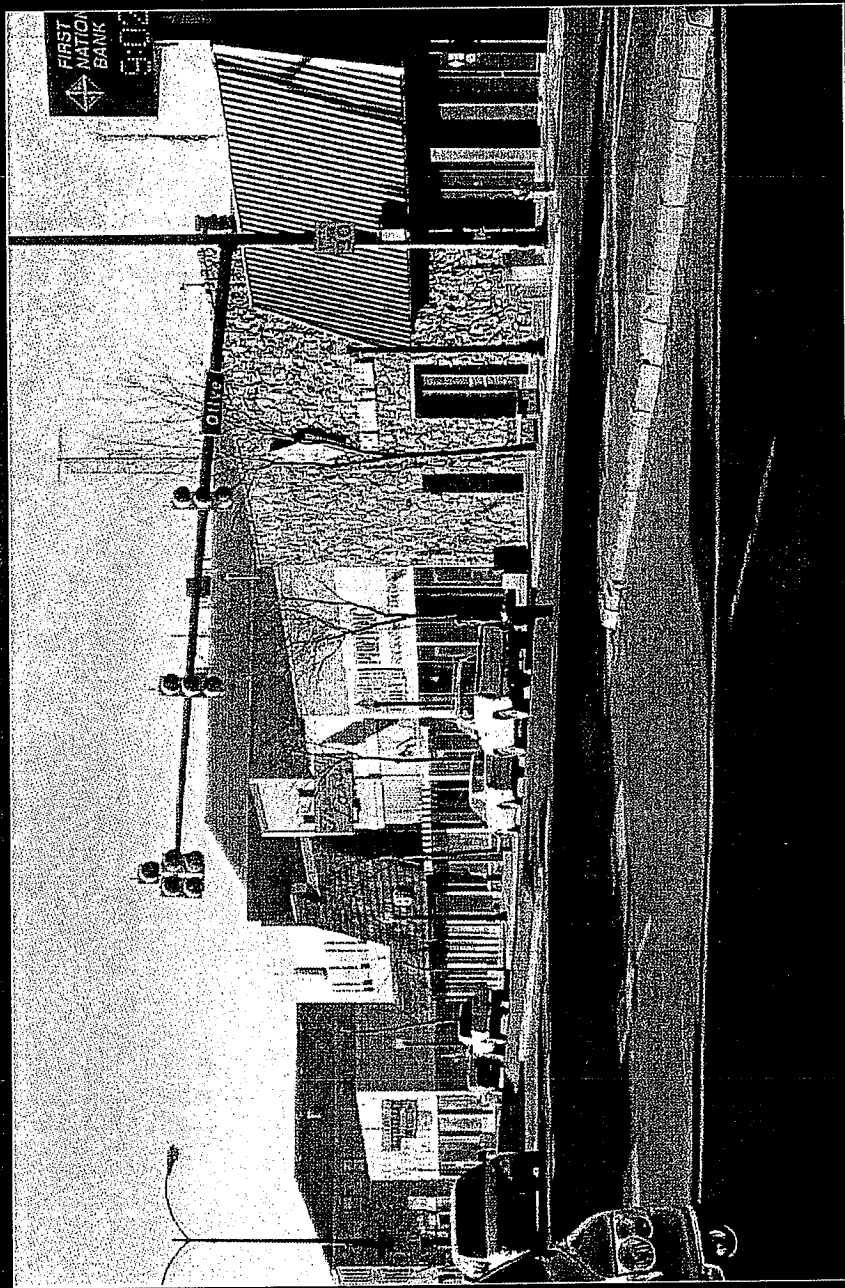


...from Around the Country



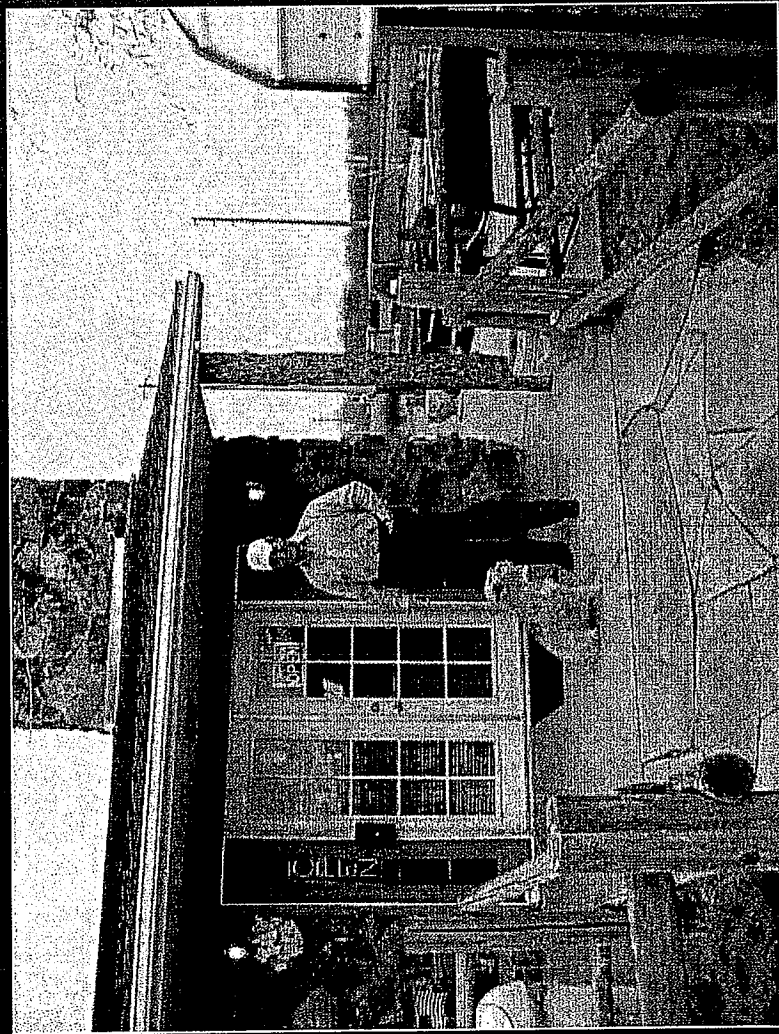
00003955

....And Their Presence Had a Tremendous Impact on Lamar's Economy



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Local Rental Housing Units Booked Solid



“My rental units
have been
booked solid
because of the
windfarm
construction.”

— Brad Semmens,
owner of Country Acres
Motel and RV Park

High Occupancy at Local Motels



“Occupancy would normally run at about 20 percent in mid-December, but it hovers from 50% to completely full on some nights.”

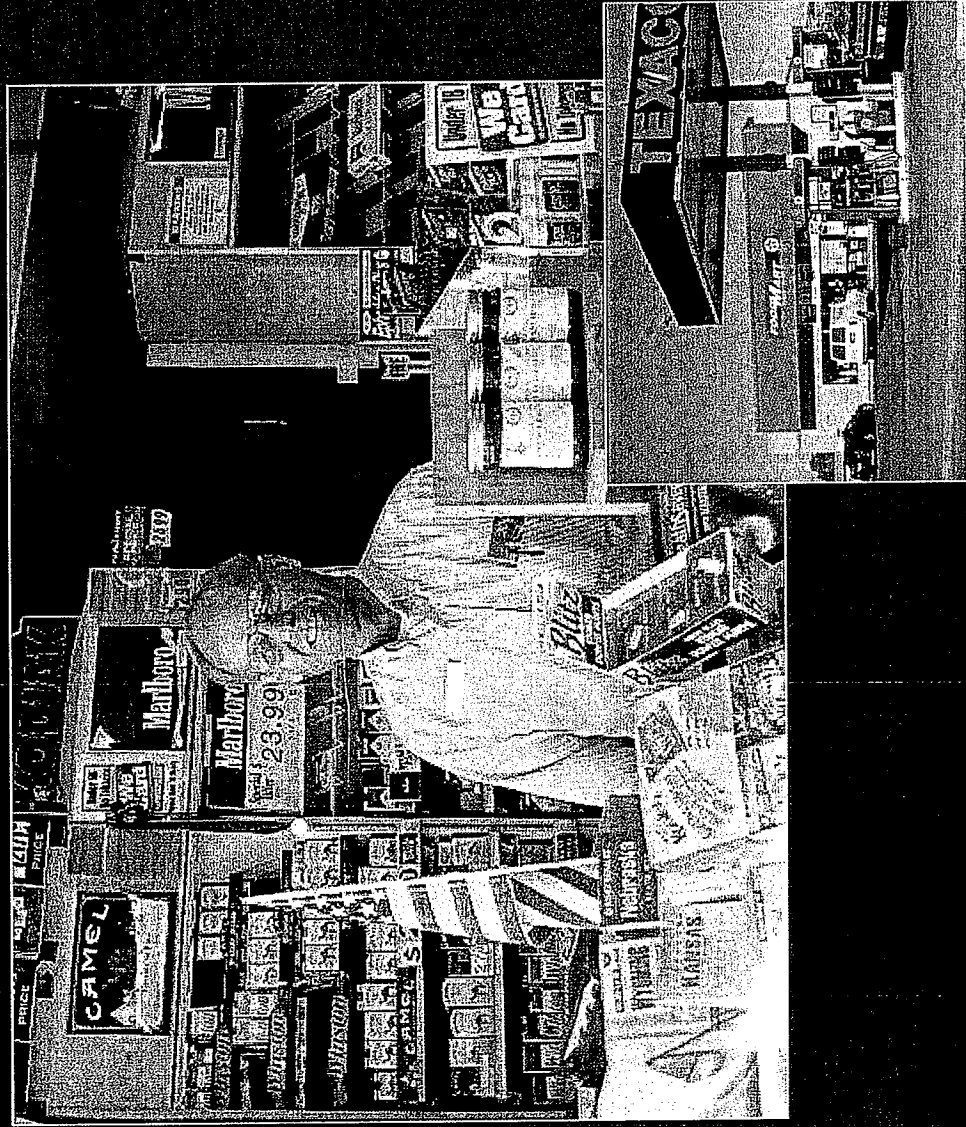
– *Manager James Emrie*

Quote from article by Steve Raabe in Denver Post, 14 December 2003

Texaco Food Mart

The project was a
"shot in the arm...it
got so busy in the
early morning that
I had to bring in
more help...I had
60 customers in a
half-hour: that's
one every 30
seconds!"

— Doug Johnson,
Owner



00003959

Hay Stack Restaurant



"We've seen a lot of workers coming in...the project has helped increase our business at least 30 percent."

– *Jamie, Manager of Hay Stack Restaurant*

Daylight Donuts

"We've had an increase in business, and the windfarm guys come in almost every morning."

— Clerk at Daylight
Donuts



00003961

DeLoach's Water Conditioning

The project
was a "shot in
the arm...the
workers drank
lots and lots of
water."

— *Jim DeLoach,*
Owner



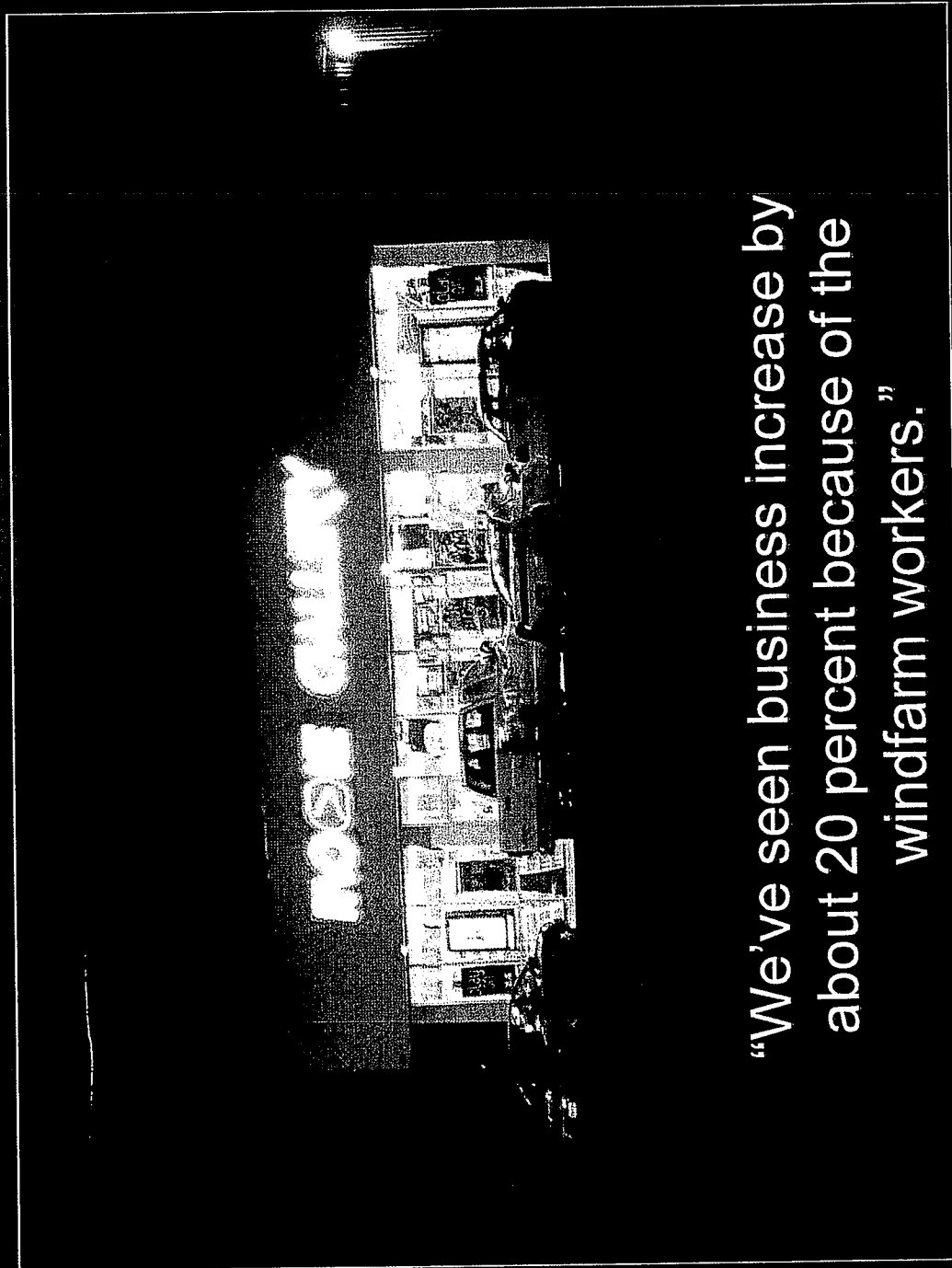
Wallace Gas & Oil

- Project has been a "Godsend...it's helped us to keep our heads above water."
 - Company has delivered 110-115K gallons to the project, representing about \$250K more than it would otherwise have taken in.



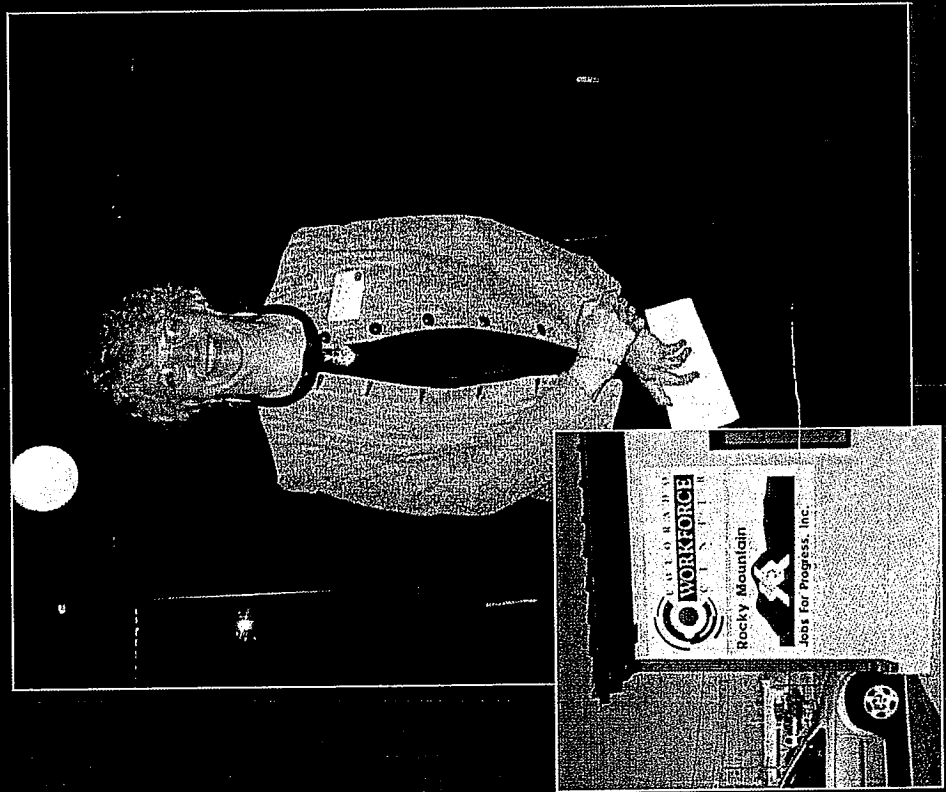
Brett Buxton of Wallace Gas & Oil

Movie Gallery



"We've seen business increase by
about 20 percent because of the
windfarm workers."

Workforce Colorado [State Job Service Agency]



“Because of the drought,
the economy has been
really bad, and the
windfarm has been a
real blessing... we
would love to see them
come back and do
more!”

— Linda Mulbery, Workforce
Colorado

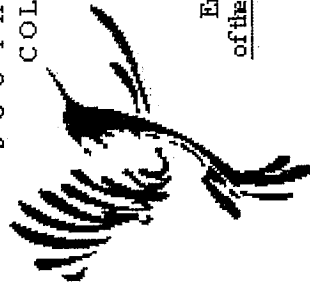
Interest in Business Relocation Soars



"Because of the windfarm, business relocation inquiries have begun increasing from small manufacturers and oil-field services firms."

— Jan Anderson, Executive
Director, Southeast
Colorado Enterprise
Development, Inc.

SOUTHEAST
COLORADO

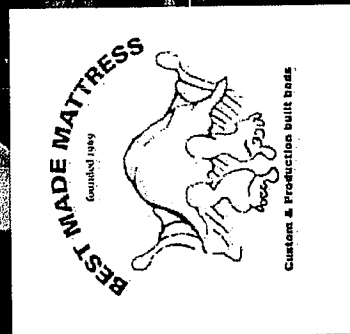


Emerald
of the Plains

Best Made Mattress Company of Denver

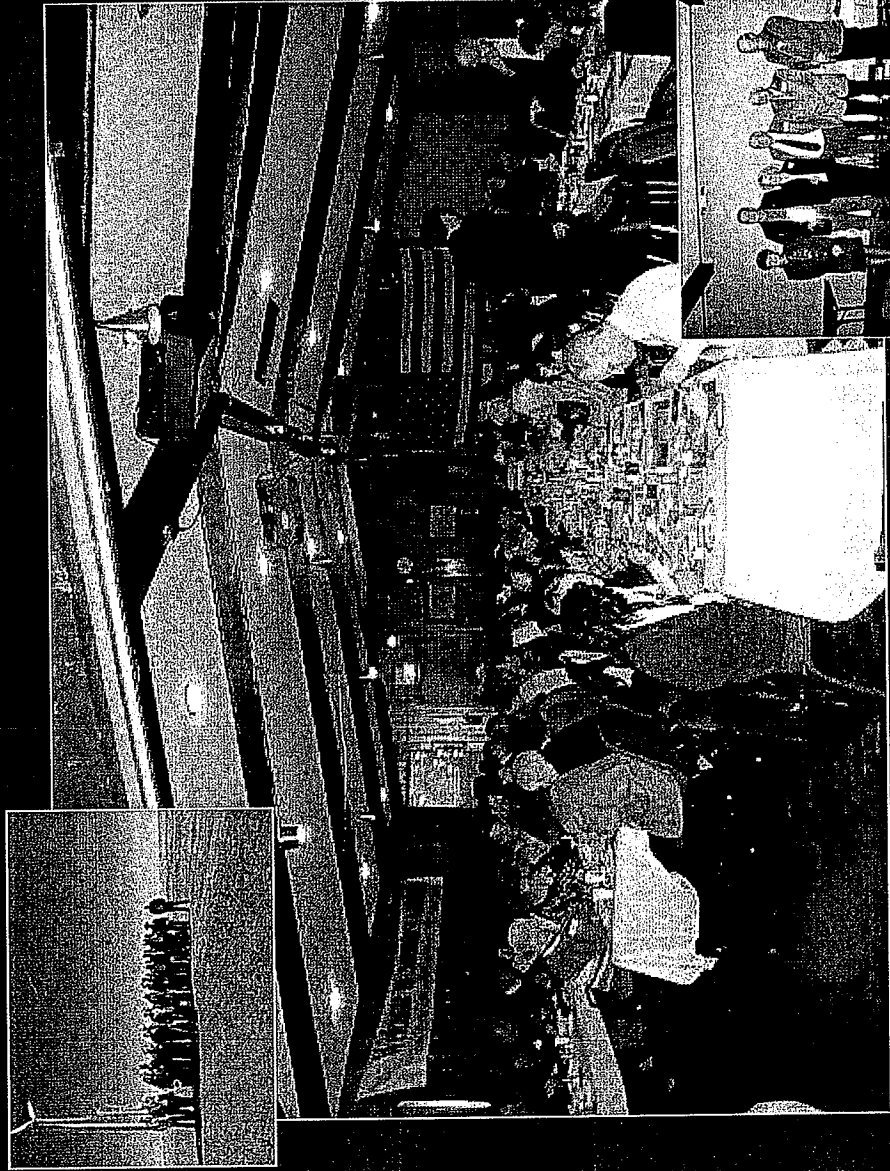
"The new windfarm project has made us take a second look at relocating [our] mattress plant to Lamar."

— Thomas Jay Wacker,
Business Manager, Best
Made Mattress Company,
Denver [from Lamar Daily
News of 22 January 2004]



Thomas Wacker and Jason
Lucas of Best Made Mattress
Co.

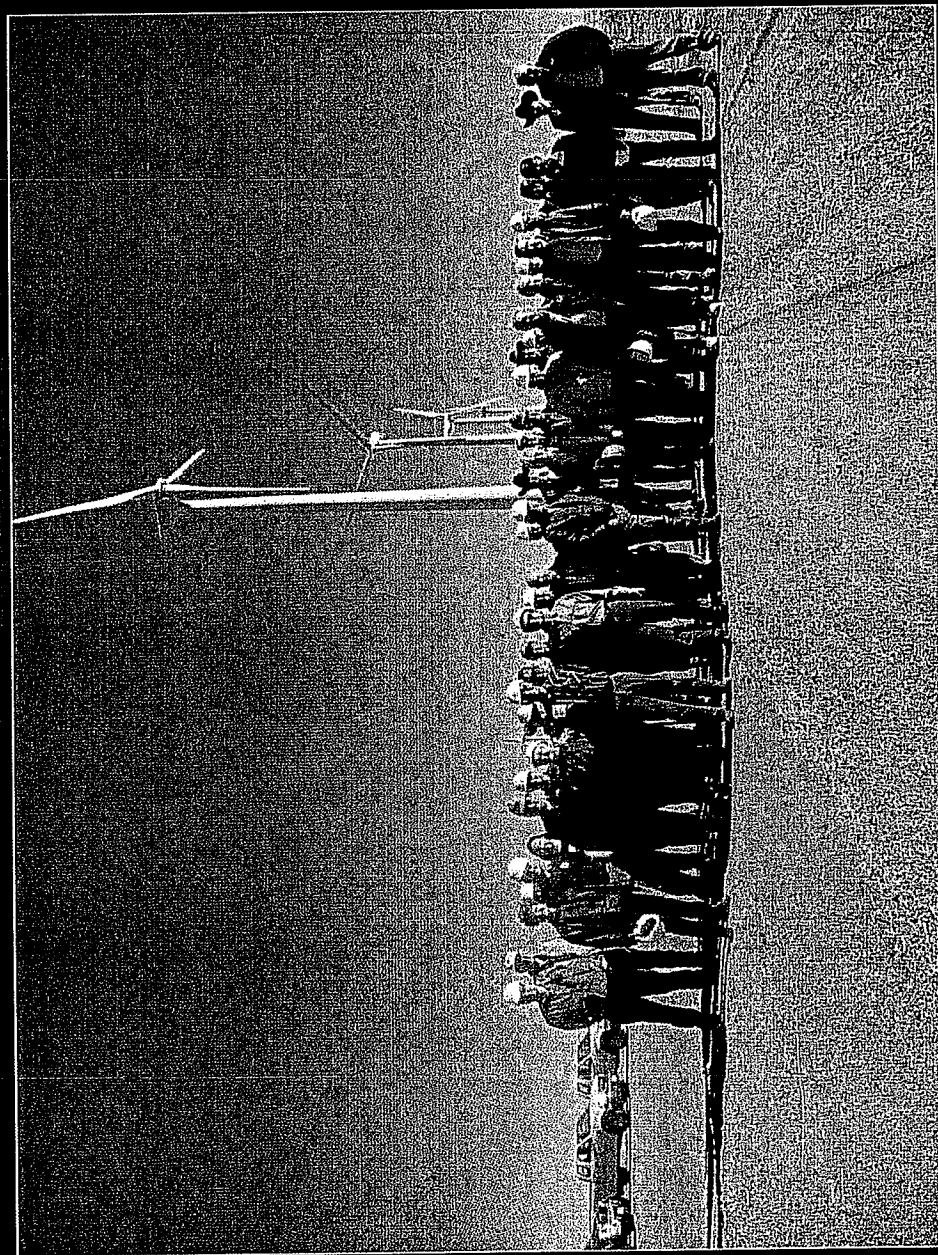
Windfarm Instills "New Spirit of Community in Lamar"



"The windfarm
has instilled a
new spirit of
community in
Lamar...it's
intangible but
very real."

— *Chris Rundell,*
local rancher

Tremendous Local Support



00003969

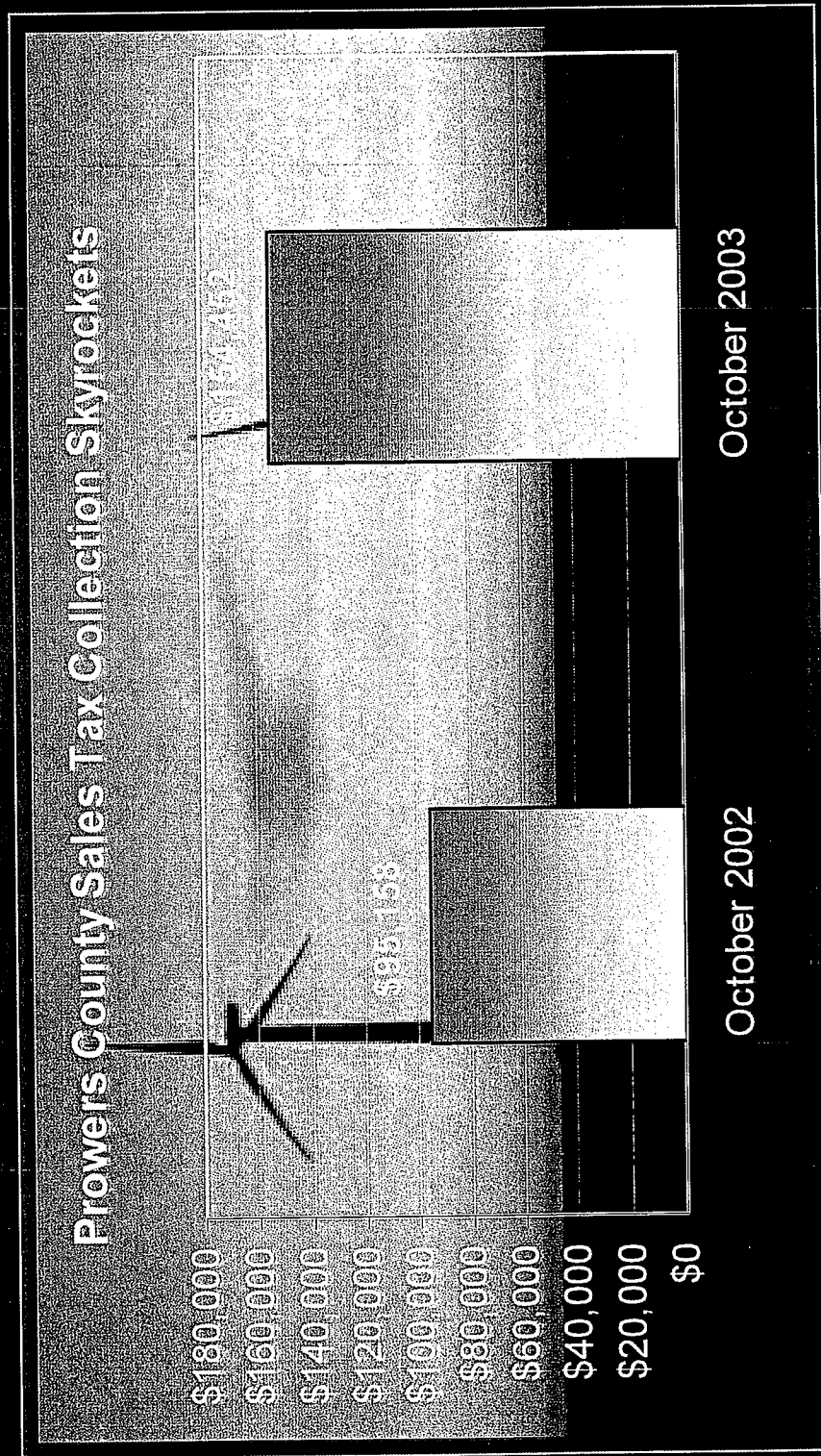
Site Services for a Typical 100MW Windfarm

Man-hours

Turbine & Tower Installation Svcs.	121,080
Concrete Construction Services	72,000
Equipment Transportation Services	42,650
Project Management Services	36,775
Engineering & Surveying Services	25,300
Vendor Field Services	20,535
Road Building Services	18,940
Underground Cable Installation Svc.	17,250
General Labor Services	15,000
Local Material Delivery Services	12,500
Electrical Installation Services	8,770
Concrete Services	6,800
Equipment Repair & Fueling Svc.	6,000
Inspection & Testing Services	5,000
Food Preparation & Delivery Svcs.	3,500
Housing & Lodging Services	3,000
Real Estate & Legal Services	2,800
Communication System Services	<u>1,120</u>
	419,020

The total site services required for construction of a typical 100MW windfarm is about 419,020 man-hours—equivalent to approximately 53,377 days of work at the site.

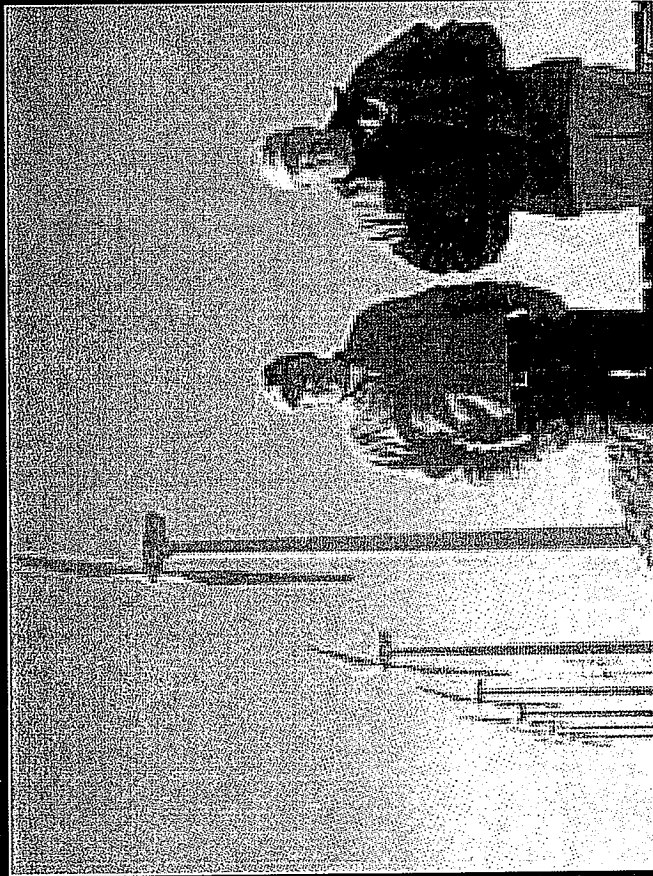
Construction Boosted County Sales Tax Revenues



Landowner Payments Boost Entire Region

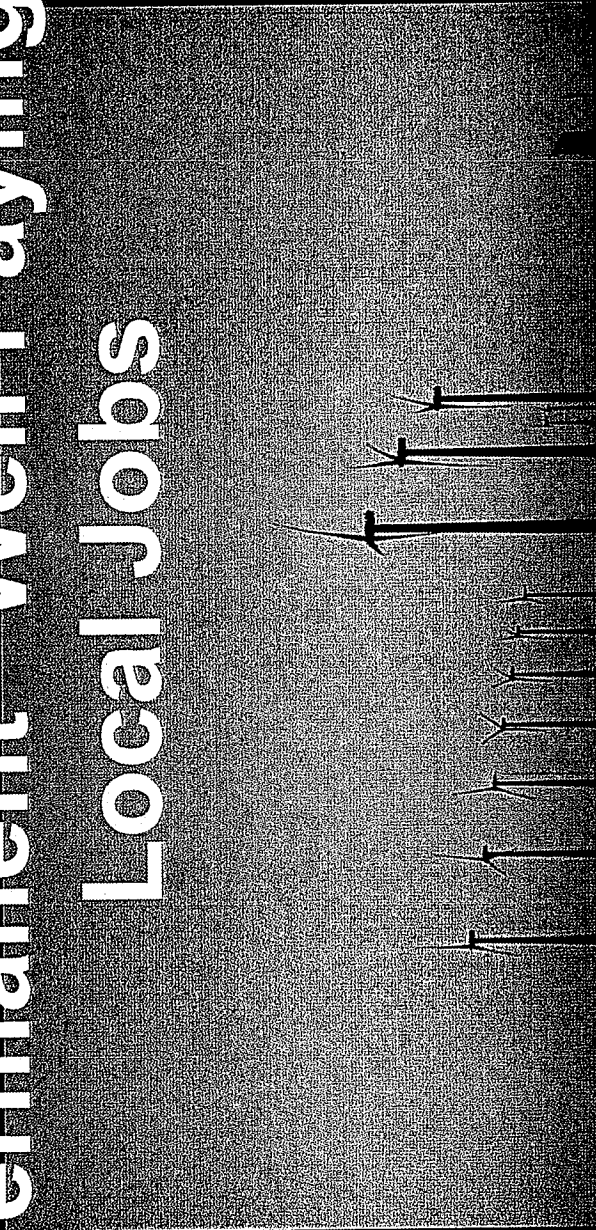
Property owners will receive royalty payments based on the amount of power generated

- Typical payments characterized as between \$3,000 and \$6,000 for each of the project's 108 turbines.



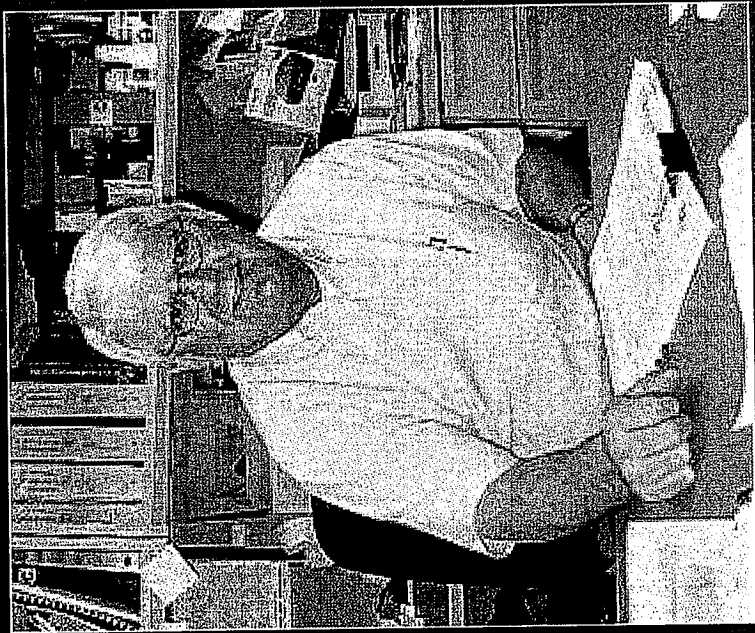
Property owners Kenneth and Michael Emick. Photo from Pueblo Chieftain

Colorado Green Has Brought 15-20 Full-time Permanent "Well Paying" Local Jobs



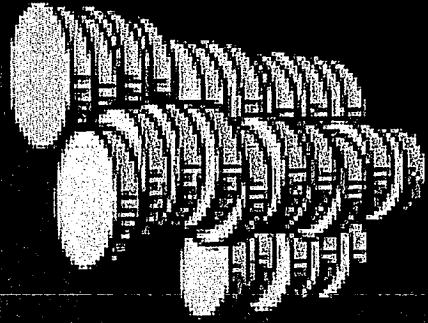
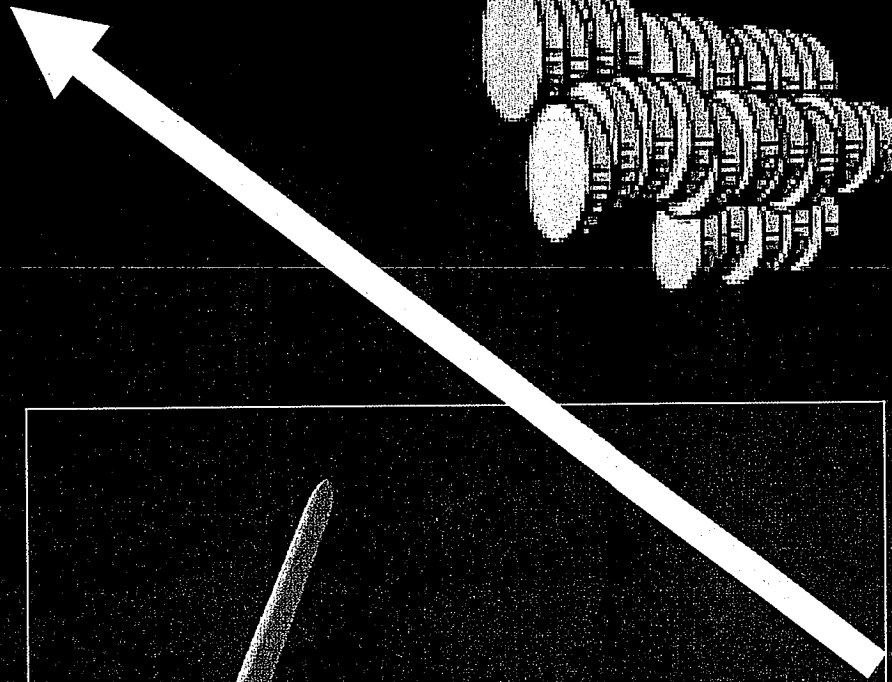
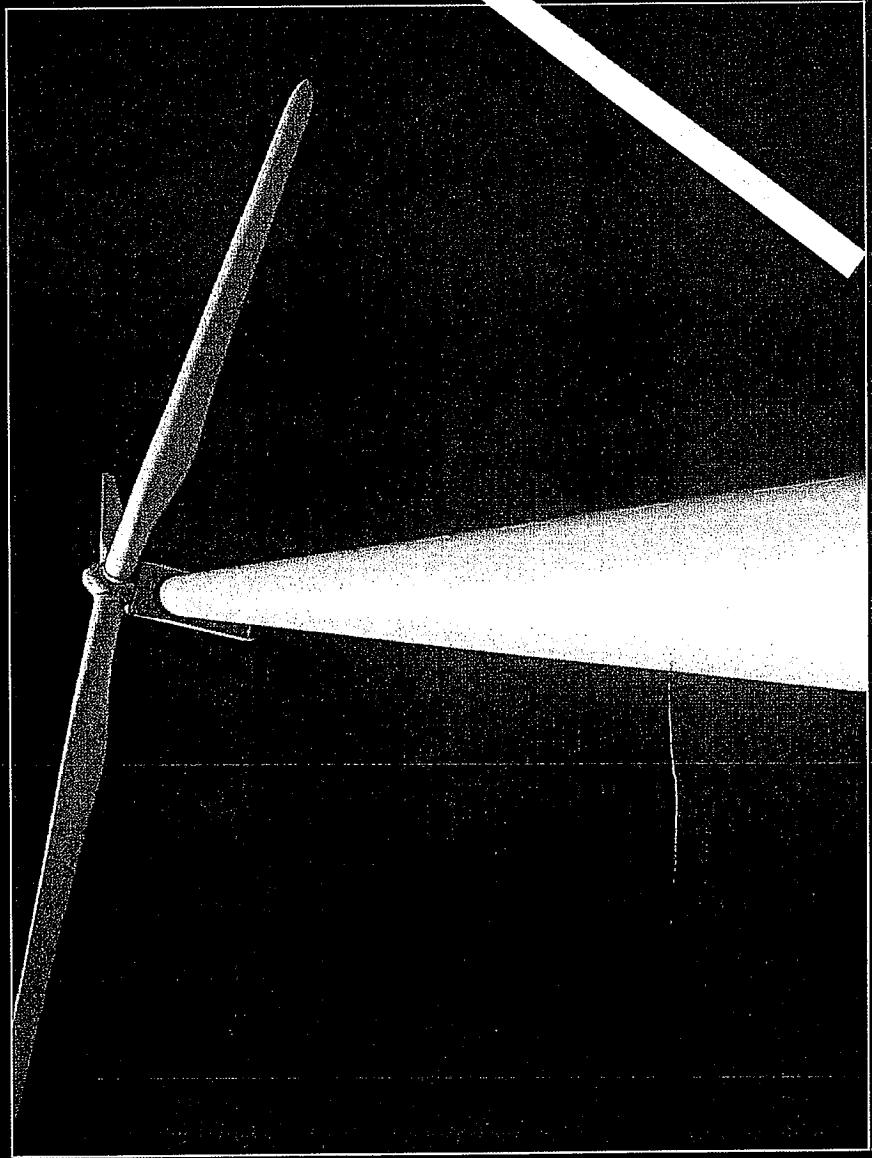
00003973

Prowers County Assessor Andy Wyatt Outlines Some of the Windfarm's Benefits...



00003974

Project Has Increased Prowers County's Tax Base by 29%...



....Providing \$917,000 Annually for Re-2 School District General Fund...



Photo from Lamar Daily News by Verna McDowell

...\$189,000 Each Year to the Prowers Medical Center...



00003977

Windfarm a "Blessing" to the Entire Area



"It's the greatest
thing that has
happened to this
area, and it's a
blessing to Prowers
County and
Southeast Colorado."

— Leroy Mauch, Prowers
County Commissioner

Support From Neighboring Baca County

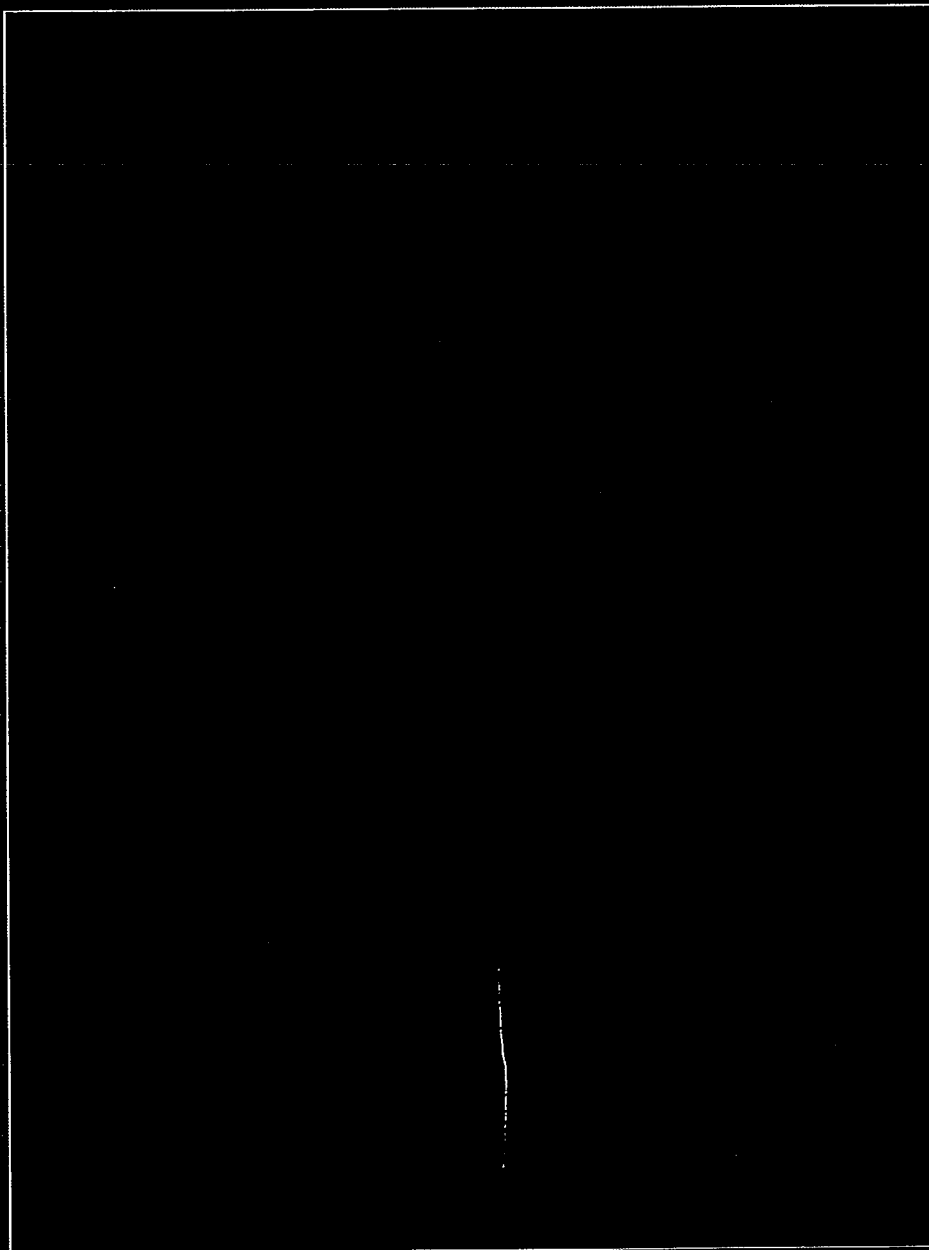
"A windfarm in Baca County would provide real benefits to us, too, tax-wise, employment-wise and energy-wise. I hope to see new wind energy development in our county very soon."

— *Baca County
Commissioner Ray Miller*



Springfield, county seat of Baca County, Colorado

Capture the Benefits of Wind in Your Community



Video clip courtesy GE Wind

00003980

Thank You!

Craig Cox

coxcrraig@catt.net

303-679-9331

Facility Siting Rules and Statutes

Siting Statutes

Division 22

Divisions 30 - 95

Division 1

Division 23

Division 11

Division 24

Division 15

Division 26

Division 20

Division 27

Division 21

Division 29

Siting Statutes

Oregon Revised Statutes

Chapter 469: Energy Conservation

Statutes regarding the siting and regulation of energy facilities begin at ORS 469.300.

Division 1

Chapter 345 Oregon Administrative Rules

GENERAL PROVISIONS

Full text of Division 1 (PDF)

Sections:

345-001-0000 Notice of Permanent Rulemaking

345-001-0005 Uniform and Model Rules

345-001-0010 Definitions

345-001-0020 Purpose

345-001-0030 Applicability

345-001-0035 Electric and Magnetic Field Committee

345-001-0050 Public Records Availability and Fees for Copying

345-001-0060 Council Representation at Contested Case Hearings

345-001-0080 Reconsideration and Rehearing - Orders in Other than Contested Cases

Energy Generation Areas

345-001-0200 Creation of an Energy Generation Area

345-001-0210 Effect of an Energy Generation Area

345-001-0220 Energy Generation Areas

Division 11

Chapter 345 Oregon Administrative Rules

COUNCIL MEETINGS AND COMMUNICATIONS

Full Text of Division 11 (PDF)

Sections:

345-011-0000 Authority and Purpose

345-011-0005 Quorum and Rules of Order

345-011-0010 Officers

345-011-0015 Meetings

00003982

345-011-0020 Agendas for Regular Meetings
 345-011-0025 Consideration of Matters Not on Agenda
 345-011-0030 Order of Business
 345-011-0035 Requests to Place Items on the Agenda
 345-011-0045 Committees and Subcommittees
 345-011-0050 Council Files
 345-011-0055 Council Communications
 345-011-0060 Waiver and Suspension
 345-011-0070 Council Requests for Information
 345-011-0080 Unacceptable Conduct

Division 15

Chapter 345 Oregon Administrative Rules

PROCEDURES GOVERNING COUNCIL AND DEPARTMENT OF ENERGY PROCEEDINGS, INCLUDING SITE CERTIFICATE HEARINGS

Full text of Division 15 (PDF)

Sections:

345-015-0001 Purpose and Authority

Procedures for the Conduct of Contested Cases

345-015-0012 Filing and Service of Documents in a Contested Case
 345-015-0014 Contested Case Notices
 345-015-0016 Requests for Party or Limited Party Status
 345-015-0018 Authorized Representative
 345-015-0022 Petition for Indigent Status
 345-015-0023 Duties of Hearing Officer
 345-015-0024 Suspension of Hearing and Exclusion of a Party
 345-015-0038 Separate Hearings
 345-015-0043 Evidence: Testimony Submitted in Writing
 345-015-0046 Evidence: Official Notice
 345-015-0051 Evidence: Resolutions of Cities, Counties and Tribes
 345-015-0054 Motions
 345-015-0057 Prohibitions on Interlocutory Appeals to Council
 345-015-0059 Prohibitions on Stays
 345-015-0062 Reopening Record Prior to Decision
 345-015-0080 Participation by Government Agencies
 345-015-0083 Prehearing Conference and Prehearing Order
 345-015-0085 Hearing Officer's Proposed Contested Case Order

Procedures for Council and Department of Energy Review of an Application for Site Certificate

345-015-0110 Public Notice of a Notice of Intent
 345-015-0120 Memorandum on a Notice of Intent
 345-015-0130 Informational Meeting on a Notice of Intent
 345-015-0140 Review by the Department of Energy
 345-015-0160 Project Order
 345-015-0180 Agency Memorandum on a Site Certificate Application
 345-015-0190 Determination of Completeness
 345-015-0200 Notice to Agencies that the Application is Complete
 345-015-0210 Draft Proposed Order
 345-015-0220 Public Hearing on the Draft Proposed Order
 345-015-0230 Council Review and the Department of Energy's Proposed Order
 345-015-0240 The Decision-Making Record

Procedures for Expedited Review of Certain Energy Facilities

345-015-0300 Request for Expedited Review of Small Capacity Facilities
 345-015-0310 Request for Expedited Review of Special Criteria Facilities
 345-015-0320 Public Hearing Procedures for Special Criteria Facilities

Exemptions from Council Jurisdiction

345-015-0350 Council Determination of Exemption
 345-015-0360 Contents of Request for Exemption

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345-015-0370 Consideration of Request for Exemption

345-015-0380 Loss of Exemption

Confidentiality and Inadmissibility of Mediation Communications

345-015-0500 Confidentiality and Inadmissibility of Mediation Communications

Division 20

Chapter 345 Oregon Administrative Rules

NOTICE OF INTENT

[Full text of Division 20 \(PDF\)](#)

Sections:

345-020-0006 Submission of a Notice of Intent

345-020-0011 Contents of a Notice of Intent

345-020-0016 Amendment of a Notice of Intent

345-020-0040 Distribution of a Notice of Intent

345-020-0060 Expiration of a Notice of Intent

Division 21

Chapter 345 Oregon Administrative Rules

APPLICATION FOR A SITE CERTIFICATE

[Full text of Division 21 \(PDF\)](#)

Sections:

345-021-0000 General Requirements

345-021-0010 Contents of an Application

345-021-0020 Specific Application Requirements for Siting of Surface Facilities Related to Underground Gas Storage Reservoirs

345-021-0050 Distribution of a Preliminary Application

345-021-0055 Distribution of a Complete Application

345-021-0080 Agency Coordination

345-021-0090 Amendment of an Application

345-021-0100 Contested Case Proceeding on the Application - Burden of Proof

Division 22

Chapter 345 Oregon Administrative Rules

GENERAL STANDARDS FOR SITING FACILITIES

[Full text of Division 22 \(PDF\)](#)

Sections:

345-022-0000 General Standard of Review

345-022-0010 Organizational Expertise

345-022-0020 Structural Standard

345-022-0022 Soil Protection

345-022-0030 Land Use

345-022-0040 Protected Areas

345-022-0050 Retirement and Financial Assurance

345-022-0060 Fish and Wildlife Habitat

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345-022-0070 Threatened and Endangered Species
345-022-0080 Scenic Resources
345-022-0090 Historic, Cultural and Archaeological Resources
345-022-0100 Recreation
345-022-0110 Public Services
345-022-0120 Waste Minimization

Division 23

Chapter 345 Oregon Administrative Rules

NEED STANDARD FOR NONGENERATING FACILITIES

Full text of Division 23 (PDF)

Sections:

345-023-0005 Need for a Facility
345-023-0020 Least-Cost Plan Rule
345-023-0030 System Reliability Rule for Electric Transmission Lines
345-023-0040 Economically Reasonable Rule for Natural Gas Pipelines or Liquefied Natural Gas Storage Facilities

Division 24

Chapter 345 Oregon Administrative Rules

SPECIFIC STANDARDS FOR SITING FACILITIES

Full text of Division 24 (PDF)

Sections:

Specific Standards for Wind Facilities

345-024-0010 Public Health and Safety Standards for Wind Energy Facilities
345-024-0015 Siting Standards for Wind Energy Facilities

Specific Standards for Surface Facilities Related to Underground Gas Storage Reservoirs

345-024-0030 Public Health and Safety Standards for Surface Facilities Related to Underground Gas Storage Reservoirs

Specific Standards for Transmission Lines

345-024-0090 Siting Standards for Transmission Lines

Standards for Energy Facilities that Emit Carbon Dioxide

345-024-0500 General
345-024-0510 Principles for the Adoption of New Standards for Fossil-Fueled Power Plants
345-024-0550 Standard for Base Load Gas Plants
345-024-0560 Means of Compliance for Base Load Gas Plants
345-024-0570 Modification of the Standard for Base Load Gas Plants
345-024-0580 Monetary Offset Rate
345-024-0590 Standard for Non-Base Load Power Plants
345-024-0600 Means of Compliance for Non-Base Load Power Plants
345-024-0610 Modification of the Standard for Non-Base Load Power Plants
345-024-0620 Standard for Nongenerating Energy Facilities
345-024-0630 Means of Compliance for Nongenerating Energy Facilities
345-024-0640 Modification of the Standard for Nongenerating Energy Facilities
345-024-0680 Carbon Dioxide Offset Projects
345-024-0710 Monetary Path Payment Requirement
345-024-0720 Qualified Organization

00003985

Division 26**Chapter 345 Oregon Administrative Rules****CONSTRUCTION AND OPERATION RULES FOR FACILITIES**

Full text of Division 26 (PDF)

Sections:

345-026-0005 Purpose
345-026-0010 Legislative Authority
345-026-0015 Scope and Construction
345-026-0048 Compliance Plans
345-026-0050 Inspections
345-026-0080 Reporting Requirements for Energy Facilities
345-026-0105 Correspondence with Other State or Federal Agencies
345-026-0170 Notification of Incidents

Rules for Nuclear Installations

345-026-0300 Regulations Applicable to Nuclear Installations
345-026-0330 Radiological Environmental and Effluent Monitoring
345-026-0340 Security Plans for Nuclear Installations
345-026-0350 Emergency Planning for Nuclear Installations
345-026-0370 Standards for Council Approval of the Decommissioning Plan
345-026-0390 Spent Nuclear Fuel Storage

Division 27**Chapter 345 Oregon Administrative Rules****SITE CERTIFICATE CONDITIONS, AMENDMENT, TRANSFER AND TERMINATION AND
DEPARTMENT OF ENERGY APPROVAL OF GAS STORAGE TESTING PIPELINES**

Full text of Division 27 (PDF)

Sections:

345-027-0000 Certificate Expiration
345-027-0011 Applicability
345-027-0020 Mandatory Conditions in Site Certificates
345-027-0023 Site Specific Conditions
345-027-0028 Monitoring Conditions
345-027-0030 Amendment to Extend Construction Beginning and Completion Deadlines
345-027-0050 When an Amendment is Required
345-027-0060 Request to Amend Certificate
345-027-0070 Review of a Request for Amendment
345-027-0080 Review of Request by Certificate Holder for Expedited Amendment
345-027-0090 Request by Any Person for Amendment to Apply Subsequent Laws or Rules
345-027-0100 Transfer of a Site Certificate
345-027-0110 Termination of a Site Certificate

Department of Energy Approval of Gas Storage Testing Pipelines

345-027-0210 General
345-027-0220 Request for Approval
345-027-0230 Review of a Request for Approval
345-027-0240 Conditions

Division 29**Chapter 345 Oregon Administrative Rules****NOTICE OF VIOLATION, CIVIL PENALTIES, REVOCATION OR SUSPENSION****00003986**

Full text of Division 29 (PDF)**Sections:**

345-029-0000 Policy
345-029-0005 Definitions
345-029-0010 Report by a Responsible Party
345-029-0020 Notice of Violation
345-029-0030 Classification of Violations
345-029-0040 Response to Notice of Violation
345-029-0050 Enforcement Conference
345-029-0060 Civil Penalties
345-029-0070 Contested Case Proceeding
345-029-0080 Payment of Penalty
345-029-0090 Council Consideration of Mitigating Factors
345-029-0100 Revocation or Suspension of Site Certificate

Divisions 30 - 95**Chapter 345 Oregon Administrative Rules****Division 30:****RESEARCH REACTORS** ([full text PDF](#))**Division 50:****RADIOACTIVE WASTE MATERIALS** ([full text PDF](#))[Tables](#) (76 kb pdf)**Division 60****TRANSPORTATION OF RADIOACTIVE MATERIAL** ([full text PDF](#))**Division 70****CONFIDENTIAL TREATMENT OF SECURITY PROGRAM INFORMATION** ([full text PDF](#))**Division 76****SPECIFIC STANDARDS FOR THE SITING OF NUCLEAR POWER FACILITIES IN OREGON** ([full text PDF](#))**Division 92****STANDARDS FOR THE SITING OF URANIUM MILLS IN OREGON** ([full text PDF](#))**Division 95****CONSTRUCTION, OPERATION, AND DECOMMISSIONING RULES FOR URANIUM MILLS** ([full text PDF](#))

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CHAPTER 4

Regulatory Framework

Many of the issues identified during and subsequent to the Critical Environmental Issues Analysis described in *Chapter 3* will require regulatory review and approval by one or more government authorities.

Early in project development, it is important to conduct a detailed analysis of the potential permits, approvals, and consultations that might apply to a wind project. The developer should use the results of this analysis to develop a comprehensive regulatory strategy for the project. Factors such as required field studies, approval timeframes, potential for public review and/or hearings, avenues for appeal and application and/or review fees should all be included in regulatory planning. Early identification of regulatory requirements and applicable thresholds may afford the developer time to modify project plans to minimize impacts and potentially costly and time consuming regulatory reviews. A developer may wish to involve consultants and legal counsel early in the process to help identify and implement the best approach.

Early identification of regulatory requirements and applicable thresholds may afford the developer time to modify project plans to minimize impacts and potentially costly and time consuming regulatory reviews.



This chapter of the handbook provides a synopsis of federal, state, and local regulatory programs and permitting issues frequently encountered by wind energy projects.

4.1 Federal Regulatory Framework

Several federal policies provide directives and guidance to federal agencies and developers of wind projects. On May 18, 2001, Executive Order 13212 "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use" directed federal agencies involved in reviewing energy-related projects to streamline their internal approval processes and established an interagency task force to coordinate federal efforts at expediting approval mechanisms. The Energy Policy Act of 2005 and the National Energy Policy of 2001 report provide additional guidance to federal agencies and developers to promote the development of domestic renewable energy supplies. Interagency working groups such as The Federal Interagency Wind Siting Collaboration have evolved out of such national initiatives to facilitate the coordination among federal agencies regarding wind energy specifically and to develop a federal agency wind energy information center.

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In addition to carrying out general federal policy regarding wind energy development, federal agencies must review potential impacts from the construction and operation of a wind project as with any development project. When a project is located on privately, locally, or state-owned land, the potential impacts of the project to resources such as wildlife, water, and aviation may also trigger a federal approval process.

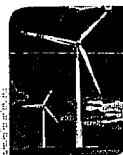
Sections 4.1.1 to 4.1.6 discuss the federal statutes that may apply to a project regardless of where it is located. Section 4.1.7 discusses additional federal procedures specific to projects that are located on federally managed lands. The following table provides a summary of commonly required federal approvals for wind power projects. This table is reproduced in the Resources section of the handbook with links to guidance documents for further information on each requirement.

Typical Federal Permitting Requirements for Wind Energy Projects

Regulatory Authority	Statute	Permit/Approval	Description	Triggers
Federal				
Lead Agency varies by project <u>Council on Environmental Quality Regulations (CFR 1500-1508)</u> and <u>supplemental regulations</u> from lead agency	National Environmental Policy Act (42 USC 4321)	Record of Decision or FONSI or Categorical Exclusion	Establishes national mandate for federal agencies to review environmental impacts of proposed actions Process can be combined with state and local environmental reviews	<ul style="list-style-type: none"> ■ Federal permit or approval required ■ Siting on federal lands ■ Accessing federally owned transmission line ■ Receipt of federal grants
<u>U.S. Fish and Wildlife Service (50 CFR 13 and 17)</u>	Endangered Species Act (16 USC 1531-1544)	Endangered Species Act Consultation and Incidental Take Permit	Regulates activities affecting threatened and endangered species: Section 3 (16 USC 1532) defines terminology Section 7 (16 USC 1536) establishes federal interagency consultation Section 9 (16 USC 1538) establishes prohibited actions Section 10 (16 USC 1539) establishes permits and exceptions Section 11 (16 USC 1540) describes penalties and enforcement	<ul style="list-style-type: none"> ■ Consultation with FWS under Section 7 always recommended ■ Activities that may result in take or harm to species and their habitat, such as site clearing and wind turbine operation
<u>U.S. Fish and Wildlife Service (50 CFR 13 and 21)</u>	Migratory Bird Treaty Act (16 USC 703-712)	Consultation	Prohibits harm, possession, or take of migratory bird species, nests, and eggs. Strict liability statute.	<ul style="list-style-type: none"> ■ Potential impact to migratory bird species protected by the act
<u>U.S. Fish and Wildlife Service (50 CFR 13 and 22)</u>	Bald and Golden Eagle Protection Act (16 USC 668-668d)	Consultation Golden Eagle Nest Take permit	Prohibits harm, possession, or take of bald and golden eagles. Strict liability statute.	<ul style="list-style-type: none"> ■ Potential impact to bald or golden eagle ■ Necessity for moving golden eagle nest

Typical Federal Permitting Requirements for Wind Energy Projects (Cont'd)

Regulatory Authority	Statute	Permit/Approval	Description	Triggers
Federal (Cont'd)				
<u>Advisory Council on Historic Preservation, Tribal Historic Preservation Office and State Historic Preservation Office</u> (36 CFR 60 and 800)	National Historic Preservation Act (16 USC 470)	Section 106 Consultation	Requires federal agencies to review impacts to historic and Tribal resources and allows ACHP to provide comments. Consultation authority delegated to SHPO and THPO.	<ul style="list-style-type: none"> ■ Consultation with the SHPO is always recommended to determine need for Section 106 Consultation ■ Federal permit or approval required ■ Activity may impact property listed in or eligible for listing in the <u>National Register of Historic Places (NRHP)</u> ■ Activity may impact Tribal resources
<u>U.S. Army Corps of Engineers</u> (33 CFR 320-331 and 40 CFR 230)	Clean Water Act (33 USC 1251 et seq) Section 404 (33 USC 1344)	Individual, general, and nationwide permits	Regulates discharge of dredged or fill materials into waters of the United States	<ul style="list-style-type: none"> ■ Activities that may impact federal waters, including wetlands
<u>U.S. Army Corps of Engineers</u> (33 CFR 320-331)	Rivers and Harbors Act of 1899 (33 USC 401 et seq) Section 10 (33 USC 403)	Section 10 Permit	Regulates obstructions to navigable waters of the United States	<ul style="list-style-type: none"> ■ Building or replacing bridges
<u>Environmental Protection Agency and state agencies</u> (40 CFR 122 and 123)	Clean Water Act (33 USC 1251 et seq) Section 402 (33 USC 1342)	National Pollution Discharge Elimination System (NPDES) Stormwater Permit	Regulates discharges into waters of the United States. Usually delegated to state authority.	<ul style="list-style-type: none"> ■ Potential for discharge from site assessment, construction, and operation
<u>Federal Aviation Administration</u> (14 CFR 77)	49 USC 44718	Notice of Proposed Construction (Form 7461-1) Hazard Determination	Notifies FAA of proposed structures that might affect navigable airspace. Form requires proposed markings and lighting. FAA must review possible impacts to air safety and navigation, as well as the potential for adverse effects on radar systems.	<ul style="list-style-type: none"> ■ Construction or alteration of structures standing higher than 200 feet above ground level ■ Construction or alteration of structures near airports ■ 14 CFR 77.13 provides details ■ Siting within radar line-of-sight of an air defense facility
<u>Environmental Protection Agency</u> (40 CFR 112)	Oil Pollution Act (33 USC 2701 et seq)	Spill Prevention, Control, and Countermeasure (SPCC) Plan	Establishes procedures, methods, and equipment requirements to prevent and contain oil spills	<ul style="list-style-type: none"> ■ May apply to fuel stored on site for emergency power generator or other purpose. ■ SPCC rules currently being amended
<u>Environmental Protection Agency</u>	Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) (42 USC 9601-9675)	ASTM Environmental Site Assessment	CERCLA is the principal statute that governs liability with respect to contaminated properties	<ul style="list-style-type: none"> ■ Contaminated property



4.1.1 National Environmental Policy Act

Signed into law on January 1, 1970, the National Environmental Policy Act (NEPA) (42 USC 4321) was the first major environmental law in the United States. This important statute established a national environmental policy and required federal agencies to undertake an assessment of the environmental effects of their proposed actions prior to making decisions. Regulations promulgated by the Council on Environmental Quality (CEQ) (40 CFR Parts 1500 – 1508) implement the procedural provisions of NEPA, and each federal agency has its own set of regulations to implement the CEQ's NEPA regulations.

For wind projects that are not located on federal lands, comprehensive environmental reviews most often occur as part of state or local permitting processes rather than as part of a federal agency NEPA review.

The extent of the environmental assessment necessary during a NEPA review varies based on the significance of the potential impacts associated with a project. For wind projects that are not located on federal lands, comprehensive environmental reviews most often occur as part of state or local permitting processes rather than as part of a federal agency NEPA review (Section 4.2 and Section 4.3). Wind projects in the western part of the United States encounter comprehensive NEPA reviews more often than in the eastern part due to the greater amount of federal lands available for development. Although federal reviews for wind projects generally consist of consultations or permits that do not require the preparation of lengthy environmental assessment documents, activities that might trigger a comprehensive NEPA review include:

The Bureau of Land Management (BLM) developed a Programmatic Environmental Impact Statement to evaluate issues associated with wind energy development on western public lands administered by the BLM, including Alaska. The Final EIS was released and approved in 2005.

Example



- granting rights to use federally managed land
- required federal permits or approvals, such as
 - U.S. Fish and Wildlife Service Incidental Take Permit
 - individual permit from the U.S. Army Corps of Engineers pursuant to Section 404 of the Clean Water Act for discharge of fill or dredged materials into waters of the United States (including federal wetlands)
 - permit under Section 10 of the Rivers and Harbors Act for work in navigable waters of the United States
- accessing federally-owned transmission lines
- receipt of federal grant monies or other federal funds

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For the purposes of NEPA review, federal agency actions are divided into the three categories listed below. When performing NEPA review, the agency must determine which of the following categories applies:

1. **Categorical Exclusion:** Each agency is permitted to adopt a list of Categorical Exclusions (CX) which are types of actions that individually or cumulatively do not have significant effects on the environment. For example, the use of a CX for the issuance of short-term right-of-way authorizations by the Bureau of Land Management may be applicable to some wind energy site testing and monitoring locations. Unless extraordinary circumstances exist, an agency can proceed with an action that is a listed CX without further NEPA review.

2. **Environmental Assessment:** The vast majority of actions fall within the category requiring an Environmental Assessment (EA). An EA is a concise public document that provides sufficient evidence and analysis to assist the agency in determining whether to prepare an Environmental Impact Statement (EIS) for a proposed action, and to comply with NEPA when no EIS is required. Developers can increase their chances of remaining in the EA category by minimizing project impacts and/or including mitigation measures in the initial proposal.

After performing an EA, if an agency determines that the action would not significantly affect the environment, it prepares a Finding of No Significant Impact (FONSI). A FONSI is a brief document that presents why an agency has determined that no EIS is required for a particular action. The FONSI includes the EA or a summary and references to related documents. The agency is required to make the FONSI available to the public, but unless certain circumstances are triggered, the agency is generally not required to make the FONSI available for a 30-day public review.

3. **Environmental Impact Statement:** If the agency determines that the action would have a significant effect on the quality of the human environment, the agency must prepare an EIS. Agency regulations or guidelines may specify those actions that typically would require an EIS. Alternatively, an agency may prepare an EA to determine whether an EIS is necessary.

If an agency determines that an EIS is required, it must prepare a Notice of Intent (NOI), publish the NOI in the Federal Register, and commence the scoping process.

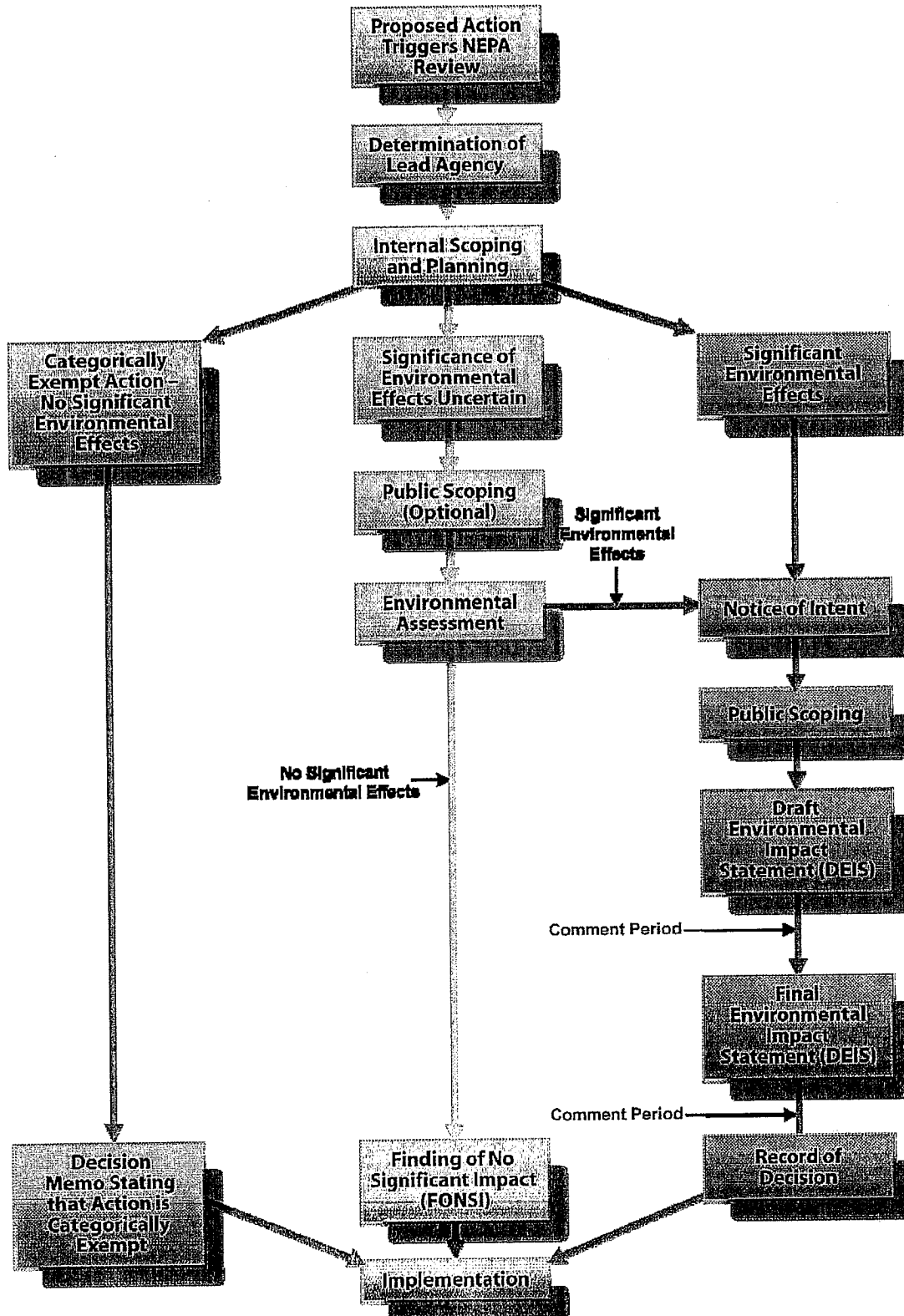
Federal agency actions under NEPA review are divided into three categories:

- 1) Categorical Exclusion
- 2) Environmental Assessment
- 3) Environmental Impact Statement



The following flowchart provides a step-by-step account of the NEPA process.

NEPA Process



In general, an agency may not take any project-related action (such as issuing a permit) while the EIS is pending. During this interim period, applicants can develop plans or designs, or undertake other work to support an application, such as conduct meteorological, environmental, cultural, and engineering studies. Although the federal agency is responsible for preparing an EA and/or EIS, applicants usually provide the agency with supporting studies and documentation.

NEPA requires that its mandates be met with a minimum of delay and duplication with other state and federal agencies. The CEQ regulations strongly urge state and local agencies and the relevant federal agencies to cooperate with one another to reduce duplication between NEPA and comparable state and local requirements. Such cooperation should include joint planning processes, environmental research and studies, public hearings, and the preparation of joint EISs under NEPA and state environmental impact laws (see “Little-NEPAs” discussion in [Section 4.2.3](#)), so that one document will satisfy both federal and state requirements.

4.1.2 Fish and Wildlife

4.1.2.1 Endangered Species Act

The Endangered Species Act (ESA) (16 USC §§ 1531 – 1544) establishes measures to prevent extinction of fish, wildlife, and plant species. The purpose of the ESA is “to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved” and “to provide a program for the conservation of such ... species.” (ESA §2(b)). Section 3 of the ESA defines terminology. Section 7 mandates interagency consultation for activities that may affect protected species. Section 9 establishes activities that are prohibited by the ESA. Section 10 establishes permits and exceptions that may be granted to the prohibitions in Section 9. Section 11 describes the penalties for violations of the ESA.

The land-based provisions of the ESA are implemented and enforced under regulations promulgated by the U.S. Fish and Wildlife Service (FWS) (50 CFR Parts 13 and 17). The FWS is responsible for terrestrial and freshwater organisms, while the National Marine Fisheries Service (NMFS) is responsible for marine organisms. (The role of NMFS is not discussed further because offshore wind projects are beyond the scope of this handbook.) Several principal aspects of wind energy project

- Section 3 of the ESA defines terminology.
- Section 7 mandates interagency consultation for activities that may affect protected species.
- Section 9 establishes activities that are prohibited by the ESA.
- Section 10 establishes permits and exceptions that may be granted to the prohibitions in Section 9.
- Section 11 describes the penalties for violations of the ESA.



development, including site clearing and wind turbine operation, may trigger the regulatory requirements of the ESA.

Section 3 - Section 3 of the ESA defines three fundamental terms:

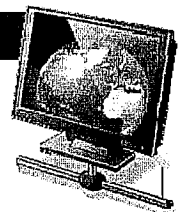
- “Endangered species” means “any species which is in danger of extinction throughout all or a significant portion of its range.” (ESA §3(6)).
- “Threatened species” means “any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range” (ESA §3(20)). Regulations for a threatened species may be less restrictive than if it were endangered.
- “Critical habitat” for a threatened or endangered species means “specific areas within the geographical area occupied by the species...on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and specific areas outside the geographical area occupied by the species ...upon a determination by the Secretary [of the Interior] that such areas are essential for the conservation of the species” (ESA §3(5)).

Section 7 - Section 7 of the ESA states that federal agencies shall “insure that any action authorized, funded, or carried out...is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification” of designated critical habitat” (ESA §7(a)(2)). The Section 7 provisions require that a federal agency authorizing, funding or carrying out any action that may affect protected species consult with the FWS. Project developers should work with the reviewing agencies to engage the FWS in a discussion about impacts to species protected by the ESA.

Where wind energy projects require a federal approval (e.g., land use authorization from the Bureau of Land Management), a Section 7 consultation will occur as part of the federal permit review process. Although such consultation is only required for activities that involve federal action or approval, consulting with the FWS is always recommended for wind energy projects due to the potential to incur liability under Section 9 of the ESA, a strict liability provision that does not require intent or knowledge of a violation. Early consultation with the FWS to identify potential impacts to protected species can help to minimize liability under the ESA.

Resource

The Section 7 consultation process is outlined in detail in the Endangered Species Consultation Handbook issued jointly by the FWS and NMFS in March 1998.



Developers should confer with environmental consultants and legal counsel to determine ESA applicability to their project and to establish an early dialogue with the FWS, state endangered species authorities, and other stakeholders. The consultation process involves requesting a list of endangered, threatened, and candidate species and a list of critical habitats from the FWS and relevant state authorities. The FWS may provide species lists and other information under an informal consultation process or under a formal consultation process. If a formal process is required, the FWS issues a "Biological Opinion" at the end of the consultation process regarding the potential effects of the proposed action on threatened and endangered species and their habitat.

If the consultation determines that development of the wind project is likely to result in an "incidental take" of a threatened or endangered species, the FWS may issue an Incidental Take Statement as part of the Biological Opinion. The Incidental Take Statement exempts the project from the Section 9 prohibitions discussed below and thus from the permitting requirements of Section 10, provided reasonable and prudent measures are taken to minimize the impacts of the incidental take. An "incidental take" is a taking that "is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity." (ESA §10(a)(1)(B))

Section 9 - Section 9 of the ESA prohibits any person from "taking" endangered species of fish or wildlife. (ESA §9(a)(1)). The FWS regulations extend this prohibition to threatened species. The definition of "take" is broad and includes harassing or harming a listed species. (ESA §3(19)). "Harass" is defined by the FWS regulations as an action likely to injure a listed species by significantly disturbing normal behavior patterns such as breeding, feeding or sheltering (50 CFR 17.3). "Harm" is defined by the FWS regulations to include habitat modification or degradation that "actually kills or injures wildlife ... by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering" (50 CFR § 17.3). The "take" prohibition covers fish and wildlife but not plants. However, it is unlawful to remove an endangered species of plant from federal land and reduce it to possession (ESA §9(a)(2)). When Section 7 consultation is not required, engaging in voluntary consultation with the FWS would reduce liability from unknowingly violating Section 9.

Section 10 - Section 10 of the ESA establishes permits and exceptions to the prohibitions listed in Section 9. If the developer of a wind project determines that a "take" is likely to occur as a result of a project that is not otherwise subject to Section 7 consultation (because no federal approval is required), the developer can apply for an Incidental Take

Resource

In 1996, the FWS and NMFS issued a joint Handbook for Habitat Conservation Planning and Incidental Take Permitting Process, which provides guidance for developing HCPs.



Permit (ITP) from the FWS. To apply for an ITP, the developer must submit a habitat conservation plan (HCP), including proposed mitigation measures and alternatives to the proposed action (ESA §10(a)(2)(A)). Since the issuance of an ITP by the FWS would be a federal action subject to Section 7, an intra-FWS consultation would be conducted. Approval of the ITP would also require NEPA compliance. For wind projects, the FWS usually requires preparation of an EA or EIS to accompany the HCP. However, if the FWS determines that the HCP is a “low-effect” HCP, the ITP approval would be considered as a categorically excluded action and would not require additional review under NEPA.

If the FWS finds that the taking will be incidental and satisfactorily mitigated, the HCP is adequately funded, and the taking will not “appreciably reduce the likelihood of the survival and recovery of the species in the wild,” it must issue the ITP (ESA §10(a)(2)(B)). While the decision to apply for an ITP is within the developer’s discretion, if a take attributable to the project occurs and the take has not been authorized by an ITP, the developer would be subject to liability under Section 9.

FWS’s “No Surprises” rule allows an applicant for an ITP to negotiate long-term assurances that no additional mitigation of impacts will be required, even if circumstances change (50 CFR §§ 17.22, 17.32). The rule provides some assurance that no additional land use restrictions or financial compensation will be required from the permit holder if unforeseen circumstances arise indicating that additional mitigation is necessary. The rule was recently upheld by a Federal District Court in *Spirit of the Sage Council v. Kempthorne* (Aug 2007).

Section 11 - Section 11 of the ESA establishes penalties and enforcement provisions. Violations of the ESA can result in stringent civil and criminal penalties and/or injunctions by the FWS against operation of a project. Section 11 also includes a citizen suit provision that allows any individual to file a civil action to enjoin any person, including any governmental agency, from violating the ESA. A citizen can also commence a civil suit to compel the FWS to comply with the provisions of the ESA or to perform a nondiscretionary duty under the ESA. Citizens must provide sixty (60) days written notice to the alleged violator and to the Secretary before commencing a civil action.

Section 11(b) of the ESA makes it a crime to “knowingly violate” any provision of the ESA, or any permit, certificate, or regulation issued under the ESA. As noted earlier, the ESA is a strict liability statute and



Knowledge or intent is not required for violation of the ESA. Consultation with the FWS to identify potential impacts to protected species at the start of project development is important to minimize liability under the ESA.

does not require intent or knowledge. Early consultation with the FWS reduces the possibility of unknowingly violating the ESA.

4.1.2.2 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (16 USC §§ 703-712) establishes provisions for the protection of migratory birds. The MBTA forbids anyone "at any time, by any means, or in any manner, to pursue, hunt take, capture, kill [or] any part, nest, or eggs of any such bird...." (16 USC § 703(a)). The MBTA is distinct from the ESA because it protects migratory bird species that are not necessarily threatened or endangered. Over 800 species of migratory birds are protected by the MBTA (50 CFR 10.13). The FWS implements and enforces the MBTA.

Several principal aspects of wind energy project development, including site clearing and wind turbine operation, are subject to the provisions of the MBTA. Consultation with the FWS regarding MBTA compliance and permitting can happen concurrently with the FWS review of impacts on protected species under the ESA.

However, the MBTA is a strict liability statute and does not provide for permits similar to an ITP to cover accidental impacts from a wind energy project. Knowledge or intent is not required to be liable under the MBTA. (16 USC § 707(a)). Courts have held that even the accidental killing of a migratory bird can be a criminal act under this law. Proactive measures, such as involving the FWS early in project development, would minimize the risk of mortality and avoid costly enforcement.

4.1.2.3 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (Eagle Protection Act) was passed in 1940 to prevent the extinction of the bald eagle and was amended in 1962 to include protection of the golden eagles (16 USC §§ 668-668d). The Eagle Protection Act makes it unlawful to "take, possess, sell, purchase, barter...transport, export or import ..." any bald eagle or golden eagle, their parts, nests, or eggs (16 USC § 668(a)). "Take" means to shoot at, poison, wound, kill, capture, trap, collect, molest or disturb", the eagles (16 USC § 668c). The Eagle Protection Act authorizes substantial fines for misdemeanor and felony violations of the Act by individuals and organizations as well as possible imprisonment (16 USC §§ 668, 668b). As with the ESA and MBTA, the FWS oversees the implementation of the Eagle Protection Act.

Several principal aspects of wind energy project development are subject to the provisions of the Eagle Protection Act. Consultation and permitting can happen concurrently with the FWS review of impacts of



Knowledge or intent is not required for violation of the MBTA or the Eagle Protection Act. Consultation with the FWS to identify potential impacts to protected species at the start of project development is important to minimize liability.

proposed actions on protected species under the ESA. A Golden Eagle Nest Take permit is available for obtaining permission to move a golden eagle nest in order to prevent harm to the nest or eggs. However, the Eagle Protection Act is a strict liability statute and does not provide for permits that cover accidental impacts from wind energy projects.

The Eagle Protection Act protects bald and golden eagles regardless of whether or not they are threatened or endangered. In July 2007, the U.S. Secretary of the Interior published a final rule removing the bald eagle from the federal list of endangered and threatened wildlife (72 Fed. Reg. 37346). Although the Bald Eagle no longer receives protection under the ESA, both the Eagle Protection Act and the MBTA continue to provide protection for the species. Additionally, in May 2007, the FWS published the National Bald Eagle Management Guidelines to elaborate on regulations for implementing the Eagle Protection Act.

Resource

The FWS issued the final rule to announce the removal of the bald eagle from the endangered species list in July 2007. Although the Bald Eagle no longer receives protection under the ESA, both the Eagle Protection Act and the MBTA continue to provide protection for the species.



Training operating staff to recognize protected birds. Photo courtesy of PPM Energy.

4.1.2.4 Interim Guidelines/Federal Advisory Committee

On May 13, 2003, the FWS within the DOI issued Interim Guidance on Avoiding and Minimizing Wildlife Impacts from Wind Turbines (Interim Guidelines). The FWS indicated its intent to evaluate the guidance over a two-year period.

On December 8, 2003, AWEA submitted comments on the Interim Guidelines to the FWS. AWEA noted that the lack of consultation with the wind industry prior to issuance of the guidance had resulted in a document that has technical flaws, contains inaccurate assumptions, and calls for a level of regulation disproportionate to wind's impacts on wildlife, especially as compared to impacts from other activities.

Additionally, although the Interim Guidelines are voluntary, AWEA noted that permitting agencies throughout the country were beginning to adopt the guidance as required procedure. AWEA encouraged the FWS to engage in a dialogue with the wind industry, providing an opportunity to exchange research and information on the potential effects of wind energy projects on wildlife.

On April 26, 2004, the FWS issued a memorandum regarding implementation of the Interim Guidelines. Among other things, the FWS clarified that the guidance is intended to be general in nature and should be applied as appropriate based on local conditions. The FWS stated: the "Interim Guidelines are not to be construed as rigid requirements, which are applicable to every situation, nor should they be read literally." Nevertheless, government agencies and other stakeholders continued to apply the Interim Guidelines as mandatory requirements, without taking into consideration site-specific considerations.

On March 13, 2007, DOI announced the formation of a Wind Turbine Guidelines Federal Advisory Committee (FACA) to provide recommendations and advice to the DOI and the FWS "on developing effective measures to protect wildlife resources and enhance potential benefits to wildlife that may be identified." On October 26, 2007, the Secretary of the Interior announced in a press release that 22 individuals had been named to serve on the FACA. Meetings of the Committee will be open to the public and notice of upcoming meetings will be published in the Federal Register. The public will have an opportunity to provide input at the meetings.

The FACA presents a critical opportunity for the FWS to publish a revised document that is protective of wildlife without imposing an undue economic burden on the industry. The potential mandatory nature of the Interim Guidelines makes it imperative that the wind industry continue to provide the FWS with current information and resources. Section 5.1 describes studies and methodologies for assessing and mitigating potential impacts to biological resources.

4.1.3 Cultural and Paleontological Resources

4.1.3.1 Cultural Resources

Cultural resources include archaeological, architectural, and traditional resources that include, but are not limited to, objects, sites, buildings, structures, and traditional cultural places. Archaeological and architectural cultural resources generally may be related to either the prehistoric (before written records) or the historic (starting with written



The potential mandatory nature of the Interim Guidelines makes it imperative that the wind industry continue to provide the FWS with current information and resources.

records) time periods. Traditional cultural places include natural features as well as man-made locations that have cultural associations important to a particular ethnographic or ethnic population.

4.1.3.1.1 The National Historic Preservation Act

The National Historic Preservation Act (NHPA) (16 USC 470) is the basis for current national policy on cultural resource issues and historic preservation. The NHPA promotes historic preservation, which includes “the protection, rehabilitation, restoration and reconstruction of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, or culture” (16 USC 470).

The NHPA:

- created the National Register of Historic Places (NRHP), a listing of historic properties of national, regional, state, and local significance
- established the Advisory Council on Historic Preservation, an independent federal agency responsible for administering the protective provisions of the Act
- directed states to appoint State Historic Preservation Officers (SHPOs)
- requires federal agencies to take into account the effects of their undertakings on properties on or eligible for the NRHP (Section 106 consultation process)

In addition to federal requirements under the NHPA, many states have developed their own historic preservation policies. These state policies may mirror or relate to the federal process but may also include unique requirements. Developers need to be familiar with state-specific guidelines and requirements to understand the steps that may be involved in permitting a project. Additional details on the state process are included in Section 4.2.5.

If federal action (i.e., permits, financial assistance or federal lands) is required for a wind project, the developer will be expected to support the lead federal agency in the agency’s compliance with Section 106 of the NHPA. The Advisory Council on Historic Preservation has identified procedures to be followed by federal agencies to comply with Section 106 at 36 CFR 800. If no federal permits are required, developers may be required to support SHPO offices or the relevant state lead agency in complying with the state’s process for addressing cultural resources issues.

Resource

The National Park Service maintains the list of sites on the NRHP.



Whether guided by the federal or state process, a wind developer will likely be required to sponsor studies necessary to provide information that will allow agencies to understand if a proposed project may have an effect on historic properties, i.e., cultural resources that are listed in, or qualify as eligible for listing in, the NRHP. [Section 5.6](#) discusses cultural and historical resources impact analysis and mitigation with respect to cultural resources.

4.1.3.1.2 Other Regulatory Considerations

Prior to implementing studies, a project on federal, state, or tribal lands may need to obtain a permit under the Archaeological Resources Protection Act of 1979 (ARPA) (16 USC 470aa et seq.). An ARPA Permit would be obtained through the landowning agency or tribe. If studies are performed on federal or tribal lands, researchers will be required to comply with the Native American Graves Protection and Repatriation Act (NAGPRA) (25 USC 3001) if human remains attributable to Native American populations are discovered.

4.1.3.2 Paleontological Resources

Paleontological resources are the fossil or organic remains, traces, or imprints of an organism preserved in the earth's crust since some time in the geologic past, such as shells, bones, diatomite beds, and associated rock and soil matrices. Paleontological resources are non-renewable and can, in some instances, be quite rare. They have the potential to inform scientists about past environments and evolution.

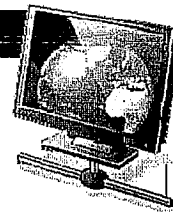
Paleontological resources located on federal lands are protected by several major laws, including the Federal Land Policy and Management Act of 1976 (43 USC § 1701-1782), NEPA, and various sections of Title 43 of the Code of Federal Regulations. Developers may be required to conduct surveys prior to development of final project design, consider avoidance of adverse effects, and/or take action following unanticipated discovery of fossils during construction.

4.1.4 Water Resources

Two major pieces of federal legislation, the [Clean Water Act](#) (CWA) (33 USC 1251-1387) and the Rivers and Harbors Act (33 USC 401 et seq.), govern impacts to water resources. The CWA has a broad goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters. Among other things, the CWA establishes the basic structure for regulating discharges of pollutants into the [waters of the United States](#) and managing polluted runoff. In particular, wind energy projects may be subject to Water Quality Certification under

Resource

The [Bureau of Indian Affairs](#) and [Tribal Historic Preservation Officers](#) can provide additional guidance on compliance with NAGPRA and other Native American cultural resource concerns.



Two major pieces of federal legislation, the [Clean Water Act](#) (CWA) and the [Rivers and Harbors Act](#), govern impacts to water resources. In particular, wind energy projects may be subject to Water Quality Certification under Section 401 of the CWA and permit requirements under Sections 402 and 404 of the CWA and Section 10 of the Rivers and Harbors Act.



Section 401 of the CWA and permit requirements under Sections 402 and 404 of the CWA.

Section 10 of the Rivers and Harbors Act applies to work in or over navigable waters of the United States. Under Section 10, the placement of structures that affect the course, location, condition, or capacity of navigable waters requires a permit from the Army Corps of Engineers (USACE). For example, land-based wind projects might require a Section 10 permit if construction activities require building or replacing a bridge in a navigable waterway or creating docks to receive materials via waterway.

4.1.4.1 Section 401 - Water Quality Certification

Water Quality Certification under Section 401 of the CWA is required for certain activities in wetlands and waters. Water Quality Certification sets out the conditions that have identified as being necessary to ensure that a proposed project will comply with state or tribal water quality standards and other appropriate requirements of state or tribal law. This process gives states and tribes the authority to review projects that require federal approval (such as a permit or license) and that might result in a discharge to state or tribal waters, including wetlands. For a wind energy facility, needed federal approvals that could trigger the need for a 401 Water Quality Certification include a permit from the USACE pursuant to Section 404 of the CWA or Section 10 of the Rivers and Harbors Act.

The EPA has primary authority under Section 401, but authority is often delegated to a state agency. In general, Section 401 Water Quality Certification should not cause delays in project approval. In many cases, Section 401 review is conducted at the same time as the federal agency approval process pursuant to a joint permit process. A state also may issue a general Section 401 Water Quality Certification for a Nationwide Permit (NWP) or Regional Programmatic General Permit (PGP) promulgated under Section 404 of the CWA. Some states use their CWA authority to impose additional conditions on or deny a NWP. Developers should consult with the applicable state environmental agency for more information about Section 401 Water Quality Certification.

4.1.4.2 Section 402 - National Pollutant Discharge Elimination System

The National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. The CWA authorizes EPA to implement the NPDES program. However, EPA has delegated its authority to most states and some Indian tribes. In those jurisdictions where EPA remains the permitting authority, the applicable

regional office of EPA issues the NPDES permits. A chart summarizing NPDES delegation authority can be found on EPA's website.

During construction of a wind energy facility, a NPDES General Stormwater Permit for Construction Activities (CGP) is required for any land disturbance equal to or greater than 1 acre (including smaller sites that are part of a larger common plan of development). This includes clearing, grading, and excavation activities. In areas where EPA is the permitting authority, the "operator" must comply with EPA's CGP. The operator is the entity (e.g., an owner, general contractor, or subcontractor) that has operational control over the construction plans or day-to-day activities at the site.

States that administer the NPDES program have developed their own CGPs that incorporate, at a minimum, the requirements of the federal CGP. Federal regulations allow states, territories, and tribes to add certain conditions to the CGP that apply only in that area, even where EPA is the permitting authority and the federal CGP applies. EPA or the permit issuing state can require that a project obtain an individual Stormwater Permit for Construction Activities if the site is particularly large or in sensitive areas if the state determines that the protection offered by the CGP is inadequate.

The CGP application form is called a Notice of Intent (NOI). When EPA is the permitting authority, an applicant is authorized to discharge stormwater from construction activities seven calendar days after acknowledgment of receipt of a complete NOI is posted on EPA's NPDES website. Some states require NOIs to be submitted earlier in the process, especially if there are special circumstances (e.g., the activity is located near surface water that has one or more water quality issues). Developers should confirm the deadlines in the applicable state.

If eligible for coverage under a CGP, prior to submitting an NOI the operator must develop a Stormwater Pollution Prevention Plan (SWPPP) in accordance with the CGP. Among other things, the SWPPP must identify pollutant sources and non-storm water discharges; establish procedures to identify, construct, implement, and maintain Best Management Practices (BMPs); develop a maintenance schedule for post-construction BMPs; and identify a sampling and analysis strategy and schedule for discharges from construction activity into regulated water bodies. SWPPPs can typically incorporate by reference other required plans and procedures required under other laws or regulations such as a Spill Prevention, Control, and Countermeasure (SPCC) Plan. Section 5.11 contains additional discussion of SPCC Plans.

During construction, the developer will be required to have a qualified professional regularly inspect the construction site for compliance with the SWPPP. An official inspection log book must be kept at the construction site. Requirements are established in the CGP, and the compliance system is detailed in the SWPPP. Failure to file an NOI or comply with the CGP or SWPPP can lead to enforcement action, including fines, civil and criminal penalties, and incarceration.

- **Stormwater Permits for Industrial Activities** - In addition to a stormwater permit for construction activities, some wind energy facilities may need an industrial stormwater permit to cover their operations. Although EPA regulations do not currently require an industrial stormwater permit for wind energy generation, many states that implement the NPDES program require all electricity-generating facilities to obtain coverage under an industrial stormwater general or individual permit.
- **Other Water Discharges** - Although most wind energy facilities will not have a non-stormwater-related discharge of process or other wastewater, if such a discharge is planned, an individual NPDES permit to cover the discharge must be obtained from EPA and/or the applicable state agency. Applications for a new discharge must be filed at least 180 days in advance of the anticipated first discharge. Typically work on such an application should begin at least 3 to 6 months before the application due date (i.e., 9 to 12 months before the first discharge).

4.1.4.3 Section 404 - Discharge of Dredged or Fill Materials

Section 404 of the CWA (33 USC 1344) regulates a particular source of water pollution, specifically the discharge of dredged or fill material into waters of the United States, including wetlands. The USACE, rather than EPA, manages and administers the regulatory program (33 CFR 320-331) and issues permit decisions. Section 404 requires a federal permit before dredged or fill material may be discharged into waters of the United States, unless the activity is exempt from regulation. Examples of wind energy-related activities that might require a Section 404 permit include (but are not limited to) clearing and grading, building project infrastructure such as turbines, access roads, and collection systems, and performing road work, such as culvert replacements or intersection improvements.

Under Section 404, regulated waters of the United States include surface waters that are navigable waters and their tributaries, all interstate surface waters and their tributaries, natural lakes, all

impoundments of these waters, and all wetlands adjacent to these waters. Wetlands generally include vegetated areas that are wet at least during some parts of the year such as swamps, marshes, bogs, and similar areas. The USACE uses the 1987 Corps of Engineers Wetlands Delineation Manual, regional supplements, and related guidance to identify and delineate wetlands under Section 404 of the CWA. The USACE manual organizes the characteristics of a potential wetland into three categories—soils, vegetation, and hydrology—and establishes criteria for each category.

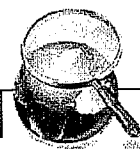
If a wind energy project will involve construction in the vicinity of an area subject to Section 404, it may require a permit. The applicable USACE district office makes the final determination as to whether an area is jurisdictional (subject to the CWA) and whether the proposed activity requires a permit. If a permit is required, the USACE may issue either a general (national or regional) or individual permit.

Several recent U.S. Supreme Court and lower court decisions have addressed the issue of the extent to which the CWA covers isolated wetlands and tributaries (see e.g., Rapanos v. United States and Carabell v. United States (126 S. Ct. 2208 (2006))). In response to the Supreme Court decisions, USACE and EPA issued guidance clarifying which waters are subject to Section 404 of the CWA. New regulatory interpretations and their relevancy for compliance under Section 404 may be identified during consultation with the USACE.

General Permit - Discharges that have only minimal adverse impacts may be eligible for a general permit. General permits cover categories of activities the USACE has identified as being substantially similar in nature and causing only minimal individual and cumulative environmental impacts. The USACE issues general permits on a nationwide, regional, county, or state basis. General permits eliminate the individual review process and allow eligible activities to proceed with minimal delay provided the conditions of the general permit are satisfied. Some wind projects may not be able to satisfy the minimal disturbance criteria necessary to be eligible for a general permit.

There are currently 50 Nationwide Permits (NWP) that address specific types of construction activities. NWP are reissued every 5 years and were last issued in 2007. NWP that typically apply to wind projects include NWP 12 (utility line discharges), NWP 33 (access roads), NWP 39 (commercial and institutional developments), and NWP 27 (wetland restoration). Different permits may apply to different components of a wind energy facility. However, USACE considers the total acreage of wetland affected by the entire project to determine whether a permit is

Recent U.S. Supreme Court and lower court decisions have addressed the issue of jurisdiction over wetlands. In response to the Supreme Court decisions, USACE and the EPA issued guidance clarifying which waters are subject to Section 404 of the CWA.



Example

necessary. Consultation with the appropriate regional office is necessary to identify which permits apply to a particular project. Proposed work must satisfy the NWP criteria (e.g., limits on the area of project disturbance). Under some circumstances, the NWP requires the applicant to submit a Preconstruction Notification (PCN) to the USACE. It can take 45 to 90 days to complete the NWP process.

Regional permits address activities in a limited geographic area, typically a specific basin or watershed. Many states have chosen to pursue a Programmatic General Permit (PGP). PGPs enable states to simplify the regulation process, reduce duplicative regulatory programs, and preserve limited resources while protecting the aquatic environment.

Individual Permit - An individual permit is required for activities that have the potential to significantly impact surface waters and wetlands or if there is no NWP, regional permit, or PGP that covers the proposed activity. In addition, "Letters of Permission" are sometimes available when the proposed project involves a lesser degree of impact on aquatic resources and the project is non-controversial. The review process for an individual permit application can be time consuming, taking 6 to 12 months or longer, and can require costly studies and preparation of an EIS. If required, an individual Section 404 permit is frequently the last authorization obtained prior to construction. It may be possible to shorten the review process by requesting a pre-application consultation with the USACE and other federal, state, and local agencies involved in the review. The consultation allows for informal discussions about the proposal before an applicant makes irreversible commitments of resources. The process can assist the applicant in understanding the review criteria applied by USACE, assess whether there are any feasible alternatives, and provide a forum for discussing potential mitigation measures.

Failure to obtain and comply with a Section 404 permit when necessary can delay the project and result in potential liability. It is important that the developer and construction contractor review and understand the permit conditions. In addition to federal requirements, many states and some local municipalities also require permits for wetland and/or dredge and fill-related work ([Section 4.2.4.2](#)).

4.1.5 Aviation

The Federal Aviation Administration (FAA) Office of Obstruction Evaluation and Airport Airspace Analysis is responsible for the safety of civil aviation. The FAA has jurisdiction over any object that may impact or

interfere with the navigable airspace or communications technology used in aviation operations. Construction of wind turbines and meteorological towers often require FAA review.

The FAA requires a developer to file a Notice of Proposed Construction (NPC) (Form 7460-1) for any structure greater than 200 feet above ground level. In some circumstances, the filing of a Form 7460-1 may also be required for a structure less than 200 feet above ground level depending on the distinction and length of nearby runway. The NPC must include a plan for appropriate markings and lighting based on FAA requirements. Following receipt of FAA Form 7460-1, the FAA conducts a study process to determine whether the proposed action will create a hazard to navigable airspace. At the end of the process, the FAA issues either a Determination of No Hazard (DNH) or a Notice of Presumed Hazard (NPH). An NPH may initiate a process of negotiation and appeal. Form 7460-1 also requires a proposal for affixing appropriate markings and lighting to the wind turbines and met towers. Advisory Circular 70/7460-1K describes the kinds of markings and lighting applicable to airspace navigation.

Since most turbines exceed the 200-foot height criterion, and therefore trigger FAA review, developers must understand and comply with applicable FAA regulations. Consultation with the FAA during the completion of Form 7460-1 may help lead to a DNH.

4.1.6 Electromagnetic Interference

Studies in the United States and Britain have concluded that wind turbines may interfere with radar systems. In a last-minute amendment to the National Defense Authorization Act for Fiscal Year 2006, Congress mandated that the Secretary of Defense submit a report to Congress on the effects of wind farms on military readiness and specifically whether wind facilities interfere with Long Range Surveillance Radar, often called Air Defense radar. On September 27, 2006, the DoD published its report, The Effect of Windmill Farms on Military Readiness. The report concluded that wind farms located within radar line-of-sight of an air defense radar facility may degrade the ability of the radar to perform its intended function. This impact is essentially due to "shadowing" and increased "clutter" caused by the mere presence of the turbine structures and the rotational movement of the turbine blades. The magnitude of the impact, according to the report, depends upon the number and location of the turbines.

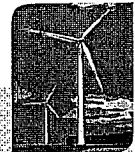
Consultation with a number of federal agencies that have jurisdiction over radar systems is often part of obtaining regulatory approvals. As

The F.E. Warren Air Force Base in Wyoming erected two 660-kW turbines that are estimated to offset 4,855 tons per year of carbon dioxide and save the Air Force more than \$3 million in energy costs over 20 years.

Example

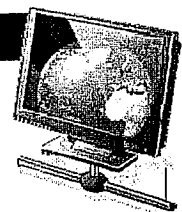


Since most turbines exceed the 200-foot height criterion, and therefore trigger FAA review, developers must understand and comply with applicable FAA regulations.



Resource

The DOE Federal Wind Siting Information Center provides information on agency efforts to develop analytical tools, collect test data, and create solutions to mitigate the impact of wind turbines on advanced radar systems.



part of its hazard determination described in Section 4.1.5, the FAA engages other agencies to review a project that has filed an NPC and provide feedback on the potential for the project to obstruct military radar. The FAA would also conduct internal evaluations for complications to FAA radar systems. The National Telecommunications and Information Administration (NTIA) Interdepartment Radio Advisory Committee (IRAC) also provides federal agencies the opportunity to comment on potential radar issues, as discussed in Section 5.9.1. The National Weather Service is another federal agency that operates a radar system, the National Weather Service Next Generation Weather Radar (NEXRAD).

Consultants that are familiar with FAA regulations and DOD radar concerns can conduct screening analyses to examine the potential for interference with federal radar. Consultation with agencies such as the FAA and NTIA early in the development process may also identify potential impacts to radar systems. However, the FAA and NTIA consultation processes do not entirely eliminate the potential for protest. Standardized consultation procedures need to be established, and developers should stay apprised of improvements as the process evolves.

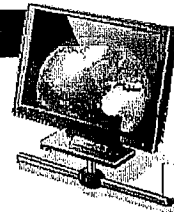
4.1.7 Federally Managed Lands

Federal approvals and reviews under federal statutes such as NEPA, ESA, and NHPA may apply to wind projects anywhere in the United States, regardless of whether the project is located on private, local, state, or federal land. Where a project is proposed on federally-managed lands, additional federal regulations and guidelines apply.

Various agencies have jurisdiction over federal lands and land management programs. The discussion in this section highlights the regulations and policies of a number of agencies that regulate development on federal lands. As noted earlier, federal guidance regarding wind development, such as the Energy Policy Act of 2005 and the National Energy Policy of 2001, encourage agencies to collaboratively develop policies for more efficient review and permitting of wind energy projects. Currently, some agencies, such as the Bureau of Land Management (BLM), already have policies specific to wind energy. Other agencies review wind projects using the same procedures as for other development projects. Some agencies, such as the United States Forest Service (FS), are in the process of amending their regulations to create permitting processes specific to wind energy.

Resource

The FAA Long Range Radar Tool is publicly available for the initial evaluation of the potential to obstruct Air Defense and Homeland Security radar.



For all wind projects on federally managed lands, issuance of land use permits and right-of-way authorizations does not relieve the applicant of obtaining any and all other permits and authorizations that may be required for the proposed project, such as NEPA compliance, consultations under the NHPA and ESA, and CWA Section 404 permits.

Agencies with Jurisdiction over Projects on Federally Managed Lands

Agency	Wind Siting Policy	Guidance
<u>Department of Interior</u> <u>Bureau of Land Management</u>	Yes	<ul style="list-style-type: none"> ▪ <u>Wind Energy Development Policy (Instruction Memorandum No 2006-216)</u> ▪ <u>Programmatic EIS and Record of Decision</u>
<u>Department of Interior</u> <u>Bureau of Reclamation</u>	No	<ul style="list-style-type: none"> ▪ <u>Reclamation Manual</u> ▪ <u>Directives and Standards LND 08-01 "Land Use Authorizations"</u>
<u>Department of Interior</u> <u>Bureau of Indian Affairs</u>	No	<ul style="list-style-type: none"> ▪ <u>Energy Consumption and Renewable Energy Development Potential on Indian Lands</u> ▪ <u>Energy Policy Act of 2005, Section 1813 Indian Land Rights-of-Way Study</u>
<u>U.S. Department of Agriculture</u> <u>Forest Service</u>	Proposed	<ul style="list-style-type: none"> ▪ <u>Forest Service Manual 2726</u> ▪ <u>Forest Service Handbook 2709.11</u> ▪ <u>Amendments to internal agency directives for special use authorizations proposed in September 2007 (72 Federal Register 184).</u>
<u>U.S. Department of Agriculture</u> <u>Natural Resource Conservation Service</u>	No	<ul style="list-style-type: none"> ▪ <u>2002 Farm Bill</u> amended Section 3832 of the Farm Security and Rural Investment Act
<u>U.S. Department of Defense</u>	No	<ul style="list-style-type: none"> ▪ <u>Renewable Energy Assessment Team</u>
<u>U.S. Fish and Wildlife Service</u>	No	<ul style="list-style-type: none"> ▪ <u>The FWS manages land under easements for wetlands, water fowl production areas, and grasslands.</u> ▪ <u>Consultation with the FWS is necessary to identify these areas.</u>

4.1.7.1 Bureau of Land Management

The Bureau of Land Management (BLM), an agency within the DOI, manages approximately 262 million acres of public lands in the United States and is responsible for the development of wind energy resources on BLM-administered lands. BLM has established a Wind Energy Development Program.

On August 24, 2006, BLM issued its Wind Energy Development Policy (BLM Wind Policy) (Instruction Memorandum No. 2006-216) which supports development of wind energy in acceptable areas on BLM-administered lands and minimizes potential environmental and sociocultural impacts. The policies and best management practices (BMPs) contained in the BLM Wind Policy establish mechanisms to protect and enhance natural and cultural resources and identify the issues and concerns that need to be addressed by project-specific plans. Mitigation measures to protect these resources must be incorporated into each project's Plan of Development. These mitigation measures may include the specific programmatic BMPs, as well as

additional mitigation measures contained in relevant BLM guidance and stipulations.

The BLM Wind Policy authorizes private ROW grants for three types of wind energy projects:

1. Site-specific ROW for site testing and monitoring for individual meteorological towers and instrumentation facilities (3-year term) (Site-Specific Grant).
2. ROW for testing and monitoring for a larger testing and monitoring area (renewable 3-year term) (Testing and Monitoring Grant).
3. ROW for long-term commercial wind energy projects (unlimited term, generally 30 to 35 years) (Project Development Grant).

The table below summarizes the salient features of each type of BLM ROW grant.

Features of Types of BLM Right-of-Way Grants for Wind Energy Projects

	Site-Specific Grant	Testing and Monitoring Grant	Project Development Grant
Purpose	Authorization for individual meteorological towers and instrumentation facilities	Authorization for use of project area for testing and monitoring; not only for individual meteorological towers or instrumentation facilities	Authorization for use of project area for the construction of all facilities necessary for a long-term, commercial wind energy project, including construction of turbines, access roads, distribution lines, and associated facilities
Land Area of Grant	Grant authorizes use of minimum amount of land necessary for permitted equipment	Grant authorizes the use of reasonable amount of land necessary for a full-scale wind energy project in the future	Grant authorizes use of reasonable amount of land area for the proposed facilities and allows for reasonable setbacks from right-of-way boundaries
Term of Grant	Three years	Three years	Typically 35 years
Renewal Terms	None	May include the right to extend term for one additional 3-year period	May include the right to extend the term of the grant
Exclusivity of Grant	Grant does not include exclusive or preferential rights	Grant includes the exclusive right to use project site for wind energy projects for the term of the grant, but grantee must file an application for Project Development Grant if it elects to develop the project	Grant includes the exclusive right to use the project site for wind energy projects for the term of the grant, but may require developer to allow public access to the site for public awareness and education purposes
BLM Retained Rights	BLM retains right to use land for compatible uses	BLM retains right to use land for compatible uses, subject to grantee's exclusive right for wind energy project	BLM retains right to use land for compatible uses, subject to grantee's exclusive right for wind energy project
Applicable Fees	Minimum annual rent of \$50 per tower or instrumentation facility	Annual rent is greater of \$1.00 per acre per year or \$1,000.00	Annual rent is \$2,365.00 per megawatt of anticipated installed generation capacity
Best Management Practices	Not required	Required, with site-specific covenants (e.g., bonding, road construction and maintenance, vegetation removal)	Required, with site-specific covenants (e.g., bonding, road construction and maintenance, vegetation removal)
Assignment	Not required	Assignment is allowed with BLM approval	Assignment is allowed with BLM approval

Developers interested in applying for any of the above types of projects must submit an application using a standard form provided by BLM (Standard Form 299). Under the BLM Wind Policy, developers are encouraged to schedule pre-application meetings with BLM to assist in preparing and processing the application, identify potential issues and conflict areas, identify any environmental or cultural resource studies that may be needed, assess public interests and concerns, identify other authorized uses, identify other general recreation and public uses in the area, discuss potential alternative site locations, and discuss potential financial obligations that the applicant must be willing to assume. Early public notification and involvement of local communities and other stakeholders is also important to increase public acceptance and avoid potential conflicts, especially in areas where other land uses are involved. Timelines for processing ROW applications are set forth in BLM's regulations.

As with all projects proposed on federally-managed lands, wind energy projects on BLM lands are subject to review under NEPA. Pursuant to NEPA, BLM prepared a Programmatic EIS (PEIS) and Record of Decision (ROD) for its Wind Energy Development Program. The PEIS assesses the environmental, social, and economic impacts associated with wind energy development on BLM-administered land, and the ROD establishes policies and BMPs for the administration of wind energy development activities as well as minimum requirements for mitigation measures.

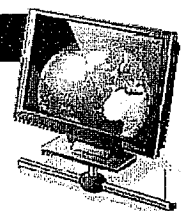
To the extent that the Programmatic EIS addresses anticipated issues and concerns associated with an individual wind energy project, including potential cumulative impacts, BLM will "tier off" the analysis in the PEIS and limit the scope of additional, project-specific NEPA analyses. The site-specific NEPA analyses will include analysis of project site configuration and micrositing considerations, monitoring program requirements, and appropriate site-specific stipulations. In some circumstances, compensatory mitigation may be appropriate. The BLM Wind Policy describes the scope of NEPA review required for the various types of ROW grants. For example, the scope of environmental analysis for a Project Development Grant application will be broader than for a Testing and Monitoring Grant application.

4.1.7.2 Bureau of Reclamation

The DOI's Bureau of Reclamation (BOR), makes federal lands available for renewable energy development. As of 2007, approximately 14,700 MW of hydro-generation was owned and operated by the BOR. The BOR does not have an official policy for siting wind turbines or wind project

Resource

The Bureau of Land Management (BLM) developed a Programmatic Environmental Impact Statement to evaluate issues associated with wind energy development on western public lands administered by the BLM, including Alaska. The Final EIS was released and approved in 2005.



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components on its land, but follows the general guidance provided by national initiatives and directives for promoting wind energy development on federal lands. The National Energy Policy of 2001 directs the Secretary of the Interior to reevaluate access limitations to federal lands to increase domestic production of renewable energy, specifically wind energy, and the Energy Policy Act of 2005 directs the DOI to take actions to promote the development of domestic renewable energy supplies.

The BOR's Reclamation Manual provides guidance for applying for "use authorization" of BOR lands under Directives and Standards LND 08-01. Use authorizations include easements, leases, and permits/licenses for activities on or across lands or interests in lands and water surfaces under the jurisdiction of the BOR. The BOR will grant use authorizations only when the proposed use is compatible with BOR purposes and is consistent with applicable Resource Management Plans. The BOR reserves the right to refuse to authorize any use that may be incompatible with the federally authorized purposes of BOR projects or interferes with BOR's rights or operations.

The BOR has not granted exclusive use authorizations to wind developers for wind measurement or wind project facility development, as are available under the BLM's ROW grant system.

The processing of BOR commercial use applications involves the five steps listed below.

Step One - Pre-Application Meeting

- Meet with the realty specialist in the BOR Area Office with oversight over the proposed site.
- Familiarize the BOR staff with the proposed project.
- Applicant informed of the approval criteria and the process by which the agency will evaluate applications.
- A map and detailed project description may be presented to the BOR at the pre-application meeting to enhance understanding early on in the process.

Step Two - Completing an Application

- Follow the instructions on how to apply for a use authorization set forth in BOR regulations at 43 CFR 429, which are referenced in the following application forms:

- Right-of-Use Application, Form 7-2540
- Application for Transportation and Utility Systems and Facilities on Federal Lands, Standard Form 299

Step Three - Initial Application Review

- Review by BOR.
- BOR will inform the applicant whether or not the proposed use is compatible with BOR projects and programs in the area.

Step Four - Additional Review Processes

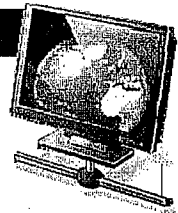
- If the application is deemed complex, involving construction or environmental compliance, or requires an appraisal to determine the market-based rent, several months may be needed to conclude the application process.
- Developer conducts the studies requested by BOR specialists. Developer may need to negotiate scope of studies, citing nearby projects, if appropriate.

Step Five - Issuance of the Use Authorization

- BOR processes the application and notifies the applicant in writing of its decision.
- Developer and BOR sign contract and developer pays rent. Developer authorized to use the land requested in the application.

Resource

The Tribal Energy Program, under the Department of Energy's Office of Energy Efficiency and Renewable Energy, provides financial and technical assistance to tribes for feasibility studies of renewable energy development on tribal lands and offers assistance to tribes for the initial steps toward renewable energy and energy efficiency development.



4.1.7.3 Bureau of Indian Affairs/Indian Reservations

The Bureau of Indian Affairs (BIA) within the DOI is responsible for the administration and management of 55.7 million acres of land held in trust by the United States for American Indians, Indian tribes, and Alaska Natives. There are 561 federally recognized tribal governments in the United States. Among the agency's responsibilities are developing forestlands, leasing assets on these lands, directing agricultural programs, protecting water and land rights, developing and maintaining infrastructure, and economic development.

The BIA and tribal governments are authorized to grant ROW across tribal lands for energy resources, electric transmission lines, and natural gas and oil pipelines. Title V of the EAct of 2005 includes important additional provisions relating to energy on tribal lands. Among other things, Title V authorizes DOI to enter into "Tribal Energy Resource

Agreements" (TERA) with Indian tribes and to establish and implement regulations governing the TERA approval process. The intent of these agreements is to promote tribal oversight and management of energy and mineral resource development on tribal lands and further the goal of Indian self-determination. The DOI published proposed regulations in August 2006 in the Federal Register. Additionally, pursuant to Section 1813 of the EAct of 2005, the DOI and the DOE submitted a joint Report to Congress in May 2007 on issues associated with Indian Land ROWs.

The BIA works with tribes to develop renewable energy on tribal lands. The BIA has funded Wind Energy Feasibility Studies and economic evaluations that indicate high wind energy potential on 93 reservations located in California, New Mexico, Nevada, Utah, Wyoming, Arizona, Montana, North Dakota, Minnesota, and Wisconsin. The BIA is using a recent study by the Energy Information Administration, Energy Consumption and Renewable Energy Development Potential on Indian Lands, on a reservation level to evaluate particular opportunities for economic benefit from renewable energy development.

To explore the possibility of siting a wind generating facility on BIA-managed trust land, a developer may take the following three steps.

Step One - Contact Tribal Executive and Appropriate BIA Office

- Each Native American tribe is organized with its own treaty and constitution; therefore, there is no standard process.
- The tribal executive will refer the developer to the appropriate tribal committees or offices to explore whether the tribe is interested in the developer's proposed project.
- Upon obtaining assurance of the tribal government's interest, the developer should ask the tribal executive for a referral to the appropriate BIA regional personnel for preliminary discussions.

Step Two - Determine Regulatory Processes

- Federal law allows tribes to fully implement or share in implementation of energy permitting authority on tribal lands if certain planning conditions have been met.
- Developer must ascertain the level of involvement the tribe will have in relation to the BIA in determining how to develop a proposed wind project on tribal land.

- Permitting requirements are reservation-specific.
- Consult with the tribe and the BIA to determine the permits that will be required, to whom applications must be submitted, and which entity has the ultimate authority over the issuance of the permits.

Step Three - Complete All Required Permit Applications and Studies and Comply with other Federal Requirements

- Applications accepted.
- Cost reimbursement account is established.
- Developer conducts the studies that the tribe and/or BIA have requested. Developer may need to negotiate scope of studies, citing nearby projects, if possible.
- Comply with NEPA, ESA, NHPA, and any other federal requirements. Either the BIA or the tribe could be designated as the lead agency pursuant to NEPA.

4.1.7.4 Forest Service

The Forest Service, within the U.S. Department of Agriculture (USDA), is responsible for managing 193 million acres of National Forest System (NFS) lands. Wind energy uses are governed by the Forest Service's special use regulations at 36 CFR part 251, subpart B. Wind energy proposals and applicants are currently processed in accordance with 36 CFR 251.54 and direction in Forest Service Manual 2726 and Forest Service Handbook 2709.11 on administration of special uses. Requests for utilization of NFS lands for wind energy facilities are currently processed in the same manner as other proposed commercial uses of public lands.

In September 2007, however, the Forest Service proposed to amend its internal agency directives for special use authorizations and wildlife monitoring, which would provide direction and guidance specific to wind energy development on NFS lands (72 Federal Register 184). According to the proposed rule, these amendments would "supplement, rather than supplant or duplicate, existing special use and wildlife directives to address issues specifically associated with siting, processing proposals and applications, and issuing special use permits for wind energy uses. The proposed directives would ensure consistent and adequate analyses for evaluating wind energy proposals and applications and issuing wind energy permits."



In September 2007, the Forest Service proposed to amend its internal agency directives for special use authorizations and wildlife monitoring, which would provide direction and guidance specific to wind energy development on NFS lands. Developers using this handbook should confirm the status of the proposed amendments prior to proceeding with a proposal on NFS lands.

Developers using this handbook should confirm the status of the proposed amendments prior to proceeding with a proposal on NFS lands.

Unlike the BLM ROW grant systems, under current Forest Service regulations, the Forest Service does not specifically allow for the exclusive use of a portion of public land while testing for wind. The Forest Service is instructed to limit the land granted to a minimum for the actual installation. The Forest Service must consider a competitive offering if it appears that multiple commercial entities are interested in the same services or the same geographic area. To avoid being required to apply for the facility before the wind testing is completed, the proponent must demonstrate that the installation of one or a few meteorological towers on NFS lands does not necessarily indicate that a wind energy facility would subsequently be developed there.

Forest Service regulations require the agency to respond to an application for the use of public lands with a two-tier screening process to determine if the use is in the public interest.

Under current law, a developer would take the following steps when seeking to site a wind energy facility on Forest Service land:

Step One - Pre-Application Meeting

- Meet with the officer managing special uses within the District where the use is desired.
- Determine if the project will pass the two-tier screening process. The screening process is very broad and most of the concerns do not apply to wind energy facilities.
- If proponent demonstrates that the project passes the screening process, is in the public interest, and will not interfere with other uses of NFS lands, then the Forest Service officer will allow the submittal of an application for a special use permit.

Step Two - Apply for a Special Use Permit

- Submit a detailed project description and proof of financial and technical capability.

Step Three - Complete All Required Studies and Comply with other federal requirements

- Application accepted.

- Establish a cost reimbursement account.
- Proponent conducts the studies requested by the Forest Service. Because the Forest Service has limited experience with wind energy applications, Forest Service specialists may request numerous studies to evaluate the potential environmental impacts. Developer may need to negotiate scope of studies, citing nearby projects, if appropriate.

4.1.7.5 National Resource Conservation Service/Farm Service Agency

The USDA Natural Resources Conservation Service (NRCS) provides leadership to help private land owners and managers conserve soil, water, and other natural resources. NRCS provides technical and financial assistance for many conservation activities.

The NRCS and the USDA's Farm Service Agency (FSA) administer a number of conservation-based programs for private landowners. The Conservation Reserve Program (CRP) conserves soil and water resources and provides wildlife habitat by encouraging farmers to voluntarily remove croplands from production and plan permanent areas of grass and trees on lands that need protection from erosion, to act as windbreaks, or in places where vegetation can improve water quality or provide habitat for wildlife. Farmers enter into contracts for between 10 and 15 years and receive annual payments, incentive payments for certain activities, and cost-share assistance to establish the protective cover. An off-shoot of the CRP is the FSA Conservation Reserve Enhancement Program (CREP) with similar management constraints and goals. These tracts cannot be hayed, tilled, seeded, or otherwise disturbed (including disturbance associated with power line or other project construction) without authorization from the USDA. The 2002 Farm Bill amended Section 3832 of the Farm Security and Rural Investment Act to allow the use of CRP land for wind energy generation and biomass harvesting for energy production.

In addition to managing land that may be used for wind energy facility siting, local NRCS service centers are available to assist wind developers in constructing and operating their wind facilities in a manner consistent with soil, water, and natural resource conservation. The NRCS Conservation Technical Assistance program provides voluntary conservation technical assistance to land users, communities, units of state and local government, and other federal agencies. NRCS also provides expertise in soil science and leadership for soil surveys and for the National Resources Inventory, which assesses natural resource conditions and trends in the United States.

The 2007 Farm Bill also addresses energy issues. Title IX "Energy" recommends expanding federal research on renewable fuels and bioenergy and reauthorizing, revising, and expanding programs that provide valuable tools for the advancement of renewable energy production and commercialization.

Example


4.1.7.6 Department of Defense

Wind initiatives are being pursued by each of the U.S. military branches that make up the Department of Defense (DOD). In 2002, funding was set aside by Congress to assess the renewable energy potential of U.S. military installations. The DOD created a Renewable Energy Assessment Team to explore wind and other renewable energy resources at military installations. Led by the U.S. Air Force, the team conducted on-site assessments at military bases in the continental United States (CONUS). The completed reports summarize the wind, solar, and geothermal resources identified at and within 100 miles of military installations. The team found potential to develop up to 70 MW of wind projects on 109 installations. Additionally, the team made recommendations on how to purchase affordable renewable energy and encourage the growth of on-site energy development at select military bases.

It is DOD policy to pursue on-site production of renewable energy where feasible because it provides energy savings, reduces the military's dependence on foreign energy, and saves money while increasing energy security. The best potential for developing wind projects on DOD installations occurs where utility rates are high or where power is generated at remote sites and a wind/diesel hybrid can be developed.

The DOD's renewable energy programs include financial support for demonstration projects, sponsorship of a wide variety of demonstration projects (compatible with operations at the installation), continuing evaluation of renewable energy opportunities, and innovative approaches for attracting private capital for on-installation development.

Wind generation projects at military institutions are typically funded through the Energy Conservation Investment Program (ECIP) or Energy Savings Performance Contracting (ESPC). The Office of the Secretary of Defense controls ECIP funding allocation. ESPC is a contracting agreement that enables agencies and institutions to implement energy-saving projects without having to make hefty up-front investments. The contractor, or other potential partners such as venture capitalists, "green" investors, state energy offices or utilities, owns the energy system and incurs all costs involved—including design, installation, startup/testing, operations, and maintenance—in exchange for a share of any energy cost savings. The contractor recovers its investment and ultimately earns a profit by charging the institution for the supplied energy at a rate that is less expensive than energy from a conventional system. To explore the possibility of siting a wind generating facility on a

The DOD has installed wind turbines at several locations, including the Naval Auxiliary Landing Field in San Clemente Island and the Air Force Space Command at Ascension Island.

Example



Resource

The following list provides offices that are available to contact for information on wind energy development relative to each military service.

Army:

- Army Contracting Agency

Navy:

- Navy Technology Validation Program
- Naval Facilities Engineering Command
- Navy Small Business Office

Air Force:

- Air Force Civil Engineering Support Center
- Air Force Small Business Office



DOD military installation, a developer should start by contacting the appropriate branch of the service.

The U.S. General Services Administration (GSA) and the U.S. Department of Energy (DOE) also provide support to wind developers interested in doing business with the federal government. Additionally, the DOD suggests that wind companies interested in siting facilities on military installations attend the annual Energy Workshop and Exposition, an event sponsored by DOE, DOD, and GSA that attracts over 1,000 energy, environmental, and transportation professionals.

4.2 State Regulatory Framework

The regulatory process for siting a wind energy project varies widely from state to state. For example, some states have vested primary siting authority in a state agency while others have left this authority to local governments to handle through their land use and zoning ordinances. Recognizing the great diversity among state programs, this section discusses the more typical state-level regulatory frameworks that a wind developer is likely to encounter. Prior to commencing a wind energy project in any state, a developer should determine the applicable regulatory structure and understand the allocation of responsibility among federal, state, and local government agencies. The lack of uniformity among regulatory programs means that what may be a simple, streamlined review process before a single agency in one state may be a complex, time-consuming process involving multiple levels of review in another state. The following table provides a summary of commonly required state approvals for wind energy projects.

The regulatory process for siting a wind energy project varies widely from state to state. Prior to commencing a wind energy project in any state, a developer should determine the applicable regulatory structure and understand the allocation of responsibility among federal, state, and local government agencies.

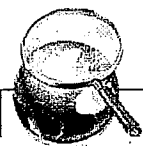


4.2.1 State Energy Facility Siting Commissions/Public Utility Commissions

In some states, the state legislature has given a single agency primary jurisdiction for siting decisions for wind energy projects. In these states a dedicated agency oversees all issues relating to the siting of new energy generation facilities, allowing other state agencies to participate as interested parties. Examples of these types of agencies include public utilities commissions, state siting boards, or environmental agencies. The Resources section provides a list of state agencies with siting authority. The review process before a primary agency may involve detailed adjudicatory hearings during which attorneys and expert witnesses provide information about numerous issues. This detailed review may include environmental impact review, superseding that under the state "little NEPA" program (see Section 4.2.3).

In Ohio, siting authority is vested in the Ohio Power Siting Board for wind projects with generating capacity greater than or equal to 50 MW or an electric transmission line greater than or equal to 125 kV.

Example



Typical State Permitting Requirements for Wind Energy Projects

Agency	Approval	Trigger	Description
State			
Lead Agency varies by project	"Little NEPA" decision	Review threshold established by state statute	Many states have their own environmental impact review or environmental planning laws that are similar to the federal NEPA process. The state review may be required when the federal process is not. When both the federal and state reviews are required, one environmental impact assessment is typically coordinated among federal and state agencies to satisfy both sets of requirements.
Public Service/Utility Commission or State Energy Facility Siting Commission/Board/Council	Siting approval and/or Certificate of Public Use and Convenience	Often required for transmission lines above established voltage or length or that cross county boundaries. May be required for wind projects above established MW.	Some states delegate siting approval of wind projects and transmission lines to a public service or utility commission or to an energy facility siting authority. These agencies may review all energy projects, only specific types of projects as defined by state regulations, or projects that request a consolidated state process.
State environmental quality agency	Permit for stormwater discharges	Potential for discharge from site assessment, construction, and operation	Administration of the federal National Pollution Discharge Elimination System (NPDES) program is often delegated to state agencies. Many states have developed general permits and permits-by-rule as part of their programs.
State environmental quality agency	Water Quality Certification under Section 401 of Clean Water Act	Need for Section 404 permit.	Section 401 Water Quality Certification is necessary to demonstrate that a project will comply with state water quality standards. The Water Quality Certification is typically required before USACE can approve a Section 404 permit. Some states may also require Water Quality Certification as part of a state water quality permit.
State environmental quality agency	Other water-related permits	Impacts to state waters	In addition to state NPDES permits, many states have additional water-related permits, such as isolated wetlands permits, floodplain permits, and water use/water rights permits. Often, states use a joint process with USACE to regulate impacts to state waters, especially to wetlands.
State Historic Preservation Office/State Archaeologist	Cultural, historic, and archaeological resources consultation/studies/permits	Potential impacts to cultural resources	Many states have preservation regulations programs similar to the federal historic preservation program. Consultation with the SHPO and State Archaeologist identifies potential impacts and any studies and permits that would be required.
State department of natural resources/department of parks and wildlife	Wildlife and habitat consultation/permit	Impacts to state wildlife	Some states, such as Texas, issue permits for impacts to protected wildlife or habitat. More often, these agencies do not have permits like the FWS Incidental Take Permit, but consultation is necessary to identify state-protected species and habitat within a project area and to determine need for mitigation measures.
State Department of Transportation	Oversize/overweight vehicle permits	Travel of oversize or overweight vehicles on state roads	Most states set size and weight limits for vehicles traveling on state roads. Permits are required for vehicles that exceed the established limits, such as vehicles carrying turbine components. Special permits for construction equipment are often available.
State Department of Transportation	Utility Permit	Placement of utility lines within state rights-of-way	If project transmission line plans require utilities along state rights-of-ways, this permit would be required.
State Department of Transportation	Entrance/Access Permit	Construction of access road onto state road	If project plans require the construction of new roads that enter state roads, this permit would be required.

A state-issued permit may serve as a consolidated or comprehensive permit, providing a “one-stop” siting process and exempting the project from other state and/or local regulation. Sometimes authority to issue delegated federal permits (such as authority to issue permits under the CWA) that is typically administered by a state environmental agency has not been delegated to the state siting agency, in which case those federal permits must be separately obtained. Alternatively, the state-issued permit may require that any other state and local permits be consistent with the primary state permit. In other states, various state and local agencies retain the autonomy to review matters under their jurisdiction and issue separate permits and approvals.

Some states may not treat wind energy projects any differently than other large-scale electricity generating facility projects. There may be a state siting law that applies generally to all electric generation and transmission facilities, or to generating and transmission facilities above a certain size or length. Alternatively, a state law may apply to all energy facilities, but may have specific provisions applicable only to renewable energy projects. Or the law may apply on a voluntary basis to any renewable energy facilities (regardless of size) that choose to participate in the review process. Other states have laws that specifically address wind energy projects above a threshold generating capacity and that may apply on a voluntary basis for smaller projects.

4.2.2 Model Ordinances and Guidelines

Some states have developed model wind ordinances, providing a regulatory framework for cities, towns, and counties reviewing wind energy projects. Other states have developed voluntary guidelines for local governments to consider in response to proposed wind energy projects. Such guidelines are also useful tools for developers to consult as they commence a project. The Resources section provides a list of model wind ordinances and guidelines.

4.2.3 State Environmental Impact Review Laws (“Little-NEPAs”)

Many states have their own environmental impact review or environmental planning laws. The impetus for these laws can be traced to passage of NEPA in 1969, discussed in Section 4.1.1. The review and documentation required under these state laws often parallel those required under the federal statute. As a result, these “state equivalents” are often referred to as “little-NEPAs.”

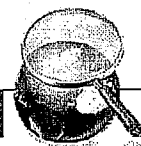
In Washington, the Energy Facility Site Evaluation Council provides a “one-stop” siting process for major energy facilities.

Example



Kansas does not have a siting board or public utility/service commission that oversees siting of energy projects. Instead, siting authority is vested in local government entities.

Example



In New York, commercial-scale wind projects typically have to prepare an environmental impact statement under the State Environmental Quality Review Act.

Example



Little-NEPA statutes typically do not result in issuance of a permit, but rather require an investigative process to occur before state and local agencies issue permits. The process generally involves an assessment of the environmental consequences of a project or various aspects of the project. In some states, the little-NEPA may substantively require taking all feasible measures to avoid, minimize, and mitigate project impacts. The reports required by the little-NEPA may be drafted by the state or local agency overseeing the review process, or the developer may be required to prepare this information for the agency's review.

In states with this type of legislation, not every project is subject to little-NEPA review. For example, in some states environmental impact review is superseded by the review process applying to energy generation, interconnection, and/or transmission facilities. Elsewhere, however, environmental impact review procedures apply irrespective of any energy specific review. Developers should review the applicable statute and regulations to determine whether their project triggers any of the jurisdictional thresholds or criteria. The potential for adverse impacts associated with the proposed project will likely dictate the extent of environmental review required. For example, siting a commercial-scale wind energy project in or adjacent to protected resource areas may require detailed studies documenting potential impacts and mitigation measures. Such studies can be costly and time-consuming. It is critical for a developer to determine the scope of review to identify those studies reasonably necessary to assess potential impacts.

The Resources section provides a table that identifies states with environmental impact review/environmental planning requirements similar to NEPA, along with the statutory citations and links to the relevant agency websites.

4.2.4 State Environmental Laws

Numerous state regulatory programs are likely to be triggered by a proposed wind energy project. While such programs often mirror, implement (through delegated authority), or complement similar federal laws, the state version is typically more stringent than its federal counterpart. One or more of the following regulatory programs are typically encountered by wind energy projects. This list is not exclusive, and in planning a project it is critical for a developer to identify any potentially applicable state regulatory programs and to understand the process for obtaining necessary approvals.

4.2.4.1 Endangered Species

Wind energy projects will often be subject to state laws governing endangered, threatened, and rare species. Even with careful planning, turbines, access roads, transmission lines, and other infrastructure may impact the habitat of one or more species of concern to a state.

Significantly, the state list of species of concern almost always includes species in addition to those listed under the federal Endangered Species Act (*Section 4.1.2.1*). State endangered species laws typically require the developer to coordinate with the applicable state agency to determine whether the proposed project could potentially impact any state protected plant or animal. Incidental "takes" of a protected species and/or alteration of its habitat may be allowed, subject to a permit and/or mitigation plan. Violation of these laws is generally a serious offense, potentially resulting in criminal fines and incarceration. A list of state resources for endangered species can be found in the *Resources* section of this handbook.

4.2.4.2 Wetlands and Waterways

Wind energy projects are often located near wetlands and waterways. While it is often possible to site a project to avoid or minimize impacts on these resources, permits and approvals may be required.

4.2.4.2.1 Section 401 State Water Quality Certification

As discussed in *Section 4.1.4.1*, state Section 401 Water Quality Certification is required under the federal CWA for certain activities in wetlands and waters. Section 401 of the CWA gives states and tribes the authority to review projects that require federal licenses or permits and that might result in a discharge to state or tribal waters, including wetlands. For a wind energy facility, such federal approval might include a permit from the USACE pursuant to Section 404 of the CWA or Section 10 of the Rivers and Harbors Act. The purpose of Section 401 review is to ensure that a project will comply with state or tribal water quality standards and other appropriate requirements of state or tribal law.

Section 401 Certification should generally not cause delays in project approval. In most cases, Section 401 Certification review is conducted at the same time as the federal agency review. Many states have established a joint permit process to ensure this occurs. For Section 404 permits, the USACE has developed Nationwide and Regional Programmatic General Permits to streamline the approval process for specific activities that disturb a minimum acreage of jurisdictional wetlands (i.e., where an individual wetland permit is not required). These Nationwide and General permits may already have been approved, denied, or partially denied by the applicable state agency, including

Many states, such as Iowa and Minnesota, have developed joint applications that are submitted to USACE and the state simultaneously for a consolidated review of wetland jurisdiction and the need for permitting.

Example



completing the Section 401 review. Thus, if a state has approved the Nationwide or General permit, no further state review is required for Section 401 Certification; otherwise, varying degrees of state review and certification are required.

4.2.4.2.2 Wetlands

Most states have regulatory programs that address wetlands and/or isolated wetlands. The requirements of such programs vary from state to state. Certain programs are more comprehensive than others and some states regulate wetlands that are not governed under federal law. Although most programs are mandatory, a few rely on voluntary compliance to protect wetlands. State wetland laws also typically differ in both the activities and types of wetlands that are subject to jurisdiction. Resource areas that may be broadly regulated in one state may be wholly unregulated in another. For example, some states regulate extensive buffer areas outside of the wetlands area itself, while others are focused solely on the defined wetland. Wind energy developers should become familiar with the applicable state wetland protection programs to ensure that state regulated wetlands are identified and properly delineated according to applicable protocols and necessary approvals are obtained.

Wind energy developers should become familiar with the applicable state wetland protection programs to ensure that state regulated wetlands are identified and properly delineated according to applicable protocols and necessary approvals are obtained.



4.2.4.2.3 Waterways Crossings

Wind energy projects may also be subject to state regulatory programs governing river and stream crossings. For example, construction of an access road may require a bridge or culvert, and installation of a transmission line may alter a streambed. Among other impacts, such activities can damage water quality by stirring up sediment and harming fish and other aquatic organisms. Most states retain ownership of the beds and banks of navigable waterways, and in addition to an environmental permit for a water crossing, a use authorization from the state may also be necessary. Once again, applicable state programs vary widely and developers should familiarize themselves with the applicable state regulations and guidelines. In addition to state permits, waterway crossings often trigger the need to seek coverage under one of the USACE's Nationwide or Regional permits, because these activities can lead to incidental "filling" of a waterbody.

4.2.5 Historic Preservation and Cultural Resources

As discussed in [Section 4.1.3](#), State Historic Preservation Officers (SHPOs) administer the national historic preservation program at the state level. Federal agencies consult with the SHPO when implementing Section 106 of the National Historic Preservation Act of 1966. The SHPO

reviews federal undertakings for their impacts upon cultural resources. To carry out this role, a state will generally have a statewide preservation program tailored to the state and designed to support and promote state historic preservation interests and priorities. The state program may also be applicable to state projects (e.g., projects that require funding, licenses, or permits from any state agency). These regulations often establish a process that mirrors the federal Section 106 regulations: identification of historic properties; assessment of effect; and consultation among interested parties to avoid, minimize, or mitigate any adverse effects. The state agency will typically work closely with tribal and local communities.

Regarding paleontological resources, wind energy developers must determine if such resources exist within the proposed project area and, if so, whether they are regulated at the state level. If regulations exist, developers should consult with the regulating agency to determine what types of activities may be required. Some requirements include: conduct surveys prior to development of final project design, consider avoidance of adverse effects, and/or action following unanticipated discovery of fossils during construction. Section 5.6 discusses impact analysis and mitigation with respect to paleontological resources.

4.2.6 Stormwater

Stormwater runoff from construction activities can have a significant impact on water quality. As stormwater flows over a construction site, it picks up pollutants like sediment, debris, and chemicals. Polluted stormwater runoff can harm or kill fish and other wildlife. Sedimentation can destroy aquatic habitat, and high volumes of runoff can cause stream bank erosion.

Mandated by the federal CWA, the NPDES stormwater program requires operators of construction sites that are one acre or larger to obtain authorization to discharge stormwater under an NPDES construction stormwater permit (Section 4.1.4.2). Most states have been authorized to implement the NPDES stormwater program. EPA remains the permitting authority in a few states, territories, and on most tribal lands. States that administer the NPDES program have developed their own general permits that incorporate, at a minimum, the requirements of an EPA Construction General Permit (CGP). Even where EPA is the permitting authority and the CGP applies, federal regulations allow states, territories, and tribes to add certain conditions to the CGP that apply only in that area.

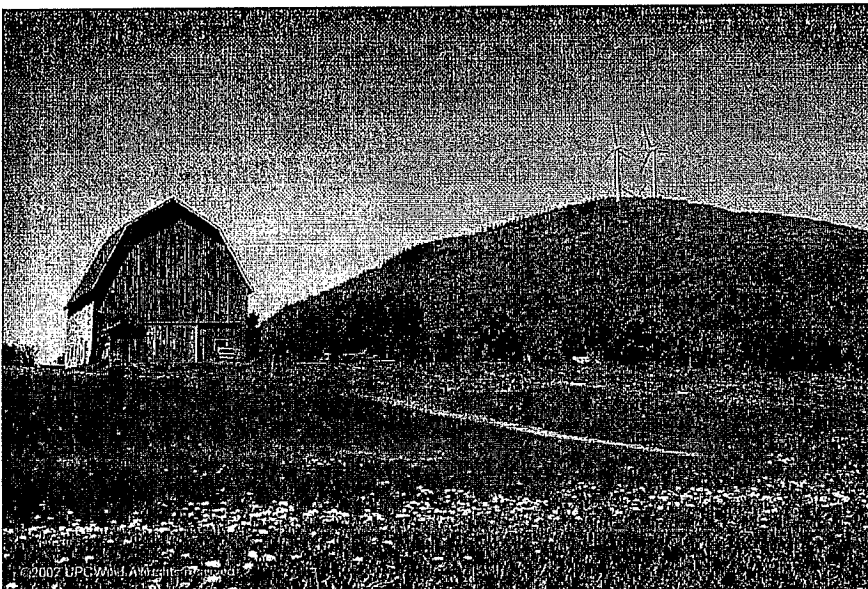
Prior to performing construction activity, developers should determine whether the state has its own regulatory program pertaining to stormwater.

4.2.7 Agricultural Protection

Wind energy projects are often constructed on active agricultural lands. To ensure non-agricultural uses are compatible with farming operations, some states have developed applicable regulatory programs and mitigation policies. For example, in New York State, the Agriculture and Markets Law prevents unreasonable restrictions by local government rules on land use within agricultural districts unless it can be demonstrated that public health or safety is threatened.

The New York Department of Agriculture and Markets has created wind energy agricultural mitigation guidelines to facilitate the review process.

Example



Mars Hill Wind Farm in Aroostook County, Maine. Photo courtesy of UPC Wind.

4.2.8 Other Applicable State Regulations

In addition to the above-referenced regulations, a wind energy project may be subject to myriad additional state regulatory programs. Although such matters will often be subject to state jurisdiction, in some cases, authority is delegated to local governments. For example, issues related to transportation of turbines and site access may require special approvals from state highway or transportation departments. Curb cut permits may be required, and separate approvals may be necessary to remove certain trees or make improvements along scenic roads. Other requirements may include permission to use former railroad property or ROW, permits to install water wells, issuance of a notice prior to demolition work, compliance with state building codes, and environmental inspection during construction.

Failure to identify and properly address these additional regulatory programs can have dramatic repercussions. Even one missing approval can impact a developer's ability to obtain financing or result in costly construction delays. Constructing without the appropriate permits can lead to civil and criminal fines and penalties, including incarceration.

4.2.9 State-Owned Lands

A proposed project may necessitate acquiring the right to use land owned and controlled by a state government. For example, the project developer may identify a possible site that is located within a state forest, state park, wildlife management area, recreation area, scientific study area, or other state preservation area. Several agencies may have jurisdiction over the various types of state-owned lands, so it is important to identify the agency that is delegated with the authority to provide a use authorization for the site in question. Use authorizations are typically governed by legislative or regulatory guidelines, and are sometimes prohibited altogether by state law or constitution. The project developer may need to obtain a use authorization, which can be in the form of a lease, an easement, a permit, or a license to use the state's land; some states even require special vote by the state legislature in order for state-held lands to be used for private purposes. Other lands may be privately owned but subject to certain restrictions to protect the public's interests, such as land beneath tidally influenced waters that have been filled.

4.3 Local Approvals

At most proposed wind energy project sites, one or more local approvals will be required. Local approvals are a critical component of the siting process for most proposed wind energy projects, particularly because local authorities often have jurisdiction to approve the actual construction of the proposed project. The Resources section of this handbook provides a list of state siting guidelines that are available to local governments for consideration when reviewing wind projects and working with wind developers. The U.S. Department of Energy's Renewable Energy Laboratory, in collaboration with the National Association of Counties, created a Wind Energy Guide for County Commissioners that can also be a useful resource for developers. A detailed discussion of local approval requirements is beyond the scope of this handbook because of the wide variety of local ordinances, regulations and policies. The following table provides a summary of commonly required local approvals for wind energy projects. Developers should consult with local agencies to



Developers should consult with local agencies to identify applicable requirements specific to the area where a wind project would be located.

identify applicable requirements specific to the area where a wind project would be located.

Typical Local Permitting Requirements for Wind Energy Projects

Agency	Approval	Trigger	Description
Local			
County/Township Zoning Administrator	Conditional Use/Special Use Permit	Development of wind project within county/township	Many counties have zoning ordinances that classify parts of the county or township into different districts. A wind project is often allowed as a conditional use in agricultural or industrial districts. A permit is required to demonstrate that the wind project will be compatible with the zoning ordinance. Many counties are incorporating requirements into their zoning ordinances specifically for wind projects, or "Wind Energy Conversion Systems (WECS)." Other counties may not have zoning ordinances.
County/Township Building/Engineer's Department	Building Permit	New construction within county/township	Building permits are often required to demonstrate that construction adheres to building and engineering codes and standards. Septic Permits are often required in addition to the building permit for installation of septic systems, such as for operations and maintenance buildings.
Road Department	Oversize/Overweight Permit, Access/Entrance Permit, Utility Permit	Project affecting county roads	Counties and townships may have transportation and rights-of-way permits comparable to those issued at the state level. Counties may restrict which roads and bridges are available for overweight/oversize transportation. Coordination with local road and public works departments is necessary to create transportation plans that address county restrictions and transportation concerns.

As discussed in *Chapter 3*, local approvals required for a wind energy project are often identified during the preliminary site characterization. The issuing authority may be a local planning commission, zoning board, town, city or village council, county board of supervisors or commissioners, or a similar entity. Although some state siting boards are authorized to supersede local processes, most if not all, state siting boards must first demonstrate that construction and operation of the proposed wind project would be consistent with local ordinances and that there is no reasonable objection to the development of the project. Many state (and federal) agencies are uncomfortable with or prohibited from issuing their own approvals for a wind farm before controversies with local officials are resolved. Thus, it is essential for developers to work cooperatively with local officials and make a good-faith effort to comply with all local requirements to obtain necessary approvals.

Similar to the state regulatory process, the need for local approvals and the process for obtaining approvals vary throughout the country. In some areas, the local approval process will be time-consuming and the project will be subject to close scrutiny. In contrast, some municipalities

require only a building permit. Before embarking upon a wind energy project, a developer should assess which local approvals will be required and consult with local counsel.

4.3.1 Preliminary Regulatory Analysis

This list can be used as a checklist when carrying out a preliminary inquiry into local permitting requirements to identify whether or not these typical permits apply to a project.

As indicated above, it is important to distinguish between permitting requirements for a meteorological tower and the actual wind turbines and equipment comprising an operational wind energy project. Often a meteorological tower can be permitted as a temporary structure, an accessory or ancillary use to the existing use at the property, or a scientific device. Depending on the zoning regulation, a wind energy developer may seek to have the turbines deemed to be accessory or ancillary uses, especially if the landowner continues to use the underlying land for a viable use such as farming.

In some cases, the proposed location for a wind energy project is within or in close proximity to more than one municipality. Depending on state and local requirements, abutting communities may need to be notified of requests for zoning relief due to their potential interest in the proposed wind facility. For example, even if a project is located in only one town, it may be visible from another town. The developer should consult with local counsel with respect to the public



At a minimum, a wind energy developer should ask the following questions regarding local approvals:

- ✓ Is there a Comprehensive Plan or Master Plan for land use in the area? Does it include information regarding wind energy projects, renewable energy, or sustainability?
- ✓ Do the local zoning regulations provide for wind energy projects? If so:
 - In which zoning district or districts are wind energy projects permitted?
 - Is the wind energy project allowed as of right with no zoning approval required?
 - Is a special permit, special exception or variance required for use of property as a wind energy project in the applicable zoning district?
 - Will the wind energy project satisfy all dimensional requirements such as height and setbacks? If not, is a dimensional variance available? What are the applicable standards for such zoning relief? What is the likelihood of obtaining relief?
 - Does one entity, such as a planning board, provide an advisory recommendation to a second entity, such as a zoning board, where zoning relief is required?
 - Are there any relevant overlay districts that might impact the ability to site the wind energy project (e.g., Groundwater Protection Overlay District that would restrict the ability to install foundations at certain depths)?
 - Are the standards relaxed if the wind energy project is deemed to be a public utility project?
 - Is development plan review or site plan review required?
 - What are the landscaping or screening requirements?
 - Do access roads need to comply with certain standards for construction of roads?
- ✓ Is there a local building code that regulates wind energy projects?
 - Is a building permit required?
 - Are electrical or other permits required?
- ✓ If the local zoning regulations or building code do not address wind energy projects, is there an opportunity for the developer to work with the community to enact or amend the zoning regulations to include provisions that are favorable to the development of wind energy projects?
- ✓ Is there a moratorium in place regarding wind energy projects? If so, is it possible to lift the moratorium?
- ✓ What provisions of the zoning regulations apply to a meteorological tower?
 - Are there provisions for temporary uses? Scientific or research uses? Accessory or ancillary uses?
 - If none, then what zoning relief is available (e.g., special permit, special exception, variance)? What are the standards for such zoning relief? What is the likelihood of obtaining such relief?



notification requirements. Failure to comply with all applicable public notification requirements could delay or prejudice the approval of the developer's applications for approval.

4.3.2 Pre-Application Process and Preliminary Design

Once the applicable zoning and permitting requirements have been identified, it is useful for the wind energy developer to meet with the municipal planning staff responsible for zoning and planning issues. It is helpful to prepare a draft application and preliminary plans to review with staff to identify issues and outstanding application requirements. Wind energy developers should consider working with local officials and residents to ensure that the issues important to the municipality and its residents are adequately addressed prior to the submission of an application for the necessary approvals. This process of cooperative consultation may involve modifying or creating a comprehensive plan that provides for wind energy, revising zoning regulations, or identifying the universe of potential wind energy facility sites within the municipality. After initial meetings with local officials, some developers will set up community meetings or open houses to educate the public about the project.

Chapter 7 provides more details on public outreach.

During the pre-application process, the developer should anticipate questions of the following nature:

- Is another access road or route available that would have fewer impacts on the community?
- Can mitigation measures be taken to avoid potential conflict of adjacent uses?
- Could construction be limited to a certain time of the year to avoid noise impacts?
- Could the turbines be located differently to decrease visual impacts or minimize wetland impacts?
- Could the transmission line be moved to a different alignment?
- What types of traffic mitigation measures would be taken to minimize impacts?
- Will best management practices be implemented for stormwater?

It is important to distinguish between permitting requirements for a meteorological tower and the actual wind turbines and equipment comprising an operational wind energy project.

4.3.3 Formal Application and Approval Process

Once a formal zoning application is filed, local and state laws generally require notice to the public and abutters and an opportunity for public comment, followed by a public hearing or series of hearings. At the conclusion of the public hearings, the board or commission will generally issue a written decision either approving or denying the proposed project. As noted above, a wind energy project developer should consult with local counsel with respect to the applicable public notification requirements. Failure to comply with all applicable public notification requirements could jeopardize the developer's applications for approval.

Local approvals typically include a list of conditions. The conditions generally specify how the developer must construct, operate, decommission, and mitigate the project. The conditions may also include legal restrictions or establish procedural requirements. If possible, the developer should review the conditions in approval draft form and negotiate the final language of the approval to ensure the conditions are feasible. When reviewing and negotiating proposed conditions, the developer should consider at least the following questions:

- Do the conditions of approval allow the permit to be transferred or assigned to someone else?
- What happens if the developer wants to modify an aspect of the project?
- Was the project proposed in phases? If so, all phases should be permitted, with clear timelines on how long each phase will last to avoid any discrepancies in the future.

4.3.4 Appeal

A developer may be able to appeal an adverse local decision (e.g., an approval with conditions or denial) within a limited timeframe after issuance of the decision; however, many states limit the review to the record created during the local process, so it may be important to develop a clear and legally defensible record during the initial approval process. An abutter or other party affected by the wind energy development may also have the right to appeal a decision granting approval for a wind energy project. In the event of a third-party appeal, the threshold issue is generally whether the party appealing the approval has standing to appeal. Standing is the legal principle that the person has some right(s) that will be affected by the granting of the approval.

4.3.5 Timing

Timing is a critical element for any project. Most zoning and land use regulations contain minimum public notice and comment periods, and some contain maximum timeframes for permitting authorities to render decisions. These timeframes are often extended upon agreement by the applicant. An appeal of a decision must be filed within a certain period, often as short as 10 to 30 days. The developer must become familiar with the applicable deadlines and appeal periods for each permit and approval that is required for a proposed project. In planning a proposed wind energy project, a developer should build enough time into the permitting process to account for procedural requirements.

4.3.6 Payment-in-Lieu-of-Taxes (PILOT)

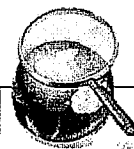
Often the key to reaching agreement with local officials on siting issues and various other local project impacts, regardless of their particular approval process used by such officials, is the size and form of annual community compensation that will be received from the project developer, owner, or operator. Virtually all wind farm facilities will be subject to property taxes and from more than one local taxing entity (e.g., town, school system, county). Because the property tax obligation can be sizable enough to adversely impact project economics and jeopardize a project's financial viability (affecting the decision to build), most developers seek to negotiate an agreement with the local taxing entities to reduce that tax obligation, often called a Payment-in-Lieu of Taxes (PILOT) Agreement. By establishing a fixed set of payments over a specific long period of time in a PILOT agreement, the developer (and the project financiers) will be assured of a known long-term expense that is not subject to either assessment change risk or tax rate risk.

4.3.7 Locally Owned Lands

Some portions of a wind energy project may be located on land owned or controlled by a municipality or local government entity. For example, the project developer may seek to place turbines on locally owned land, locate underground lines across public property (e.g., a park or open space), or make necessary road improvements on locally owned or controlled rights-of-way. In such cases, the wind energy developer will need to acquire the right to use the land.

It is important for a developer to identify the local entity responsible for granting authorization to use the property in question. The project developer will need to obtain the appropriate form of authorization, such as a lease, easement, permit, or license to use the local government's land. Certain types of conveyances may require regional or state approval as well.

In Massachusetts, if a town or city takes property for use as public open space pursuant to Article 97 of the State Constitution, the release of that land for any other use requires approval of the state legislature and the town or city government.

Example

Oregon Columbia Plateau Ecoregion Wind Energy

Siting and Permitting Guidelines

September 29, 2008

In the fall of 2007, representatives from the wind energy industry, counties, environmental organizations, consultants and state and federal resource agencies (the Taskforce) convened to collaboratively develop wind energy siting and permitting guidelines for the Columbia Plateau Ecoregion¹ (Guidelines). For almost a year the Taskforce compiled and synthesized current industry practices, agency recommendations, environmental concerns, and supportive science. These Guidelines apply to the five counties where the majority of Oregon's wind energy development is ongoing.

The Taskforce believes these Guidelines represent a successful balance between environmental protection and future development of renewable wind energy resources in the Oregon Columbia Plateau Ecoregion. The intention of the Taskforce is that wind project developers, resource agencies, permitting authorities and other stakeholders consistently apply these Guidelines. The success of these Guidelines requires training and understanding by relevant agencies, counties, and other stakeholders.

The Taskforce recognized that while the expansion of wind power resources has the potential to significantly impact wildlife and habitat, it also provides significant environmental and economic benefits. Maximizing the Ecoregion's wind energy generation potential will be an important factor in achieving Oregon's renewable energy and climate change targets. These guidelines seek to support future wind energy development, thereby achieving multiple environmentally beneficial goals, while providing careful guidance towards protection and conservation of important biological resources.

As wind energy development expands to other areas within Oregon outside the Columbia Plateau Ecoregion, the Taskforce hopes to amend these Guidelines to provide regionally specific guidance. Until separate regional guidelines can be developed, the Taskforce recommends using these Guidelines as a roadmap during each step of a potential wind project's development, construction, and operation.

These Guidelines do not expand or alter any of the existing laws, regulations, or other authorities under which local, state and federal agencies and permitting authorities operate. However, to fulfill the intent of these Guidelines, modifications to wind project developer and permitting authority practices and procedures may be necessary. It is expected that wind project developers and relevant permitting authorities will use all their means to implement these Guidelines, in a unified, consistent fashion.

¹ As defined in the ODFW wildlife conservation strategy. See Appendix for a map of the Ecoregion.

Participant List

Renewable Northwest Project

United States Fish & Wildlife Service

Oregon Department of Fish & Wildlife

Oregon Department of Energy

Washington Department of Fish & Wildlife

Sherman County

Morrow County

Klickitat County

Iberdrola Renewables

Horizon Wind Energy

Portland General Electric

Eugene Water & Electric Board

Audubon Society of Portland

Lane County Audubon

The Nature Conservancy

Stoel Rives, LLP

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Introduction

In the fall of 2007, the Oregon Department of Fish and Wildlife (ODFW), the Oregon Department of Energy (ODOE) and the United States Fish and Wildlife Service (USFWS) initiated a stakeholder Taskforce (Taskforce) to assess current and future project facility siting and permitting in Oregon's Columbia Plateau Ecoregion²(Ecoregion). The Taskforce included conservation and environmental organizations, wind project developers, local governments, and representatives of USFWS, ODFW, ODOE, and Washington Department of Fish and Wildlife (WDFW). As wind project development continues to rapidly expand in the Ecoregion, the Taskforce is charged with developing regionally consistent, voluntary siting and permitting guidelines that allow for additional wind power development while avoiding or minimizing impacts to wildlife resources. Consistent application of these guidelines by all wind developers, permitting authorities, resource agencies, and interested stakeholders is essential to successfully balance expansion of wind power resources in the region with conservation of wildlife resources. It is the Taskforce's view that while these guidelines were developed for specific application on the Oregon side of the Ecoregion, the guidelines process and approach can be adapted to other Oregon ecoregions and across state lines, and that a coordinated, consistent approach across the region is desirable.

The Taskforce recognized that while the expansion of wind power resources has the potential to significantly impact wildlife and habitat, it also provides significant environmental benefits. The Oregon legislature has acknowledged the environmental benefits of the wind industry through the passage of related legislation. Oregon law requires utilities to provide 25% renewable energy to their customers by 2025. In addition, Oregon has established goals to reduce greenhouse gas emissions by 75% below 1990 levels by 2050. Maximizing the Ecoregion's wind energy generation potential will be an important factor in achieving Oregon's renewable energy and climate change targets. These guidelines seek to support future wind energy development, thereby achieving multiple environmentally beneficial goals, while providing careful guidance towards protection and conservation of important biological resources.

The purpose of the guidelines is to ensure that wind project siting and permitting for all project sizes within the Ecoregion in Oregon, at **all permitting jurisdictional levels** (both county-level conditional use permitting and the Oregon Energy Facility Siting Council (EFSC) site certification process³) is protective of important biological resources. While these Guidelines were designed to help wind project developers comply with state and federal wildlife regulations and policy, they do not in any way supersede or delegate current regulation at the state and federal level.

The regulatory environment for the siting of wind projects in the Ecoregion is governed by multiple agencies at the Federal, State and Local levels. Each of these agencies can apply requirements to a wind project. Wind project developers should meet with regulators and

² A map of the Columbia Plateau Ecoregion of Oregon is included in the Appendix.

³ <http://www.oregon.gov/ENERGY/SITING/index.shtml>

potentially interested stakeholders such as non-governmental organizations with wildlife expertise and tribal governments early in the wind project planning process to understand those regulatory requirements and wildlife impact concerns that may be applicable for the project.

At the Federal level, applicable laws include, but are not limited to, the Migratory Bird Treaty Act (MBTA), the Bald and Golden Eagle Protection Act (BGEPA), the Endangered Species Act (ESA), and the Clean Water Act. The MBTA prohibits the taking of migratory birds except when specifically authorized by the Department of Interior (16 USC 703). Most native songbirds, wading birds, waterfowl and birds of prey are protected under the MBTA. The USFWS encourages proactive consultation between USFWS, other resource agencies, wind project developers and the permitting authority regarding the applicability of federal wildlife laws to a wind project.

At the state level, all wind projects in Oregon over 105 megawatts (MW) are reviewed and approved through a formal process coordinated by the ODOE. Wind projects smaller than 105 MW may opt into the state siting process. The formal process leads to a site certificate issued by the Oregon Energy Facility Siting Council (EFSC). Oregon EFSC guidelines state "to issue a site certificate, the [Energy Facility Siting] Council must find that the design, construction and operation of the facility, taking into account mitigation, are consistent with the fish and wildlife habitat mitigation goals and standards of OAR 635-415-0025 in effect as of September 1, 2000." Early consultation with ODFW can clarify those fish and wildlife mitigation goals and standards (see Appendix, Table 3).

At the local level, wind projects less than 105 MW are approved through a local land use procedure requiring a conditional use permit. Counties which review wind project proposals less than 105 MW in the Oregon portion of the Columbia Plateau include Wasco, Sheman, Gilliam, Morrow and Umatilla counties. Each county may have a different set of local energy facility siting criteria as some counties have adopted criteria of varied nature and complexity.

These Guidelines include specific recommendations for each phase of facility site selection, development, and operation. These wind project recommendations include consistent strategies to avoid key wildlife habitat, minimize other wind project-related impacts to habitat and wildlife, and mitigate strategies for unavoidable wind project impacts. A key recommendation that is continually stressed herein is the value of the wind developer seeking early consultation with local, state, and federal natural resource agencies. Consistent application of these Guidelines across the Ecoregion will be critical to their effectiveness. These Guidelines are designed to develop best wildlife and habitat conservation practices for wind development by (in part) creating incentives to direct wind farm development away from the highest value wildlife habitat (avoid habitat categories 1, 2,) and towards sites of lower biological value (target development on habitat categories 4, 5 and 6).

These Guidelines recommend five sequential phases: the first phase, macrositing, identifies conflicts that may make a wind project prohibitively difficult to permit from a wildlife perspective before significant investment is made by wind project developers. The second phase, pre-project assessment, identifies and assesses wildlife and habitat resources on the potential wind project site and identifies macrositing corridors that will be utilized to locate specific turbines and associated infrastructure. The third phase, macrositing, determines the final wind project design

(i.e., the final placement of turbines, roads, transmission lines, other wind project features). The fourth phase, construction, seeks to avoid and minimize impacts to wildlife by following protective measures. The fifth phase, operational monitoring, determines the actual direct mortality impacts of the wind project on wildlife and involves working with a Technical Advisory Committee (TAC) to review the results of monitoring data and make suggestions regarding the need to adjust mitigation and monitoring requirements. For projects regulated by EFSC, the project proponent should work with the USFWS, ODFW and ODOE and EFSC will determine appropriate actions. Next, these Guidelines describe mitigation strategies to compensate for unavoidable temporary and permanent impacts to habitat and wildlife species due to wind project development and operation. Finally, the Guidelines include programmatic recommendations, particularly three recommendations of high priority.

Included in the Appendix is a summary of information regarding the currently known cumulative wildlife and habitat impacts of wind energy development in the Columbia Plateau Ecoregion. Recommendations included in this summary are intended to inform future wind project planning and development within the Columbia Plateau Ecoregion, as well as direct resources to more fully understand indirect cumulative effects.

A table displaying the sequence of the five wind development and operation phases and relationship to project permitting is provided below.

Phase	Timing	Task
1 - Macrositing	Early evaluation of potential wind project site	Information/desktop review of habitat, wildlife, plants, and cumulative impacts; review of regulatory requirements; preliminary scoping of potential issues with resource agencies and permitting authorities
2- Pre-Project Assessment	During preparation of permit application	Identification of microsites; corridors, habitat mapping; early coordination with resource agencies regarding survey protocols; undertake raptor surveys; avian use surveys; T/E species and other wildlife surveys; assessment of project impacts; presentation of habitat mitigation proposal and initial calculation of habitat mitigation acreages to resource agencies.
Submit Permit Application for Agency and Public Review		
	Permit application review	Review of application by resource agencies and permitting authority for completeness. Scoping/public

		comment period. Wind project developers are encouraged to engage stakeholders with wildlife expertise.
Phase	Timing	Task
Permit Issued		
3 - Micrositing	Can occur prior to or after permit issuance, and continues through construction.	Initial micrositing to minimize habitat and wildlife impacts. Continuation of discussions with resource agencies.
4- Construction	After permit is issued, prior to and during construction.	Identification of key compliance staff; environmental training; flagging and micrositing to avoid sensitive resources; implementation of construction best management practices (BMPs).
5- Operation	After construction, during operations.	Implementation of habitat mitigation prior to wind project operation start date; site revegetation; operational monitoring; engagement with the TAC; determine potential additional mitigation with resource agencies and permitting authority as necessary.

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Wind Project Development and Operations Phases

1.0 Macrositing – Preliminary Site Review

Macrositing is a proactive process for identifying potentially significant wildlife and habitat conflicts early on in the site selection process for new wind farm projects. Macrositing should be viewed as a coarse wind project siting filter based primarily upon pre-existing information of the natural resource values located on and in close proximity to the proposed development site. This initial step in siting a project is meant to identify conflicts that may make a project prohibitively difficult to permit from a wildlife perspective before significant investment is made by project developers. Pursuing wind projects on sites where there are significant wildlife concerns should trigger elevated pre- and post-construction surveying and monitoring requirements, longer review processes, increased site development restrictions, and higher mitigation ratios compared to development of wind power projects on previously disturbed sites with lower wildlife habitat value where these requirements may be significantly reduced.

The macrositing assessment should consist of a preliminary reconnaissance field survey and a desktop review of existing information about the proposed development site. Recommended components of a macrositing review process for the proposed wind project site include broad habitat, wildlife, plant, cumulative effects, and agency/stakeholder interviews. Not all of the individual elements listed below will be prohibitive of development, but each of the elements should be considered individually and collectively to develop a preliminary understanding of wildlife impact-related project feasibility.

Wind Resource Review

1. Temporary meteorological towers (met towers) are deployed to determine if adequate wind resources occur on potential wind project sites. To the extent feasible, temporary met towers for potential wind project sites should be deployed in locations that avoid likelihood of wildlife collisions. Project developers should remove all temporary met towers and associated equipment after they are no longer needed, including removal of temporary met towers from potential wind project sites where no additional development effort is expected to be undertaken.

Habitat Review

1. Identification of habitat types and habitat categorization as per ODFW's Fish and Wildlife Habitat Mitigation Policy (Oregon Administrative Rules [OAR] 635-415-0000 through 635-415-0025, http://www.dfw.state.or.us/lands/mitigation_policy.asp) for the potential wind project development site. These habitat types and categories should be determined on a site specific basis through consultation with ODFW⁴. ODFW considers Category 1 habitats irreplaceable. These Guidelines recommend that wind developers, under all circumstances, should avoid Category 1 habitats. These Guidelines strongly discourage

⁴ See Appendix for additional detail.

wind developers from pursuing project development activities on Category 2 habitat, and strongly encourage wind developers to pursue project development activities on categories 4, 5, and 6 habitats.

2. Review of ODFW Conservation Opportunity Areas, Strategy Habitats and Strategy Species, as described within the Oregon Conservation Strategy (ODFW February 2006 – <http://www.dfw.state.or.us/conservationstrategy/>).
3. Review of other existing wildlife and habitat data systems including Oregon Natural Heritage Database, Defenders of Wildlife Conservation Registry, Partners in Flight Bird Conservation Areas, Audubon Important Bird Areas, The Nature Conservancy Conservation Areas, etc.
4. Review of potential ecological impacts to proximal protected, public and private wildlife refuges and wildlife areas.
5. Evaluation of the presence of habitat types of specific concern, including native grasslands, shrub-steppe, oak-pine woodlands, riparian woodlands, cliffs, Washington ground squirrel burrow complexes and required adjacent habitat for squirrel survival, big game winter range, and riparian corridors.
6. Evaluation of potential impacts on proximal recognized or probable migratory corridors or existence of topographic features, such as ridges or peninsulas that could funnel migratory species towards a wind power facility.
7. Review of occurrence of seasonal weather conditions, such as dense fog or low cloud cover, which may increase risk of bird and bat collisions with wind towers.

Wildlife Review

1. Presence of state or federally listed Endangered, Threatened or Sensitive Species, designated Critical Habitat, or other important wildlife habitat.
2. Presence of priority Strategy wildlife species identified in the Oregon Conservation Strategy for the Columbia Plateau Ecoregion, including but not limited to, brewer's sparrow, ferruginous hawk, grasshopper sparrow, Lewis' woodpecker, loggerhead shrike, long-billed curlew, sage sparrow, Swainson's hawk, burrowing owl, pallid bat, Townsend's big-eared bat, Washington ground squirrel, and northern sagebrush lizard.
3. Proximity to known bat colonies or important bat habitat.
4. Presence of species vulnerable to habitat loss or displacement.

Plant Review

1. Presence of state or federally listed plant species.
2. Presence of priority Strategy plant species identified in the Oregon Conservation Strategy.

Cumulative Impacts Review

1. Presence of existing proximal wind power developments.
2. Presence of other proximal causes of wildlife mortality.

Tabletop Review with Agencies and Stakeholders

1. Preliminary scoping conversations with state and local natural resource agencies, permitting entities, land managers and conservation organizations.
2. Preliminary consideration of laws and regulations (MBTA, ESA, BGEPA, Clean Water Act, Oregon Fill-Removal Law, and State Endangered Species Act).

In certain instances, where wildlife and/or habitat conflicts are identified via the macrositing process, it may be possible to design a project to avoid or minimize impacts to biological resources. In other instances wildlife and habitat priorities (e.g. listed species, Category 1 habitat) may make it prohibitively difficult to develop acceptable mitigation plans. In either situation, early knowledge of potentially significant wildlife and/or habitat conflicts should serve as a strong caution to project developers considering further investment in exploration of wind farm development on these areas of concern. If a project in an area of high natural resources concern does proceed beyond macrositing to the permitting stage and eventual wind project construction, extensive additional pre-development site-specific surveying and operational monitoring may be necessary (described in the Pre-project Assessment and Operational Monitoring sections) to identify, quantify, and mitigate specific wildlife and habitat impacts.

2.0 Pre-Project Assessment

When a potential wind project moves past the broad macrositing stage and wind resources prove to be adequate, onsite field study is necessary to further assess the site's suitability for wind energy development and, if appropriate, determine the general location of facilities within the specific parcels. The objective of this phase is to identify and assess macrositing corridors that will be utilized to locate specific turbines and associated infrastructure. The components of this phase include field studies and coordination with the permitting authority and resource agencies (i.e. state and federal wildlife agencies).

Recommended pre-project assessment components are discussed below. The pre-project assessment should be designed in consultation with the permitting authority, resource agencies and interested stakeholders with wildlife expertise. The site-specific components and the duration of the pre-project assessment should depend on the size of the project, the availability and extent of existing and applicable information in the vicinity of the project, the habitats potentially affected, the likelihood and timing of occurrence of Threatened and Endangered and other Sensitive-Status (TES) species at the site, and other factors identified during early resource agency coordination. If applicable pre-existing information is available, the project developer, permitting authority, and resource agencies should take this information into consideration when designing (and potentially modifying) the baseline studies identified below. Conversely, in areas where pre-existing information is not available or in areas of unique biological significance and/or high quality habitat, additional study may be required. The results of the information review and baseline studies should be reported to and discussed with the permitting authority and resource agencies in a timely fashion.

Identify Macrositing Corridors

Micrositing corridors represent a surveyed area within which turbines, associated access roads, collector cables and other project facilities are proposed. The micrositing corridors are centered on the preliminary project layout, and range in width depending on site and habitat conditions and the need for micrositing flexibility. The project developer should identify the micrositing corridors early in the development process, map the habitat and habitat categories within and adjacent to these corridors, and conduct all biological resource surveys, as described below. This information would be used for the project impact assessment and included in permit application materials. After the project is permitted, the turbines and other project facilities are sited within the micrositing corridors identified. These facilities may be located slightly outside the micrositing corridors if they have been adequately surveyed for biological and cultural resources before construction. Final project feature locations should comply with all applicable permit conditions. Final facility micrositing, where specific locations of project features are determined, is discussed further in Section 4.0, Micrositing – Final Project Design.

Habitat Mapping

Information about general vegetation and land cover types, wildlife habitat, habitat quality, extent of noxious weeds, and physical characteristics within the project site⁵ should be collected and compiled using best available standards.

All habitat within the project site should be mapped into specific, clearly defined habitat types, such as grassland, shrub-steppe, woodland, cropland, and Conservation Reserve Program (CRP). These broad habitat types should be further defined within the micrositing corridor into subtypes based on additional field surveys, and rated according to the ODFW habitat categories (as defined by the ODFW Fish and Wildlife Habitat Mitigation Policy; see Appendix for further information).

Raptor Nest Surveys

One full season of raptor nest surveys should be conducted, using best available standards. Consult with the local resource agency biologist as to the species to survey near the boundaries of the micrositing corridors and the appropriate timing of surveys for the applicable species. Survey(s) should determine the species and nest location(s) that will potentially be disturbed by construction activities. The survey(s) should also identify active, potentially active, and alternate or historic (active within the past five years) nest sites with the highest likelihood of impacts from the operation of the wind project. A larger survey area outside the boundaries of the micrositing corridors may be necessary if there is a likelihood of nesting or other use by state and/or federally protected or sensitive raptor species (e.g., ferruginous hawk, Swainson's hawk, bald eagle, golden eagle). A larger survey area will also be useful if the wind project is implementing site-specific studies on wildlife displacement impacts (see Wildlife Displacement Section,

⁵ Site -- a project "site" is defined as the project area bounded on all sides by the furthest most external perimeter of any ground disturbing activity and includes gravel sites used for construction, overhead and underground electrical routes, and new and upgraded substations. When EFSC is the permitting authority, wind developers should refer to EFSC site boundary definitions.

below). Additional surveys may be required depending on resource agency guidance, site-specific conditions, and preliminary findings.

All potential and confirmed raptor nests should be recorded, regardless of activity status. If possible, inactive nests (without sign of use) should be assessed for nest age, species of use, and estimation of last season used.

General Avian Use Surveys

In general, one full year of avian (including raptors, passerines, etc.) use surveys should be conducted in the project site, using best available standards. Surveys should be designed by species group and by season, as appropriate for the wind project area and its habitat types. Two or more years of seasonal data is recommended in the following cases: 1) use of the project site by the avian groups of concern is estimated to be high, 2) there is little existing relevant data regarding seasonal use of the wind project site or on nearby areas of similar habitat type, and/or 3) the wind project is especially large and/or complex. This additional avian use data should be collected to refine impact predictions and make decisions on project design. Survey durations may also be reduced dependent upon availability of pre-existing relevant survey data.

Survey protocol and duration should be discussed with the permitting authority and resource agencies prior to commencement of surveys. Best available standards should be used to design survey protocols. Good references for designing survey protocols are the National Wind Coordinating Collaborative Guidance Documents (www.nationalwind.org), listed below. Please note that these documents undergo frequent revisions.

Anderson et al. 1999 *Studying Wind Energy/Bird Interactions: A Guidance Document Metrics and Methods for Determining or Monitoring Potential Impacts On Birds At Existing And Proposed Wind Energy Sites*. National Wind Coordinating Committee
http://www.nationalwind.org/publications/wildlife/avian99/Avian_booklet.pdf

Anderson et al. 2003. *The Proper Use Of "Studying Wind Energy/Bird Interactions: A Guidance Document."* (addendum to the 1999 document) National Wind Coordinating Committee
http://www.nationalwind.org/publications/proper-use_mm.pdf

Kunz et al. 2007. *Assessing Impacts of Wind-Energy Development on Nocturnally Active Birds and Bats: A Guidance Document*. National Wind Coordinating Committee
http://www.nationalwind.org/pdf/Nocturnal_MM_Final-JWM.pdf

Surveys for Threatened, Endangered and Sensitive Species

If existing information suggests the probable occurrence of state and/or federal TES species in the micro-siting corridor (e.g., presence of suitable habitat or past sightings on-site or in the vicinity), surveys using best available standards are recommended during the appropriate season to determine the presence or likelihood of presence of the TES species. For example, if bald eagles are expected to concentrate in or near the project vicinity during winter, targeted surveys to estimate bald eagle use of the site would be appropriate. If the project is located in the known range of the state-endangered Washington ground squirrel, surveys using best available standards should be conducted in suitable Washington ground squirrel habitat. Other

multi-species surveys may also be appropriate. Survey protocol should be discussed with the permitting authority and resource agencies prior to commencement of the surveys.

Bat Surveys

Conduct bat surveys using best available standards if determined to be necessary after consultation with resource agencies. Appropriate methods, survey periods and locations depend on local environmental conditions and elevation, and vary by species and/or life stage.

Additional Wildlife Surveys

If additional species of concern (e.g., mammals, fish, reptiles, amphibians, invertebrates, etc.) may be in the project area, appropriate surveys using appropriate species-specific protocols may be conducted if determined to be necessary after consultation with resource agencies. Discuss appropriate methods, survey periods and locations with the permitting authority and resource agencies prior to commencement of the surveys.

Cumulative Impacts Report

Wind developers should summarize existing available data on wildlife impacts associated with existing wind projects proximal to proposed wind projects. This information should include habitat, displacement and mortality data and an estimation of how the new proposed wind project may affect those impacts.

Coordination

The permitting authority and resource agencies should be involved in site visits, study design, review of study results, and application of these results as they inform project design.

3.0 Micrositing – Final Project Design

Final project design (i.e., the final locations of wind turbines, roads, transmission lines, other wind project features) within the micrositing corridor is determined in this phase, and is informed by the constraints identified in the habitat mapping and other studies from Pre-Project Assessment and the subsequent conditions of permit approval. As appropriate, final wind project design should occur in consultation with the permitting authority and resource agencies and seek to avoid and/or minimize biological resource concerns, based on their input and issues of constraint identified during pre-project assessment. If further engineering design requires the wind project developer to seek to locate facilities outside of the previously surveyed micrositing corridors, the wind project developer should consult with the permitting authority and resource agencies to determine additional survey requirements.

Final wind project design should be an iterative process that should involve considerations and trade-offs between engineering, constructability, and natural resource considerations. Final wind project design should consider biological resource surveys, resource agency input, and associated permit conditions such as avoidance criteria. For instance, final location of wind project facilities may be limited by topography, meteorology and geotechnical considerations.

During final wind project design, the wind project developer and their biology consultant, working with the permitting authority and resource agencies, should continually evaluate tradeoffs among: locations of turbines, crane paths, roads, collector cables (overhead vs. underground), and other facilities; potential impacts to habitat and species that may occur; and mitigation that may be required.

Below are considerations for avoiding and/or minimizing impacts to biological resources when finalizing wind project design. These considerations should also be addressed in the permitting process and permit conditions.

Within micrositing corridors, where feasible:

- Encourage siting on agricultural lands, including using existing transmission corridors and roads where feasible.
- Protect specifically identified key habitat sites, such as raptor nests, flight routes, cliffs, high bird or bat concentration areas (especially concentration areas of sensitive status species), breeding sites, contiguous habitat where area-dependant species are present, and core habitat areas for displacement-sensitive species.
- Use tubular turbine towers to reduce perching ability and to reduce the risk of avian collision. Avoid the use of lattice turbine towers, particularly those with horizontal cross-members.
- Avoid use of guy-wired permanent meteorological towers.
- Discourage overhead collector lines⁶, unless underground collector lines are not feasible to construct (e.g., soil conductivity), the overhead collection line option has lower environmental impact, or the cost of overhead collector lines would make the wind project commercially infeasible. Overhead collector lines should be constructed in accordance with the recommendations of the Avian Power Line Interaction Committee⁷ for raptor protection on power lines, including minimum conductor spacing. Anti-perching devices should be installed on transmission pole tops and cross arms where the poles are located within 0.5 mile of turbines.

Wind Project Lighting

These Guidelines recommend minimizing wind project lighting wherever possible, except where required by the FAA. Wind project lights may attract wildlife and increase the potential for wildlife mortality.

⁶ Collector lines are lower voltage underground or overhead power lines that deliver electricity from the turbine strings to the project substation. Collector lines do not include grid transmission lines.

⁷ www.aplic.org

Wind Turbine Lighting Plan & Implementation

In general not all wind turbines within a wind project require Federal Aviation Administration (FAA) lighting. Before beginning construction the project proponent should submit a Notice of Proposed Construction or Alteration to the FAA identifying the locations of the turbines and permanent meteorological towers over 200 feet in height and a proposed lighting plan. The proposed lighting plan should minimize use of lights on towers, while complying with the FAA lighting requirements. These Guidelines recommend proposing the following in the project lighting plan to FAA:

- Use of standard white turbine paint as daylight marking, rather than daytime white flashing lights.
- Where lights are necessary, use red, flashing, synchronized lights
- Propose lighting of turbines on the periphery of the wind project and every half mile;
- Set lights at the minimum beam spread and the maximum off-phase between light pulses/bursts. Currently, the FAA requires the beam spread on turbine lighting to be between 6 and 20 degrees wide and that red lights flash between 20 and 40 times per minute. Therefore, lights should be set to a 6-degree beam spread and should flash at 20 flashes a minute.

Other Project Lighting

For any lighting at project facilities that is not regulated by the FAA, these Guidelines recommend the following best management practices to minimize potential for wildlife impacts:

- Ground lighting/outbuilding lighting should operate only on motion-sensing devices such that lights remain off unless triggered.
- Security lighting should be shielded or directed downward to reduce glare.

4.0 Construction

During project construction, project developers should continue to avoid and/or minimize impacts to wildlife and habitat by following these Best Management Practices (BMPs):

Identify Key Compliance Staff

- Each project should identify a Field Contact Representative (FCR) to be on-site to oversee compliance during construction and provide environmental training to on-site personnel. The FCR is responsible for overseeing compliance with all protective measures and coordination in accordance with the permitting authority and resource agencies and should have the authority to issue a "stop work order" if deemed necessary.

- The FCR should coordinate with a qualified biologist who should be available as needed to assist with specific issues of biological concern that are identified either prior to or arise during construction.

Environmental Training

- Develop a compliance matrix describing permit conditions for use as a reference and tracking tool for the FCR.
- Provide maps of environmental constraints (sensitive areas) to contractors to ensure sensitive sites are avoided.
- Environmental training should be provided for all on-site construction personnel, including:
 - permit requirements
 - exclusion flagging
 - sensitive species present onsite
 - protocol for responding to wildlife discoveries
 - protocol for responding to dead or injured wildlife (see Operational Monitoring Section reference to a Wildlife Handling and Reporting System)
 - any other protocols related to avoiding and/or minimizing impacts to wildlife

Sensitive Resource Avoidance

Sensitive areas to be avoided during construction, such as occupied Washington ground squirrel burrow complexes and required adjacent habitat for squirrel survival, riparian areas, and sensitive raptor nests, should be identified near planned construction areas, as described below:

- Mark sensitive habitat or species areas with orange exclusion fencing, brightly colored pin flags, wooden lathes or other marking. The contractor(s) will be instructed to work outside these boundaries at all times. The FCR should ensure that exclusion flagging is in place prior to construction in that area.
- Sensitive raptor nest trees should be flagged. The FCR should work with the construction contractor to minimize construction work in these areas to the extent feasible during periods when the nests are active.
- Avoid constructing during avian nesting season, wherever possible. If previously unknown active nests are discovered during construction, the project developer should consult with resource agency(s).

Construction Compliance

- Avoid introduction of noxious weeds as a result of disturbance from construction and operation by implementing a weed control plan developed in accordance with local guidelines.

- Minimize the risk of fire as a result of construction and operation activity by developing a fire protection plan established in conjunction with permitting authority and in accordance with local guidelines. Train all onsite personnel in the application of the fire protection plan. A wildfire can significantly impact the natural (wildlife habitat) environment.
- Undertake the restoration of wildlife habitat temporarily disturbed during the construction, maintenance or repair of the project, using a revegetation plan developed with the recommendation of the permitting authority and resource agency(s).
- Instruct all construction personnel to observe caution when driving through the project area and to maintain reasonable driving speeds (particularly during the period from 1 hour before sunset to 1 hour after sunrise) so as not to harass or accidentally strike wildlife. Post speed limits on project roads (not public roads) throughout the project construction area.
- As required under Clean Water Act National Pollutant Discharge Elimination System (NPDES) regulations, develop an Erosion and Sediment Control Plan for the project site to be implemented and monitored during construction. The plan will require the contractor to install erosion and siltation controls near riparian areas and other appropriate locations as designated in the plan. The plan should be implemented until the wind project restoration is complete and no additional erosion or sediment loss is occurring.

Minor Construction Layout Changes

Minor layout changes may occur within and outside the microsite corridors during construction, typically as a result of landowner feedback and recommendations from the construction contractor. The project developer should continue ongoing communication with the permitting authority and resource agencies to ensure they are aware of minor changes outside the microsite corridors or in areas previously restricted by the permitting authority within the microsite corridors and seek to ensure any minor project changes do not adversely affect wildlife or their habitats.

5.0 Operational Monitoring

Monitoring studies, such as avian and bat carcass surveys using best available standards are required to determine the actual direct impacts of the wind farm on wildlife mortality. Wildlife displacement surveys or other specialized surveys for species of concern may also be necessary (see the Wildlife Displacement section of the Mitigation section, below). The duration and scope of the monitoring should depend on the size of the project, and the availability of existing monitoring data at nearby projects in comparable habitat types. Wildlife species most closely monitored should be state and federal TES species, and declining species.

Operational monitoring should be designed in consultation with the permitting authority, resource agencies and interested stakeholders with wildlife expertise. A good resource for designing survey protocols is the National Wind Coordinating Collaborative Wildlife/Wind

Interaction Publications website (<http://www.nationalwind.org/publications/wildlife.htm>). A minimum of two full years of operational avian and bat fatality monitoring (not necessarily consecutive) should be conducted on the wind project site, using best available standards. Shorter study duration may be recommended if mortality information exists from immediately adjacent projects on similar habitat types. Conversely, longer study duration may be recommended in the following cases: 1) use of the project site by the avian and bat groups of concern is estimated to be high; 2) there is little existing data regarding avian and bat fatalities in the project area; 3) the project is especially large and/or complex; and/or 4) initial fatality monitoring identifies unexpectedly high incidence of mortality or locally or regionally significant impacts to avian and bat species of concern.

Wind project operators should also develop a Wildlife Handling and Reporting System. This system is a monitoring program set up for responding to and handling avian and bat casualties found by construction and maintenance personnel during construction and operation of the facility. This monitoring program should include the initial response, the handling and the reporting of bird and bat carcasses discovered incidental to construction and maintenance operations. Construction and maintenance personnel should be trained in the methods needed to carry out this program.

The wind project operator is strongly encouraged to establish and/or participate in a Technical Advisory Committee (TAC), which will be responsible for reviewing results of monitoring data and making suggestions to the permitting authority and resource agencies regarding the need to adjust mitigation and monitoring requirements based on results of initial monitoring data and available data from other projects. For projects regulated by EFSC, the project proponent should work with the USFWS, ODFW, ODOE, and the EFSC will determine appropriate actions.

Potential members to the TAC include stakeholders such as state and federal wildlife agencies, environmental organizations, landowners, permitting agencies and county representatives. The TAC needs to be comprised of an equal number of individuals with vested (monetary) and non-vested interests in the project. The project developer should make all information generated by the pre-project assessment and operational monitoring of the wind project available to the public, except where necessary to keep confidential for species protection purposes. Protocols for conducting the operational monitoring studies and procedures for reporting and handling, and rehabilitating injured wildlife should be reviewed by the TAC. Progress reports summarizing the monitoring results should be reported to the TAC on a quarterly basis.

During a wind project's post-construction monitoring, review the results and consult with the permitting authority, resource agencies and the TAC. If the results of the operational monitoring or the wildlife handling and reporting system in place for the project life indicate mortalities to bird and bat species populations or other wildlife species populations are at a level of biological concern⁸, the project developer should review and discuss these impacts with the proper

⁸ Events of biological concern could include:

- Mortalities involving endangered, threatened or sensitive and declining species and species of concern identified in the ODFW Conservation Strategy
- Large individual mortality events involving any species

regulatory agency (e.g., USFWS for ESA-listed species) and the TAC for input on a course of action. Discussions may result in the recommendation for additional conservation actions (e.g. habitat conservation, raptor nest platforms, donations to wildlife rehabilitation centers), and other options. Additional monitoring may also be required. Any impacts to state or federally-listed species require immediate consultation with the ODFW and USFWS.

Mitigation

These Guidelines strongly recommend consistent application of the following mitigation recommendations regardless of the jurisdiction in which the wind project is permitted.

These Guidelines are designed to help avoid and minimize impacts to wildlife habitat and wildlife populations during development and operations of wind power projects. However, in some cases, development and operation of wind projects will result in direct and indirect impacts to wildlife and habitat that cannot be avoided. Wind project developers should be responsible to mitigate for temporary and permanent impacts to wildlife habitat, significant displacement of wildlife populations, and other wildlife impacts that result from wind project development and operations.

These Guidelines strongly recommend that the counties' wind project permitting process rely on ODFW's Fish and Wildlife Habitat Mitigation Policy for guidance on mitigation strategies, as does Oregon's EFSC permitting process. Close and early coordination with ODFW, and other resource agencies, is therefore critical. The mitigation described in this section is designed to correlate directly with wind project impacts to wildlife and habitat. Wind power developers should hire a qualified professional biologist (generally an external consultant under contract to the wind project developer) to assess potential project impacts to wildlife habitat and wildlife populations. Wind power developers also should coordinate with resource agencies throughout the wind project development process to ensure that direct and indirect impacts to wildlife resources are accurately identified, avoided and minimized to the degree possible and completely mitigated where avoidance cannot be accomplished. Working with qualified, professional, external consultants and undertaking consultation with resource agencies will maximize transparency, credibility and efficacy of the wind project development process.

Wherever possible, mitigation should replace or provide comparable habitats. However, the proximity of mitigation activities to site of impact needs to be balanced with maximizing the efficacy of mitigation. In some instances the best mitigation solution may occur by aggregating mitigation responsibilities and activities from multiple dispersed wind projects into one larger, strategically placed mitigation activity.

Habitat Impacts

-
- Long-term high mortality levels for any species

Wind project developers should be responsible for mitigation of temporary and permanent impacts to habitat due to project development. Differing mitigation ratios should apply based on the habitat type and category that is impacted. These guidelines strongly recommend early coordination with the permitting authority and resource agencies regarding habitat typing and categorization for the proposed project site as well as for the proposed mitigation site.

Habitat types should be rated into categories based on ODFW's Fish and Wildlife Habitat Mitigation Policy. For purposes of these guidelines, habitat should be categorized based on consideration of the habitat's current condition. Permitting authorities should be aware of the potential for situations in which land has been deliberately converted to avoid or reduce mitigation responsibilities. See Tables 1, 2 and 3 in the Appendix for a description of the six habitat categories and mitigation goals and standards as defined in ODFW's Fish and Wildlife Habitat Mitigation Policy. These guidelines are designed to develop best wildlife and habitat conservation practices for wind development by (in part) creating incentives to direct wind farm development away from the highest value wildlife habitat (avoid habitat categories 1, 2, and higher quality category 3) and towards sites of lower biological value (target development on habitat categories 5 and 6). Habitat typing and categorization work for the proposed project site and the proposed mitigation site should be done by a qualified professional biologist (generally an external consultant under contract to the wind project developer).

Wind project developers, in conjunction with their consultants, and in coordination with resource agencies and the permitting authority, should develop a habitat mitigation plan that:

- (a) Describes how the mitigation plan meets the mitigation goals and standards listed in Table 3 of the Appendix in order to mitigate for the habitat impacts at the project site;
- (b) Describes and maps the location of the development action and the mitigation actions including the county, latitude and longitude, township, range, section, and quarter section;
- (c) Provides performance measures for habitat enhancements and long-term habitat conservation, including success criteria with timelines for the mitigation site, and;
- (d) Provides, at a minimum, for life of project protection and management of the mitigation site.

These guidelines recommend that all wind project mitigation funds target habitat conservation and enhancement towards higher quality habitat (i.e., Categories 1 – 4). Any mitigation habitat conserved and/or enhanced should be:

- Where possible, protected in perpetuity.
- At minimum, protected for the life of the wind project⁹ or longer through the following avenues:

⁹ The life of the wind project includes the post-operation project decommissioning and habitat restoration.

1. Fee title acquisition with conservation easement held by ODFW or a third party;
 2. Conservation easement with landowner;
 3. Provision of funds by the project developer towards a third party purchase, habitat enhancement and management action (e.g. a land trust). The intent of this option is to have the land protected in perpetuity.
- At some risk of development or conversion.
 - Protected from degradation to improve habitat function and value over time (i.e. be subject to a habitat management plan and provided legal protection).
 - In the same geographical ecoregion as the impacted habitat unless an area outside the geographical area is agreeable to resource agencies and permitting authorities.
 - Formally agreed upon by the wind developer, resource agencies and permitting authorities.
 - Transparent to the public.¹⁰

The following table provides Guidelines to implement the ODFW Fish and Wildlife Habitat Mitigation Policy's habitat categories and mitigation goals and standards. These guidelines provide corresponding examples of habitat for each ODFW habitat category and recommended mitigation for permanent and temporary impacts for each habitat category. Some especially sensitive habitat subtypes such as areas with lithosol soils or biotic crusts do not fit easily into this table's habitat categorization and mitigation and should be addressed on a case-by-case basis.

ODFW Habitat Categories and Mitigation Goals and Standards	Examples of Habitat Categories	Mitigation for Permanent Impacts	Mitigation for Temporary Impacts
1 – Irreplaceable, limited, and essential habitat. Goal of no loss of habitat quantity or quality. The standard by which to achieve the mitigation goal is	Washington ground squirrel burrow complexes and required adjacent habitat for squirrel survival Federally or	No example provided. Project developers should avoid impacts to this habitat, as it is irreplaceable.	No example provided. Project developers should avoid impacts to this habitat, as it is irreplaceable.

¹⁰ Mitigation costs may be excluded for proprietary reasons.

avoidance.	<p>State listed or Sensitive-critical raptor nests (e.g. bald eagle, golden eagle, peregrine falcon, ferruginous hawk, burrowing owl)</p> <p>Mature oak woodlands</p> <p>Critical bat habitat (which includes roost, maternity colony and hibernaculum sites – these can be found in mines, caves, rock crevices, trees, buildings or bridges, depending on the bat species)</p>		
ODFW Habitat Categories and Mitigation Goals and Standards	Examples of Habitat Categories	Mitigation for Permanent Impacts	Mitigation for Temporary Impacts
2 – Essential and limited habitat. Goal of no net loss of habitat quantity or quality and to provide a net benefit of habitat quantity or quality. The standard by which to achieve the mitigation goal is provision of in-kind and in-	<p>Quality native grassland that provides habitat for sensitive wildlife and plant species (e.g. long-billed curlew, burrowing owl, grasshopper sparrow)</p> <p>Unoccupied but potential</p>	Project developers are strongly encouraged to avoid impacts to this habitat.	Project developers are strongly encouraged to avoid impacts to this habitat. If impacts are unavoidable, temporary impacts should be mitigated for by implementing an approved restoration plan for the temporarily-impacted habitat that assures an overall net benefit of habitat quantity or quality at the site. For habitat restoration anticipated to be difficult or long-term (greater than 5 years), an additional 0.5 acres of

proximity mitigation.	<p>Washington ground squirrel habitat adjacent to an existing colony</p> <p>Quality native shrub-steppe (e.g., mature sagebrush) with sensitive wildlife and plant species (e.g. sage sparrow, loggerhead shrike)Key waterfowl use areas, quality wetlands, streams and riparian areas</p>		restoration/acre of impact should be negotiated. In all cases, a good faith effort should be made to restore the temporarily impacted area.
ODFW Habitat Categories and Mitigation Goals and Standards	Examples of Habitat Categories	Mitigation for Permanent Impacts	Mitigation for Temporary Impacts
3 – Essential or important and limited habitat. Goal of no net loss of either habitat quantity or quality. The standard by which to achieve the mitigation goal is provision of in-kind and in-proximity mitigation.	<p>Medium-quality native grassland or shrub-steppe.</p> <p>Functional but small or fragmented grassland or shrub-steppe habitat.</p>	<p>The quality of Category 3 habitat can vary considerably. Avoidance, where possible, is desirable. Mitigation can vary relative to habitat quality.</p> <p>These Guidelines recommend a 2:1 compensatory ratio when avoidance is not feasible. A 1:1 ratio may be considered where a developer can</p>	If impacts are unavoidable, temporary impacts should be mitigated for by implementing an approved restoration plan that assures no net loss of habitat quantity or quality. For habitat restoration anticipated to be difficult or long-term (greater than 5 years), an additional 0.5 acres of restoration/acre of impact could be negotiated. In all cases, a good faith effort should be made to restore the temporarily impacted area.

		demonstrate a significant opportunity to enhance a mitigation site to achieve no net loss of habitat quality or quantity.	
ODFW Habitat Categories and Mitigation Goals and Standards	Examples of Habitat Categories	Mitigation for Permanent Impacts	Mitigation for Temporary Impacts
4 – Important habitat. Goal of no net loss of habitat quantity or quality. The standard by which to achieve the mitigation goal is provision of in-kind or out-of-kind, in-proximity or off-proximity mitigation.	Low-quality grassland or shrub-steppe	These Guidelines recommend a 1:1 compensatory mitigation ratio for permanent impacts.	If impacts are unavoidable, temporary impacts should be mitigated for by implementing an approved restoration plan that assures no net loss of habitat quantity or quality. For habitat restoration anticipated to be difficult or long-term (greater than 5 years), an additional 0.5 acres of restoration/acre of impact could be negotiated. In all cases, a good faith effort should be made to restore the temporarily impacted area.
5 – Habitat with high potential to become either essential or important. Goal of net benefit in habitat quantity or quality. The standard by which to achieve the mitigation goal is provision of actions that improve the mitigation site's habitat conditions.	Low-quality (weed-infested and/or highly disturbed) habitat	These Guidelines recommend that some net benefit in habitat quantity or quality be attained through action(s) that improve the habitat conditions. For example, weed control.	A good faith effort should be made to restore the impacted area.
6 – Habitat with low potential to	Cropland that is currently being	No mitigation required other	No mitigation required.

become essential or important. Goal is to minimize impacts to surrounding habitat.	cultivated Developed land i.e., areas with pavement, structures or facilities, that eliminates natural habitat values.	than to minimize impacts to surrounding habitat.	
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Wildlife Displacement

Indirect impacts to wildlife and habitat may occur because the wind project may cause disturbance to wildlife, causing the habitat to be less appealing and suitable to both resident and/or migratory birds and other wildlife species. The displacement effect to wildlife may be temporary or permanent. If there is a strong likelihood for displacement (e.g. an existing species or habitat assemblage is especially vulnerable to displacement by wind project development), the project developer should consult with the permitting authority and resource agencies. Projects sited in higher quality habitat with sensitive species are more likely to raise displacement concerns than projects sited in lower quality habitat.

The need for site specific assessment of potential wildlife displacement should be negotiated on a project-by-project basis. If, based on existing information, displacement of wildlife from a wind project is anticipated, the project developer, permitting authority and resource agencies should discuss and agree upon suitable mitigation to offset indirect displacement effects. Alternatively, following project start-up, a research project could be implemented by the project developer to determine if wildlife displacement effects are occurring from the wind project. Results of research should be provided to the TAC for review and recommendations, and, if necessary, appropriate measures to mitigate wildlife displacement effects should be taken by the wind project operator.

Wildlife Fatalities

As is the case with most development, some mortality of bats and birds is expected to result from wind power projects. During pre-project assessment, wind project developers should estimate bird and bat mortality to determine expected wildlife impacts and associated risk. These data will be useful for efficacy of pre-project assessment, design of future projects, and assessing cumulative impacts to wildlife species. Impacts to state or federally-listed species require consultation with the ODFW and USFWS if there is potential for take of listed species. Wind power project-related mortality to sensitive, declining and more common species of birds and bats is expected to be minimized at wind projects if proper macrositing, pre-project assessment, and macrositing are implemented and good project management practices are established.

During a wind project's operational monitoring, the project owner should review the results and consult with the permitting authority and resource agencies. If mortalities to bird and bat species populations or other wildlife species populations are at a level of biological concern,¹¹ consult with the permitting authority, resource agencies and TAC. Discussions may result in the recommendation for additional conservation actions (e.g. habitat conservation, raptor nest platforms, donations to wildlife rehabilitation centers), and other options. Additional monitoring may also be required. Any impacts to state or federally-listed species require immediate consultation with the ODFW and USFWS.

Programmatic Recommendations from the Columbia Plateau Ecoregion Wind and Wildlife Energy Taskforce

During the course of development of these Guidelines, the Taskforce discussed the larger context of wind development and wildlife impacts and came up with the following policy and program recommendations:

Priority Recommendations

- 1) Regionally-specific guidelines should be created for other areas of Oregon, where wind development will likely occur. It is the Taskforce's view that the Columbia Plateau Ecoregion Guidelines process and approach contained in this document can be applied in a broader regional perspective. However, examples of mitigation ratios, species and habitats of concern, and other tools for different ecoregions in Oregon will need further development. When developed, these additional regional guidelines can be provided as appendices or supplements in this document.
- 2) The success of these Guidelines depends on providing adequate funding for full ODFW staffing support to wind developers, counties, and EFSC, to effectively participate in implementation of these Guidelines at proposed wind energy facilities. Funding could be via a legislative support package or via a cost-reimbursement agreement with wind developers.
- 3) Oregon EFSC's model wind energy siting ordinance for county governments should be revised to reflect these Guidelines.

Other Recommendations

- State legislators and agency directors should develop and fund programs designed to educate and work closely with county staff, wind project developers, agency staff and

¹¹ Events of biological concern could include:

- Mortalities involving endangered, threatened, sensitive and declining species and species of concern identified in the ODFW Conservation Strategy
- Large individual mortality events involving any species
- Long-term high mortality levels for any species

other stakeholders on the Guidelines' application to current and future wind energy project proposals. Educational and training outreach should target all interested and affected stakeholders.

- State legislators should develop legislation/support packages designed to help overcome county technical obstacles that complicate efforts to develop fully transparent procedures and access to relevant documents for wind project siting and permitting, including the creation of internet based document libraries and public notification platforms.
- The Taskforce endorses the creation of statewide digital maps depicting the intersection of wind energy potential and related transmission lines, and Oregon environment and conservation priorities. At the time of this writing, this map does not currently exist, but would be a useful tool that could be periodically updated to assist in the macrositing process. Including wind mapping databases into these Guidelines will be useful. These types of maps are usually the key factor governing where potential future projects will be located. Overlapping wind resource mapping with wildlife habitat information would allow proposed biological surveys to be prioritized in areas with the highest potential for development.
- In addition to developing these Guidelines, the Taskforce reviewed and discussed potential cumulative impacts from future wind energy development in the Columbia Plateau Ecoregion. The Taskforce developed a white paper¹² to review our discussions, research to-date, consensus opinion and recommendations for future research and analysis. The recommendations include:
 - o Fund and designate a management entity to design, establish and manage a central data repository for wildlife mortalities and habitat impacts from wind projects.
 - o Collaboratively design, fund, and implement cumulative impact analysis(es) for the Columbia Plateau Ecoregion. This analysis should determine the generational population dynamics caused by wildlife mortality from all sources of cumulative effect, create a report of key species status, trends, and "impact thresholds of concern", and develop a comprehensive mitigation plan for impacts to key species above threshold-of-concern levels.
- Studies of potential direct wildlife impacts from temporary met towers should be initiated.
- Studies of potential wildlife displacement impacts from wind project development and operation should be initiated.
- Siting and permitting guidelines for smaller scale, community wind projects (typically 10 MW or less) should be developed.

¹² The cumulative wildlife and habitat impacts review and recommendations is included in the Appendix.

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Appendix

Map of the Columbia Plateau Ecoregion

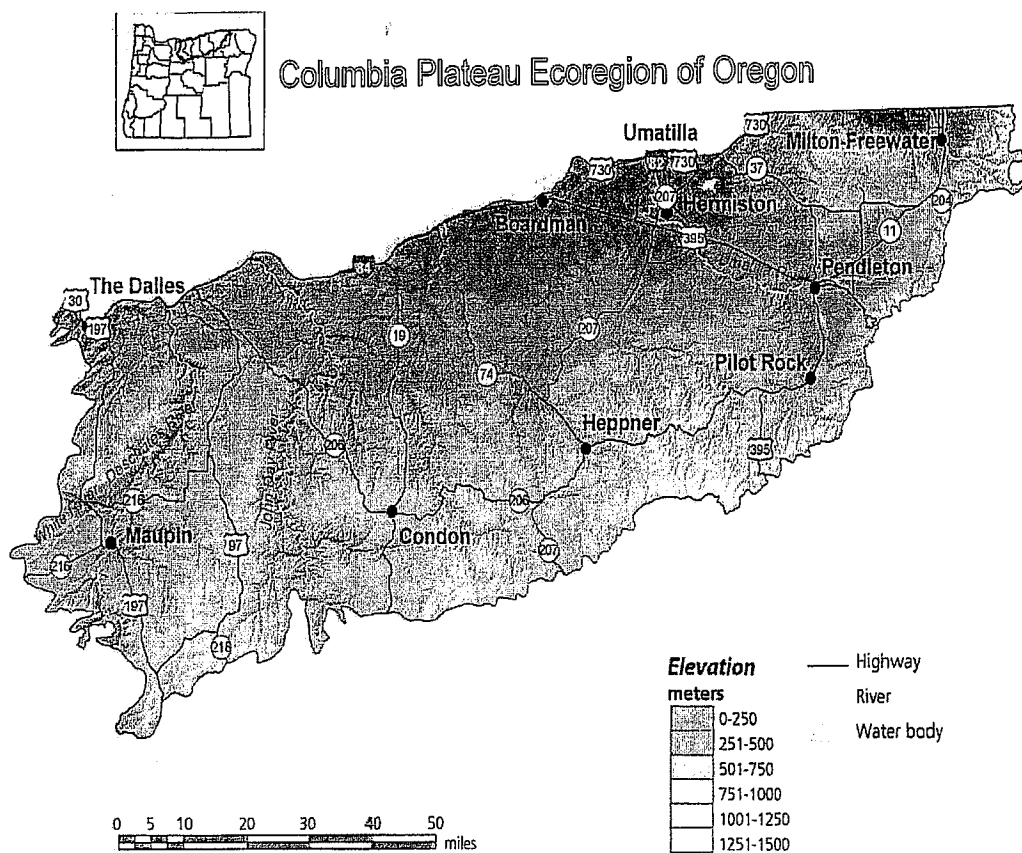
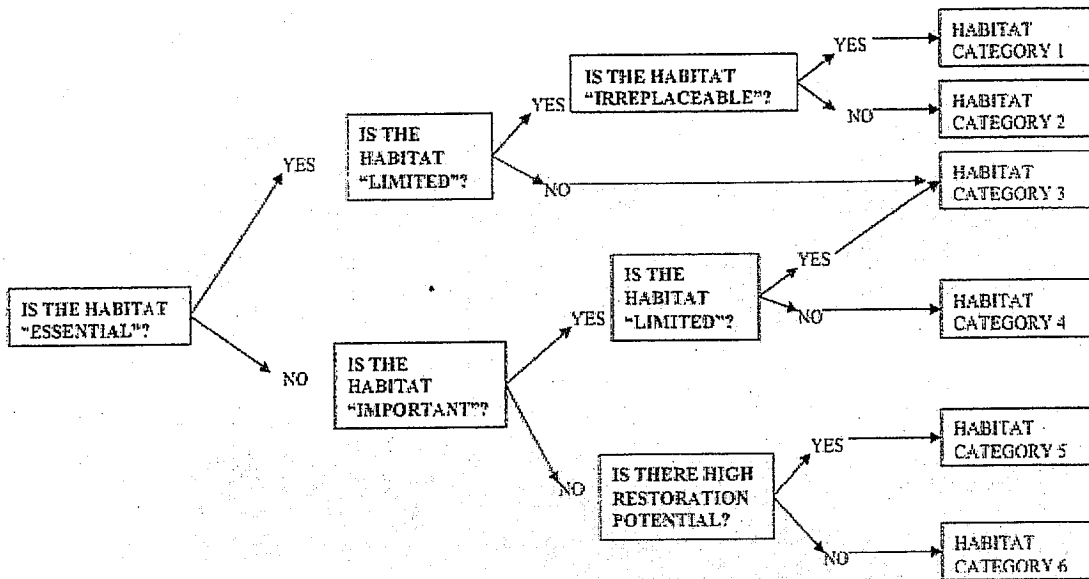


Table 1. ODFW Fish and Wildlife Habitat Categories

Habitat Category	Habitat Included
Category 1	Irreplaceable, essential and limited habitat
Category 2	Essential and limited habitat
Category 3	Essential habitat, or important and limited habitat
Category 4	Important habitat
Category 5	Habitat having high potential to become either essential or important habitat
Category 6	Habitat that has low potential to become essential or important habitat

Table 2. Fish and Wildlife Habitat Mitigation Policy Habitat Categorization



The following definitions describe various terms used to categorize habitats:

Essential Habitat: means any habitat condition or set of habitat conditions which, if diminished in quality or quantity, would result in depletion of a fish or wildlife species. These habitats contain the physical and biological conditions necessary to support the most critical life history function of the fish and wildlife species being considered.

Limited Habitat: means an amount of habitat insufficient or barely sufficient to sustain fish and wildlife populations over time. This concept requires that the relative availability of suitable habitats to support important life history functions be considered at variable scales that may go beyond the project site.

Important Habitat: means any habitat recognized as a contributor to sustaining fish and wildlife populations on an ecoregion basis over time. These habitats may not be necessary to support the most critical life history functions (i.e., spawning, breeding/nesting, juvenile rearing) of the species being considered.

Irreplaceable Habitat: means that successful in-kind habitat mitigation to replace lost habitat quantity and/or quality is not feasible within an acceptable period of time or location, or involves an unacceptable level of risk or uncertainty, depending on the habitat under consideration and the fish and wildlife species or populations that are affected. An acceptable period of time would correlate to benefiting the affected fish and/or wildlife species. Examples provided by ODFW are old-growth forests and bogs.

High Restoration Potential: means habitat that previous land uses or activities have eliminated or severely reduced its value to fish and/or wildlife. The habitat is technically feasible to restore such as a diked or drained coastal marsh.

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**Table 3. Mitigation Goals and Standards of ODFW's
Fish and Wildlife Habitat Mitigation Policy**

Category 1	No loss of habitat quantity or quality	Avoidance
Category 2	No net loss of habitat quantity or quality <u>and</u> to provide a net benefit of habitat quantity or quality	In-kind, in-proximity mitigation
Category 3	No net loss of habitat quantity or quality	In-kind, in-proximity mitigation
Category 4	No net loss of habitat quantity or quality	In-kind or out-of-kind, in-proximity or off-proximity mitigation
Category 5	Net benefit in habitat quantity or quality	Actions that improve habitat conditions
Category 6	Minimize impacts	

Cumulative Wildlife and Habitat Impacts Review and Recommendations

September 29, 2008

In 2007, the Oregon Energy Facility Siting Council (EFSC) requested a cumulative wildlife impacts analysis from existing and proposed wind energy development in the Columbia Plateau Ecoregion (Ecoregion), which in Oregon includes parts of Morrow, Umatilla, and Wasco counties and all of Gilliam and Sherman counties. The Council's recent and future review of a large number of wind energy facility applications proposed to be sited in the Ecoregion, coupled with concerns from the U.S. Fish and Wildlife Service (USFWS), the Oregon Department of Fish and Wildlife (ODFW), and environmental groups regarding wildlife and habitat impacts from wind energy development in the ecoregion, was the primary impetus for the Council's request.

Wind energy development in the Ecoregion continues to expand. Approximately 3,848 MW of wind energy generation facilities are currently operating, being constructed, or have been approved for construction within the Ecoregion (2,107 MW in Oregon, 1,741 in Washington) to date. An additional 1,309 MW of facility applications in the Ecoregion are pending Oregon EFSC siting approval, and at least 520 MW of additional county jurisdictional facilities have been proposed or are in the permitting process in Washington and Oregon.

In the fall of 2007, the ODOE, USFWS and ODFW convened the Columbia Plateau Ecoregion Wind Energy Taskforce (Taskforce). The Taskforce includes multiple state and federal agencies (ODFW, USFWS, ODOE, WDFW), wind energy developers, county representatives, non-profit environmental organizations, and consultants. The Taskforce has developed voluntary wind project siting and permitting guidelines (Guidelines), with hopes that future wind energy development in the Ecoregion is sited in a manner that prioritizes wildlife and habitat protection.

Over the course of several months, the Taskforce reviewed and discussed the most current research and opinion from consulting biologists and statisticians, state and federal agencies and non-profit environmental organizations on wind energy development and wildlife/habitat impacts in the Ecoregion, with a specific interest in defining and understanding the cumulative wildlife and habitat impacts from wind energy development.

This document provides a summary of information regarding the currently known cumulative wildlife and habitat impacts of wind energy development in the Ecoregion. Recommendations included in this document are intended to inform future wind project planning and development within the Ecoregion, as well as direct resources to more fully understand indirect cumulative effects.

Benefits of Wind Power for Conservation of Species

The Taskforce recognizes that responsible wind power development potentially offers significant environmental benefits for species conservation. One of the most significant threats facing wildlife in North America is habitat modification attributed to climate change. Wind power development represents an important strategy for reducing dependence on fossil fuels and combating the effects of climate change. The State of Oregon is a national leader in developing efforts to combat climate change. Oregon law currently requires utilities to provide 25% renewable energy to their customers by 2025. In addition, Oregon law establishes goals to

reduce greenhouse gas emissions by 75% below 1990 levels by 2050. Maximizing the region's wind energy generation potential will be an important factor in achieving renewable energy and climate change targets.

In addition, development of wind power facilities at carefully selected sites offers the potential to reduce incentives to redevelop property for less wildlife friendly practices. For many species, wind power development on disturbed sites may represent a relatively benign land-use conversion.

Finally, by developing and implementing strong guidelines, the Taskforce has created an opportunity to effectively avoid the highest quality habitats, minimize impacts, and mitigate for unavoidable direct and indirect impacts to wildlife from wind power development and to set a standard for responsible energy generation. Strategic investment of mitigation resources can allow for targeted protection of the most critical habitats and most vulnerable species.

All forms of energy generation present both direct and indirect impacts on wildlife and wildlife habitat. By carefully considering the placement of wind power facilities and mitigating for unavoidable consequences, wind power offers opportunities to minimize direct and indirect impacts on wildlife and wildlife habitat while helping to address the global threat presented by climate change.

Cumulative Impacts

The challenge facing wind power in Oregon is to meet aggressive targets to combat climate change while simultaneously avoiding adding significantly to the direct and indirect hazards facing Oregon's wildlife populations, many of which are already in serious decline. Cumulative impacts to wildlife from many sources, including wind energy, represent one of the most challenging and complicated aspects of assessing potential wind power impacts on wildlife and wildlife habitat. By definition, cumulative impacts are the additive or incremental effects of past, present, and foreseeable (future) actions taken as a whole. The impacts associated with an individual action, such as a single wind energy project, may be minor, but the impacts from a number of similar actions or projects taken collectively may be significant. Most activities, including wind energy development, have both direct and indirect impacts. Direct impacts of wind projects on birds and bats are generally associated with mortality from wind turbines. Indirect impacts may occur as a result of habitat loss from the project footprint (e.g., habitat replaced by turbine towers, access roads, substations, and other O&M facilities), lowered habitat value in close proximity to wind turbines (e.g., species displacement), decreased population viability, and habitat fragmentation. Habitat fragmentation is one of the main causes of declines in wildlife populations (Yahner 1988). Direct impacts are often easier to estimate and measure than indirect impacts. As a consequence, cumulative impact analyses have typically focused on direct impacts, such as bird mortality from collisions with turbine blades.

At a broader level, cumulative impacts reach beyond just the consequences from wind power alone. On a regional scale, there is an argument for assessing not only the cumulative impacts of wind power, but also the cumulative impacts of wind power and various other activities taken together as a whole. In other words, in addition to asking whether wind power in and of itself is having population level impacts on birds and other wildlife, consideration should be given to whether wind power is contributing cumulatively along with multiple other causes to population declines. For example, documented population declines in some avian species over the past

few decades are attributed to a number of human-related factors that result in either continued loss of habitat (e.g. urban sprawl, agricultural development), or direct mortality (e.g. collisions with buildings, vehicles, power lines, or, predation from house cats). Therefore, while wind energy developers cannot be held accountable for these other human-related factors, the question is whether the added impacts from wind power could potentially continue or even hasten documented declines in some species populations.

Understanding potential cumulative impacts of wind power development is particularly critical because aggressive state renewable energy targets may lead to large-scale habitat modification across Oregon. Failure to understand the cumulative impacts of this rapid wind project development expansion could contribute to population level impacts to species that could result in future state and federal listings. Additional species listings in turn could have dramatic impacts on the future viability of the wind development industry in Oregon. Comprehensive understanding of the cumulative impacts of wind power development is necessary both to protect our natural heritage and to preserve the viability of wind power development in Oregon. The understanding is also necessary in order to achieve objectives related to combating climate change.

Current Sources and Summaries of Cumulative Impacts Information

To determine the potential impacts of individual and multiple wind projects, the Taskforce focused its attention on several recent mortality assessments conducted by WEST, Inc. These studies found that when averaged across the Ecoregion, the number of bird and bat fatalities per megawatt from existing wind energy facilities is currently relatively low compared to other areas of the country. Each of the assessments concluded that wind power facilities on their own were not having direct population level impacts on birds or bats due to the proportion of birds and bats killed by wind turbines. However, not all cumulative avian mortality impact analyses evaluated whether wind power is contributing cumulatively along with multiple other causes to population declines of birds, bats or other wildlife species. Additionally, existing studies were not all designed to assess the cumulative impacts on species populations resulting from habitat loss or fragmentation, including that unrelated to wind energy facilities¹³. WEST, Inc estimates that 69% of bird fatalities from wind projects in the Ecoregion are passerines (e.g., golden-crowned kinglet), 18% are game birds, and 7% are raptors/vultures. From Ecoregion projects conducting post-construction monitoring, a total of 636 bird fatalities were recorded, which included 73 species, 9% of which were raptors, 40% were horned larks, and 6.5% were golden crowned kinglets. Annually, on average, they estimated 0.07 raptor fatalities/MW, 2.2 general bird fatalities/MW, and 0.68 bat fatalities/MW. The most common bat fatalities observed were the hoary bat and the silver-haired bat. These two bat species comprised more than 90 percent of all bat fatalities.

¹³ The Taskforce also reviewed the programmatic Environmental Impact Statement (EIS) for Klickitat County's Energy Overlay Zone, which did evaluate cumulative impacts associated with loss of habitat, including quantity and distribution/concentration of impacted areas across the county.

Upon review and discussion of current avian and bat fatality monitoring studies and expertise, from the Columbia Plateau Ecoregion as well as nationwide, it is the Taskforce's opinion that:

- The cumulative direct mortality from existing wind energy facilities in Oregon where mortality monitoring studies have been undertaken in the Ecoregion has not revealed population level impacts to bird or bat species;
- Past studies are not necessarily a good indicator of future cumulative impact, given the rapid expansion of wind power development in Oregon and increasing pressure to develop wind projects in high quality habitat;
- There are concerns regarding the potential for wind power development impacts on several wildlife species that are already rare or exhibiting widespread species population and distribution declines (e.g., ferruginous hawk, Swainson's hawk, Washington ground squirrel, burrowing owl);
- There are concerns that key habitats that support these sensitive wildlife species are rapidly being converted due to multiple factors, primarily unrelated to wind development;
- In the extreme, siting of even a single wind project may have a significant effect on future cumulative impact analysis¹⁴;

Based on these findings, the Taskforce's Guidelines make several recommendations that will assist with evaluating and reducing the potential for cumulative impacts. These include:

- Presence of existing proximal wind power developments.
- Presence of other proximal causes of wildlife mortality.
- Pre-project assessment surveys and operational monitoring studies that should be implemented;
- Disincentives (including increased mitigation for impacts to wildlife and habitat) to encourage avoidance of key habitats, and incentives to encourage future development on highly disturbed habitats.

However, the Taskforce acknowledges that more information sources on bird, bat and other wildlife species' population status and trends as well as status and impacts on regional habitat

¹⁴ The Altamont Pass Wind Resource Area in Northern California serves as a case in point. The wind projects are connected with the fatality of an approximately 2,000 protected birds of prey annually (Bird Fatality Study at Altamont Pass Wind Resource Area, Table 1: Total Recorded Bird Fatalities, October 2005-September 2007, Altamont Pass Avian Monitoring Team). Costly litigation and redevelopment of these facilities have not yet substantively addressed these mortality concerns. While the Altamont example is frequently cited regarding wind generation facilities, no wind energy project in the Columbia Plateau Ecoregion has demonstrated wildlife mortality problems on the scale associated with the Altamont Pass Wind Resource Area.

resources are needed. The Taskforce believes a broad-scale research project(s) is needed to better inform assessment of the cumulative impacts from wind project development on key species and habitats. Supporting collaborative monitoring and research within the Ecoregion to fully understand wind energy development and project siting impacts to key habitats will be important as wind energy development continues to expand.

Cumulative Population and Habitat Effects Research Needs Recommendations

To address concerns of cumulative impacts to avian and other wildlife populations as well as key habitats from siting of wind energy facilities, the Taskforce is providing the following recommendations to help focus research and conservation efforts.

Data Repository

Useful bird/bat/habitat data has been and is currently being collected from the wind development sites. The challenge is to make fatality, survey and monitoring data, and general site information available and easily accessible to ODFW, USFWS and interested stakeholders for ongoing wildlife fatality and habitat cumulative impact analysis. The Taskforce recommends:

- Funding and designating a central management entity to design, establish, and manage a central data repository for previously-generated and future bird/bat/habitat monitoring data;
- Requiring future developers to submit data to the central data repository;
- Engaging in a national discussion regarding a data repository for wind turbine sites across the country; and
- Requiring county planners to provide ODOE with location data on all county-permitted wind energy facilities.

Population Assessment and Scale

Currently, more research is needed that analyzes species fatality numbers or habitat impacts from all anthropogenic sources across the entire Ecoregion in the context of overall population trends. The Taskforce acknowledges that individual wind projects cannot be held to account for all anthropogenic sources. For some focal species, research of this kind would be very helpful to identify the significance of the individual wind project data that is being collected, to better define key habitat areas of high concern and wind energy-related mortality thresholds of concern, to identify areas where future wind development should be discouraged, and to identify the types of mitigation or conservation actions that would provide the greatest benefits to these species.

- Collaboratively design, fund, and implement cumulative impact analysis(es) for the Columbia Plateau Ecoregion, including investigation of fragmentation of habitat, for species of concern (e.g. ferruginous and Swainson's hawks).
- Design, fund, and implement studies to determine the generational population dynamics caused by avian and other species mortality.
- Using the results from the above Columbia Plateau Ecoregion study(ies) to collaboratively create a report of key species status, trends, and "impact thresholds of concern" for:

- A limited number of key species that are highly sensitive to additional mortality factors (for example, ferruginous hawk, Swainson's hawk, burrowing owl, hoary bat, and silver-haired bat)
- A limited number of key species that are highly sensitive to habitat loss or displacement (for example, long-billed curlew, loggerhead shrike, grasshopper sparrow)
- Developing a comprehensive action plan for impacts to key species and associated habitats that are above threshold-of-concern levels
- Publishing wind energy ecoregional studies, analyses, and monitoring in order to raise the standard and credibility of these collaborative efforts.
- Identifying the most up-to-date habitat information and data sources that should be used to evaluate cumulative impacts from wind energy development.
- Extend the study to include anticipated cumulative impacts on wildlife species and their habitat to include other areas in Oregon targeted for clean energy development.

Citations

Johnson, G. D. 2007. Cumulative Impacts Analysis for Birds and Bats from Existing and Permitted Wind Energy Projects in Klickitat County, Washington. Western EcoSystems Technology, Inc. 30 pp.

Yahner, R. H., 1988. Changes in wildlife communities near edges. Conservation Biology 2, 333-339.

#21 consists of 29 pages/complete document given to Tamara

Westlaw.

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C

Supreme Court of Washington,
En Banc.

RESIDENTS OPPOSED TO KITTITAS TUR-
BINES and F. Steven Lathrop, Petitioners,
v.

STATE ENERGY FACILITY SITE EVALU-
ATION COUNCIL (EFSEC) and Christine O.
Gregoire, Governor of the State of Washington, Re-
spondents.

Kittitas County, a subdivision of the State of Wash-
ington, Petitioner,
v.

The Honorable Christine O. Gregoire, Washington
State Governor; Energy Facility Site Evaluation
Council; Sagebrush Power Partners L.L.C.; Horizon
Wind Energy; Washington State Department of
Community, Trade and Economic Development;
Counsel for the Environment; Department of Eco-
logy; Department of Fish and Wildlife; Utilities and
Transportation Commission; Department of Natural
Resources; Department of Transportation; Renew-
able Northwest Project; Phoenix Economic Devel-
opment Group; Sierra Club Cascade Chapter; Res-
idents Opposed to Kittitas Turbines (ROKT); and
Steven Lathrop, Respondents.

Nos. 81332-9, 81427-9.
Argued June 26, 2008.
Decided Nov. 20, 2008.

Background: Petitioners filed petitions for review of governor's final determination to approve site certification agreement for location of wind turbine project in county which had not authorized the turbines. Energy Facility Site Evaluation Council (EFSEC) filed motion to certify the petitions to the Supreme Court, and the Superior Court, Thurston County, Richard D. Hicks, J., ordered certification.

Holdings: The Supreme Court, Owens, J., held that:
(1) review properly invoked the Supreme Court's

appellate jurisdiction;

- (2) Supreme Court would accept certification;
- (3) EFSLA applies to energy facilities that exclus-
ively use wind power;
- (4) Growth Management Act (GMA) did not super-
seede EFSEC's authority to preempt county's land
use decision;
- (5) final environmental impact statement (FEIS) ad-
equately considered the mitigation of the visual im-
pact caused by the project;
- (6) EFSEC chairman did not violate the appearance
of fairness doctrine; and
- (7) applicant demonstrated a good faith effort to re-
solve noncompliance issues as required prior to
preemption.

Affirmed.

West Headnotes

[1] Electricity 145 ⚡ 8.4

145 Electricity

145k8.4 k. Generating facilities in general. Most
Cited Cases

Review certification procedures under the En-
ergy Facilities Site Locations Act (EFSLA) did not
violate the state constitution by conferring unau-
thorized original jurisdiction upon the Supreme
Court, but rather properly invoked the Court's ap-
pellate jurisdiction; EFSLA created a right of direct
review in the superior court rather than the Su-
preme Court, certification procedure merely
provided a vehicle through which the superior court
transferred cases of limited appellate jurisdiction to
the Supreme Court, and Supreme Court possessed
the authority to apply direct review of final de-
cisions of administrative agencies. West's RCWA
Const. Art. 4, § 4; West's RCWA 80.50.140(1).

[2] Electricity 145 ⚡ 8.4

145 Electricity

145k8.4 k. Generating facilities in general. Most
Cited Cases

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If the superior court determines that review of a governor's final decision on an application for a site certification under the Energy Facilities Site Locations Act (EFSLA) cannot be limited to the administrative record because of procedural irregularities in the record, the court must take testimony and determine such factual issues in question before certifying the petition to the Supreme Court. West's RCWA 80.50.140(1).

[3] Administrative Law and Procedure 15A 654.1

15A Administrative Law and Procedure
 15AV Judicial Review of Administrative Decisions

15AV(A) In General
 15Ak654 Power of Legislature
 15Ak654.1 k. In general. Most Cited

Cases

The legislature may confer limited appellate review over administrative decisions by statute. West's RCWA Const. Art. 4, § 4.

[4] Administrative Law and Procedure 15A 683

15A Administrative Law and Procedure
 15AV Judicial Review of Administrative Decisions

15AV(A) In General
 15Ak681 Further Review
 15Ak683 k. Scope. Most Cited Cases

The Supreme Court sits in the same place as the superior court when reviewing a superior court's direct review of an administrative decision.

[5] Administrative Law and Procedure 15A 683

15A Administrative Law and Procedure
 15AV Judicial Review of Administrative Decisions

15AV(A) In General
 15Ak681 Further Review
 15Ak683 k. Scope. Most Cited Cases

The Supreme Court applies the same review to administrative decisions as the superior courts.

[6] Courts 106 251

106 Courts
 106VI Courts of Appellate Jurisdiction
 106VI(B) Courts of Particular States

106k251 k. Washington. Most Cited Cases
 Constitutional provision providing appellate jurisdiction in the Supreme Court over "all actions and proceedings" is not self-executing. West's RCWA Const. Art. 4, § 4.

[7] Electricity 145 8.4

145 Electricity
 145k8.4 k. Generating facilities in general. Most Cited Cases

Supreme Court would interpret word "shall" in review certification process under the Energy Facilities Site Locations Act (EFSLA) as permissive, as constitution prohibited the legislature from depriving the Supreme Court of its power to review a decision of the superior court; EFSLA stated that upon certification, "the supreme court shall assign the petition for hearing at the earliest possible date, and it shall expedite its review and decision in every way possible," and interpreting word "shall" as permissive did not require Supreme Court to accept certification but rather allowed the Supreme Court to determine whether or not to accept certification. West's RCWA Const. Art. 4, § 4; West's RCWA 80.50.140(1).

[8] Constitutional Law 92 990

92 Constitutional Law
 92VI Enforcement of Constitutional Provisions
 92VI(C) Determination of Constitutional Questions

92VI(C)3 Presumptions and Construction as to Constitutionality
 92k990 k. In general. Most Cited Cases

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The court may interpret the mandatory "shall" as permissive if it otherwise would render a statute unconstitutional.

[9] Electricity 145 ⚡8.4

145 Electricity

145k8.4 k. Generating facilities in general. Most Cited Cases

Supreme Court would accept certification from the superior court of petitions for review of governor's final determination to approve site certification agreement for location of wind turbines in county which had not authorized the turbine, where record was complete for review after supplementation, petitions involved fundamental and urgent interests, and the parties would likely seek review in the Supreme Court regardless of the superior court's decision. West's RCWA 80.50.140(1).

[10] Appeal and Error 30 ⚡840(1)

30 Appeal and Error

30XVI Review

30XVI(A) Scope, Standards, and Extent, in General

30k838 Questions Considered

30k840 Review of Specific Questions and Particular Decisions

30k840(1) k. In general. Most Cited Cases

The Supreme Court reviews the trial court's decision to limit testimony under a relevance standard, as that court received and evaluated the evidence in question.

[11] Administrative Law and Procedure 15A ⚡682

15A Administrative Law and Procedure

15AV Judicial Review of Administrative Decisions

15AV(A) In General

15Ak681 Further Review

15Ak682 k. Record. Most Cited Cases
 While appellate review of administrative de-

cisions is generally limited to the administrative record, the Supreme Court will look to the superior court record where that court has taken additional evidence necessary for review or has examined an issue not raised in the administrative record.

[12] Trial 388 ⚡57

388 Trial

388IV Reception of Evidence

388IV(A) Introduction, Offer, and Admission of Evidence in General

388k57 k. Number of witnesses. Most Cited Cases

A court may limit the amount of testimony that it will accept; the court's decision to receive testimony has practical limits.

[13] Electricity 145 ⚡8.4

145 Electricity

145k8.4 k. Generating facilities in general. Most Cited Cases

Superior court could limit testimony when supplementing the administrative record in connection with petitions for review of governor's final determination to approve site certification agreement for location of wind turbines; court permitted petitioners to supplement the record with declarations and deposition transcripts from the key people involved in allegations of procedural irregularities, and the testimony permitted by the court provided the petitioners with a sufficient record to make their allegations of impropriety against Energy Facility Site Evaluation Council (EFSEC) council members such that the only question remaining was a legal question as to whether council members' conduct amounted to a violation of law. West's RCWA 80.50.140(1).

[14] Electricity 145 ⚡8.4

145 Electricity

145k8.4 k. Generating facilities in general. Most Cited Cases

Supreme Court would consider governor's ap-

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proval under the Energy Facilities Site Locations Act (EFSLA) of a site certification agreement for the location of wind turbines as an adjudicative proceeding under the Administrative Procedures Act; as such, review included the process used in approving the certification. West's RCWA 34.05.570 (3), 80.50.100(2).

[15] Electricity 145 ⚡ 8.4

145 Electricity

145k8.4 k. Generating facilities in general. Most Cited Cases

Energy Facilities Site Locations Act (EFSLA) applies to energy facilities that exclusively use wind power such that Energy Facility Site Evaluation Council (EFSEC) had jurisdiction regarding location of wind turbine facilities. West's RCWA 80.50.060(2).

[16] Zoning and Planning 414 ⚡ 1033

414 Zoning and Planning

414I In General

414k1019 Concurrent or Conflicting Regulations; Preemption

414k1033 k. Other particular cases. Most Cited Cases

(Formerly 414k14)

Growth Management Act (GMA) did not supersede Energy Facility Site Evaluation Council's (EFSEC's) authority under the Energy Facilities Site Locations Act (EFSLA) to preempt county's land use decision in regard to wind turbine facility sites, as the EFSLA was a specific exemption to the general goals and procedures of the GMA, which did not expressly repeal EFSEC's preemption power. West's RCWA 36.70A.103, 80.50.060(2), 80.50.110(2).

[17] Statutes 361 ⚡ 223.2(1.1)

361 Statutes

361VI Construction and Operation

361VI(A) General Rules of Construction

361k223 Construction with Reference to

Other Statutes

361k223.2 Statutes Relating to the Same Subject Matter in General

361k223.2(1) Statutes That Are in Pari Materia

361k223.2(1.1) k. In general. Most Cited Cases

The court attempts to read statutes governing the same subject matter in pari materi.

[18] Statutes 361 ⚡ 223.4

361 Statutes

361VI Construction and Operation

361VI(A) General Rules of Construction

361k223 Construction with Reference to Other Statutes

361k223.4 k. General and special statutes. Most Cited Cases

Under the general-specific rule, a specific statute will prevail over a general statute.

[19] Statutes 361 ⚡ 223.4

361 Statutes

361VI Construction and Operation

361VI(A) General Rules of Construction

361k223 Construction with Reference to Other Statutes

361k223.4 k. General and special statutes. Most Cited Cases

Where the general statute, if standing alone, would include the same matter as the special act and thus conflict with it, the special act will be considered as an exception to, or qualification of, the general statute, whether it was passed before or after such general enactment.

[20] Statutes 361 ⚡ 223.4

361 Statutes

361VI Construction and Operation

361VI(A) General Rules of Construction

361k223 Construction with Reference to Other Statutes

361k223.4 k. General and special stat-

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utes. Most Cited Cases

If a general statute was enacted after a specific statute, the court will construe the original specific statute as an exception to the general statute, unless expressly repealed.

[21] Environmental Law 149E 604(4)

149E Environmental Law

149EXII Assessments and Impact Statements

149Ek598 Adequacy of Statement, Consideration, or Compliance

149Ek604 Particular Projects

149Ek604(4) k. Electricity, generation and transmission; nuclear. Most Cited Cases

Final environmental impact statement (FEIS) adequately considered the mitigation of the visual impact caused by wind turbine generator project under the Energy Facilities Site Locations Act (EFSLA), although it did not analyze specific turbine setback distances as a mitigation measure for the visual impact of the turbines, where FEIS carefully discussed the turbines' potential visual impacts in a 43-page section which indicated that locating turbines at greater distances from viewers reduced visual impact of those turbines and determined that the turbines had a greater impact on viewers the closer they are located to the viewer, and the FEIS specifically evaluated more than a dozen viewpoints, which accounted for the distance of the viewers from the turbines. West's RCWA 43.21C.030, 80.50.100(1); WAC 197-11-440(6).

[22] Environmental Law 149E 600

149E Environmental Law

149EXII Assessments and Impact Statements

149Ek598 Adequacy of Statement, Consideration, or Compliance

149Ek600 k. Consideration and disclosure of effects. Most Cited Cases

The Supreme Court evaluates the adequacy of a final environmental impact statement (FEIS) under the "rule of reason" standard; under that standard, a FEIS must present decisionmakers with a reasonably thorough discussion of the significant aspects

of the probable environmental consequences of the agency's decision. West's RCWA 34.05.570(3)(c, f).

[23] Environmental Law 149E 602

149E Environmental Law

149EXII Assessments and Impact Statements

149Ek598 Adequacy of Statement, Consideration, or Compliance

149Ek602 k. Mitigation measures. Most Cited Cases

A final environmental impact statement (FEIS) does not require inclusion of specific remedies of each environmental impact. West's RCWA 43.21C.030(c).

[24] Environmental Law 149E 579

149E Environmental Law

149EXII Assessments and Impact Statements

149Ek579 k. Purpose of assessments and statements. Most Cited Cases

The basic purpose for requiring a final environmental impact statement (FEIS) is to require local governments to consider total environmental and ecological factors to the fullest extent when taking major actions significantly affecting the quality of the environment. West's RCWA 43.21C.030(c).

[25] Environmental Law 149E 604(4)

149E Environmental Law

149EXII Assessments and Impact Statements

149Ek598 Adequacy of Statement, Consideration, or Compliance

149Ek604 Particular Projects

149Ek604(4) k. Electricity, generation and transmission; nuclear. Most Cited Cases

Energy Facility Site Evaluation Council's (EFSEC's) use of evidence outside of final environmental impact statement (FEIS), including expert testimony, in its final decision for certification of wind turbine project under the Energy Facilities Site Locations Act (EFSLA) did not render the FEIS inadequate; although FEIS was a critical eval-

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uative tool, State Environmental Policy Act (SEPA) did not require EFSEC to rely solely on the information contained in the FEIS when making its decision. West's RCWA 43.21C.030(c), 80.50.100(1).

[26] Administrative Law and Procedure 15A
 ⚡314

15A Administrative Law and Procedure

15AIV Powers and Proceedings of Administrative Agencies, Officers and Agents

15AIV(A) In General

15Ak314 k. Bias, prejudice or other disqualification to exercise powers. Most Cited Cases

The "appearance of fairness doctrine" provides that members of commissions with the role of conducting fair and impartial fact-finding hearings must, as far as practical, be open-minded, objective, impartial, free of entangling influences, capable of hearing the weak voices as well as the strong and must also give the appearance of impartiality.

[27] Administrative Law and Procedure 15A
 ⚡314

15A Administrative Law and Procedure

15AIV Powers and Proceedings of Administrative Agencies, Officers and Agents

15AIV(A) In General

15Ak314 k. Bias, prejudice or other disqualification to exercise powers. Most Cited Cases

The appearance of fairness doctrine applies only as far as practical to ensure fair and objective decision making by administrative bodies.

[28] Administrative Law and Procedure 15A
 ⚡473

15A Administrative Law and Procedure

15AIV Powers and Proceedings of Administrative Agencies, Officers and Agents

15AIV(D) Hearings and Adjudications

15Ak469 Hearing

15Ak473 k. Full, open and fair hearing. Most Cited Cases

The practicality of the appearance of fairness

will largely be determined by the procedures being applied.

[29] Electricity 145 ⚡8.4

145 Electricity

145k8.4 k. Generating facilities in general. Most Cited Cases

Department of Community, Trade and Economic Development (CTED) and Department of Natural Resources (DNR) were required by statute to participate on the Energy Facility Site Evaluation Council (EFSEC) such that their participation did not violate the appearance of fairness doctrine. West's RCWA 80.50.030(3)(a).

[30] Administrative Law and Procedure 15A
 ⚡473

15A Administrative Law and Procedure

15AIV Powers and Proceedings of Administrative Agencies, Officers and Agents

15AIV(D) Hearings and Adjudications

15Ak469 Hearing

15Ak473 k. Full, open and fair hearing. Most Cited Cases

The appearance of fairness does not protect constitutional rights.

[31] Electricity 145 ⚡8.4

145 Electricity

145k8.4 k. Generating facilities in general. Most Cited Cases

Energy Facility Site Evaluation Council (EFSEC) chairman did not violate the appearance of fairness doctrine in connection with site certification agreement for location of wind turbines in county, despite correspondence in which chairman advocated preemption of county zoning ordinance and letter to governor asking for clarification of comments about preemption in the siting process; county zoning ordinance clearly conflicted with EFSEC's jurisdiction such that EFSEC required applicant for site certification to seek compliance with the county before requesting preemption, and En-

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ergy Facilities Site Locations Act (EFSLA) specifically instructed the EFSEC to avoid costly duplication in the siting process, presumably through its preemption power. West's RCWA 80.50.010(5).

[32] Administrative Law and Procedure 15A
791

15A Administrative Law and Procedure
 15AV Judicial Review of Administrative Decisions

15AV(E) Particular Questions, Review of
 15Ak784 Fact Questions

15Ak791 k. Substantial evidence. Most Cited Cases

"Substantial evidence" is a sufficient quantity of evidence to persuade a fair-minded person of the truth or correctness of the order.

[33] Zoning and Planning 414 1033

414 Zoning and Planning

414I In General

414k1019 Concurrent or Conflicting Regulations; Preemption

414k1033 k. Other particular cases. Most Cited Cases

(Formerly 414k14)

Applicant for site certification under the Energy Facilities Site Locations Act (EFSLA) for wind turbine project demonstrated a good faith effort to resolve noncompliance issues with county zoning ordinance as required before Energy Facility Site Evaluation Council (EFSEC) could grant preemption of county ordinance; applicant actively participated in numerous hearings over a five-month period in an attempt to comply with ordinance requirements and submitted reports and presented expert testimony on the various impacts of the project, applicant made many substantial amendments to its original application in order to comply with the county code, only issue that remained in contention after efforts was residential setback distance, and applicant made several substantial concessions on that issue but finally determined that compliance with county setback requirement would

make project financially unviable, as it would reduce the project to approximately one-half of its original size. West's RCWA 80.50.090.

[34] Zoning and Planning 414 1033

414 Zoning and Planning

414I In General

414k1019 Concurrent or Conflicting Regulations; Preemption

414k1033 k. Other particular cases. Most Cited Cases

(Formerly 414k14)

Energy Facility Site Evaluation Council (EFSEC) evaluated alternate locations for proposed wind turbine project under the Energy Facilities Site Locations Act (EFSLA) as required before it could grant preemption of county ordinance restricting applicant's proposed project, although EFSEC did not focus on the state's energy needs but rather focused on alternatives available to applicant, as applicant was not required to address any alternatives that were not available to it in making a request for preemption. West's RCWA 80.50.090.

[35] Zoning and Planning 414 1033

414 Zoning and Planning

414I In General

414k1019 Concurrent or Conflicting Regulations; Preemption

414k1033 k. Other particular cases. Most Cited Cases

(Formerly 414k14)

Energy Facility Site Evaluation Council (EFSEC) adequately addressed the state's interest in providing abundant and affordable energy when preempting county zoning ordinance to allow cite certification applicant's wind turbine project under the Energy Facilities Site Locations Act (EFSLA). West's RCWA 80.50.090.

[36] Electricity 145 8.4

145 Electricity

145k8.4 k. Generating facilities in general. Most

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The Supreme Court considers the evaluation of the State's interest in providing abundant and affordable energy largely a matter of public interest, and affords great deference to Energy Facility Site Evaluation Council's (EFSEC's) expertise in that field.

****1157** Gregory L. Zempel, Kittitas County Prosecutor's Office, Neil Alan Caulkins, Jeffrey David Slothower, Attorney at Law, Ellensburg, WA, James Cortland Carmody, Velikanje Halverson PC, Yakima, WA, for Petitioners.

Kyle Joseph Crews, Attorney General's Office, William Berggren Collins, Darrel Lee Peeples, Attorneys at Law, Frederick Dee Gentry, Bean Gentry Wheeler & Peterzell, Narda D. Pierce, Benedict Garratt Pond & Pierce, PLLC, Olympia, WA, Timothy Laurence McMahan, Erin L. Anderson, Stoel Rives Law Firm, Portland, OR, Susan Elizabeth Drummond, Foster Pepper PLLC, Seattle, WA, for Respondents.

Susan Ackerman, Attorney at Law, Portland, OR, Kristopher Ian Tefft, Christian Michael McCabe, Association of Washington Business, Olympia, WA, Amicus Curiae on behalf of Association of Washington Business, Amicus Curiae on behalf of Northwest & Intermountain Power Producers Coalition.

Sara Patton, Northwest Energy Coalition, Seattle, WA, Amicus Curiae on behalf of Northwest Energy Coalition.

OWENS, J.

***283 NATURE OF THE CASE**

¶ 1 This case involves the State's authority to permit the construction and operation of wind turbines for energy production in the state without authorization from the county in which the turbines will be placed. Specifically, we consider both jurisdictional and substantive challenges arising from the governor's authority to site an energy facility

that exclusively uses wind power under the energy facilities site locations act (EFSLA), chapter 80.50 RCW.

¶ 2 Initially, we must determine whether this court has jurisdiction to review a petition certified from superior court. Under EFSLA, a party may file a petition in Thurston County Superior Court for review of the governor's decision to approve an energy facility site. Upon receiving ***284** the petition, but before taking its own review, that court will certify the petition to this court if it determines that the petition meets certain criteria. The main question regarding jurisdiction is whether this procedure violates article IV of our state constitution by vesting direct review in this court without requiring initial review by the superior court.

¶ 3 We hold that the certification procedure under EFSLA confers appellate jurisdiction on this court and therefore does not violate the constitution. We accept review of the certified petitions from the superior court.

****1158** ¶ 4 Having determined that this court has jurisdiction, we must address the various substantive challenges to EFSLA raised by Residents Opposed to Kittitas Turbines (ROKT), Kittitas County (County), and F. Steven Lathrop (collectively Petitioners). Petitioners argue that EFSLA does not authorize the governor to preempt county land use laws when siting a facility that exclusively uses wind power. Petitioners further argue that the State abused its authority in deciding whether to preempt county land use laws, that it violated the appearance of fairness doctrine, and that it failed to adequately consider an environmental impact statement. In addition, Petitioners urge this court to remand the case to the superior court for further fact finding on alleged procedural irregularities in the State's siting process. We reject all of Petitioners' claims and hold that the governor properly exercised her authority under EFSLA to approve the site certification for the wind energy project in this case.

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FACTS

I. Statutory Procedures

¶ 5 EFSLA governs the location, construction, and operation conditions of energy facilities in Washington. It creates a process for determining energy facility locations in the state. An application to construct an energy facility requires site certification, a binding agreement between the applicant and the State that conditions approval of an *285 energy facility location on the applicant's assured compliance with certain regulations related to the construction and operation of the facility. RCW 80.50.020(5). Site certification authorizes the applicant to construct and operate an energy facility in lieu of any other permit or document required by any other agency or subdivision. RCW 80.50.120(2), (3).

¶ 6 The legislature created the Energy Facility Site Evaluation Council (EFSEC) to administer the site certification process. RCW 80.50.030. EFSEC is a multiagency body comprised of representatives from various state agencies. RCW 80.50.030(3). A county in which an application has proposed an energy facility site also shall appoint a representative to EFSEC for consideration of that application. RCW 80.50.030(4). EFSEC receives and processes applications for site certification pursuant to its own adopted guidelines. RCW 80.50.040(2), (5), .071.

¶ 7 EFSLA expressly preempts energy facility certification decisions by other governmental entities. RCW 80.50.110(2). However, EFSEC must first hold a public hearing to determine whether a site certification application is consistent with the county land use plans and zoning laws. RCW 80.50.090(2). Furthermore, EFSEC must include conditions in a site certification to protect the interests of the local government or community affected by the proposed facility. RCW 80.50.100(1).

¶ 8 At the time it processed the application in this case, EFSEC had promulgated regulations governing how it would implement its preemption authority over local jurisdictions. Under these regula-

tions, if EFSEC determined that an energy facility site was not consistent with local land use or zoning laws, then the applicant had to make all reasonable efforts to resolve noncompliance with the local jurisdiction. Former WAC 463-28-030(1) (2004), *repealed by* Wash. St. Reg. 07-21-035 (Nov. 9, 2007). EFSEC would stay its own proceedings during the period that the applicant sought compliance with the local jurisdiction. Former WAC 463-28-030(2). The applicant could request preemption by *286 EFSEC after attempting to resolve noncompliance issues with the local jurisdiction. Former WAC 463-28-040 (1978), *repealed by* Wash. St. Reg. 07-21-035 (Nov. 9, 2007).

¶ 9 After processing an application, EFSEC must prepare a report for the governor recommending the disposition of the application within one year of receiving it. RCW 80.50.100(1). If EFSEC recommends that the governor approve the application, then it will provide a draft certification agreement to the governor. *Id.* The governor must either determine whether to approve or reject the draft certification or direct EFSEC to reconsider certain aspects of the draft certification. RCW 80.50.100(2)(a)-(c). If the governor directs reconsideration, EFSEC **1159 will revise the draft certification and resubmit the application to the governor. RCW 80.50.100(2)(c). The governor then must approve or reject the application. *Id.*

¶ 10 A party may file a petition for review of the governor's final decision in Thurston County Superior Court. RCW 80.50.140(1). That court will certify the petition to this court if it determines that the administrative record is complete and review can be made on the record, that the petition involves fundamental and urgent public interests, and that review by this court would likely be sought regardless of the decision in superior court. RCW 80.50.140(1)(a)-(d).

II. History of the Kittitas Valley Wind Power Project Application

¶ 11 In January 2003, Horizon Wind Energy, LLC (Horizon),^{FNI} through its subsidiary

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Sagebrush Power Partners, LLC, filed an application with EFSEC for site certification of the Kittitas Valley Wind Power Project (KVVPP or Project). The original Project proposed the construction of up to 121 wind turbine generators located along Highway 97, roughly halfway between Cle Elum and Ellensburg in Kittitas *287 County. Horizon allegedly chose this site because of the reliable wind resource and its proximity to several electrical transmission lines to which the turbines could connect.

FN1. Horizon originally filed its application under its former name, Zilkha Renewable Energy, LLC, but changed to Horizon after being acquired by Goldman Sachs.

¶ 12 The KVVPP consists of several turbine "strings" running along ridge tops over private and state owned land. Administrative Record (AR) at 52, 322 (map). Horizon obtained wind option agreements with all private landowners on whose property it would install turbines. It also negotiated a lease with the Department of Natural Resources (DNR) for use of state lands that consist of approximately one-fourth of the project site.

¶ 13 The Kittitas Board of County Commissioners (BOCC) appointed a representative to EFSEC for consideration of the Project. *See* RCW 80.50.030(4). The County also moved to intervene as an interested party in the adjudicative proceedings. EFSEC granted intervention status to the County, the Department of Community, Trade and Economic Development (CTED), ROKT, county resident Lathrop, and other parties before it held an adjudicative proceeding regarding the KVVPP application.

¶ 14 Lathrop filed a motion to disqualify DNR and CTED from participating as members of EFSEC based on the apparent interest that each department had in the KVVPP. Specifically, Lathrop alleged that CTED had conflicting interests in seeking party intervention to support the KVVPP application while holding a seat as a member of EF-

SEC. The County joined in Lathrop's motion to disqualify DNR from participating because DNR "owned" some of the project lands. AR at 2438, 2389 (acknowledging lease between DNR and Horizon). The representative of each department denied the motion to disqualify their respective departments from EFSEC. *See* RCW 34.05.425(3); AR at 2518-19 (Lathrop's petition for review of EFSEC order denying motion to disqualify).

¶ 15 EFSEC held a hearing in May 2003, at which the parties agreed that Horizon's application was not consistent with the Kittitas County Code (KCC). The County had recently enacted a Wind Farm Resource Overlay Zone *288 ordinance to require county approval of any "wind farm" location through a permitting process. AR at 461-62 (KCC 17.61A). The ordinance did not zone for wind farms but instead required applicants to apply for both a site-specific rezone as well as a site-specific amendment to the comprehensive plan in order to obtain a development permit.

¶ 16 EFSEC's regulations required Horizon to request preemption of the County's laws within 90 days of its decision. Former WAC 463-28-040. However, Horizon sought several extensions of that deadline in an attempt to seek compliance with the County's laws. In June 2003, Horizon submitted an application with the County seeking land use permits for the KVVPP. Over the next seven months, Horizon and the County attempted to site the Project in accordance with the KCC and reported on their progress **1160 to EFSEC. Ultimately, the parties could not reach agreement on compliance with the KCC.

¶ 17 In February 2004, Horizon filed a request for preemption. EFSEC scheduled an adjudicatory hearing for August 2004. After extensive briefing, Horizon and the County filed a joint motion to stay the hearing while the parties focused on another wind energy project application Horizon had filed with the County.^{FN2} In March 2005, Horizon suspended its request for preemption in order to continue to pursue land use consistency with the

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County. Later, Horizon withdrew its request for preemption altogether and refiled an application for land use permits with the County in its continuing efforts to obtain land use consistency with the KCC.

FN2. The County eventually approved Horizon's Wild Horse Wind Power Project, thereby obviating the need for preemption for that project.

¶ 18 The County received Horizon's new permit application in October 2005. ^{FN3} The application substantially reduced*289 the KVVPP from 121 turbines to a maximum of 80 turbines in order to comply with the KCC. In addition, the application proposed a 1,000-foot setback of turbines from any property owner not participating in the Project.

FN3. The application again required Horizon to apply for a development permit, which required a development agreement and a site-specific rezone of the County's existing zoning from Forest and Range and Agriculture to a Wind Farm Resource Overlay Zone. AR at 461-62, 6163-65. KCC 17.61A also required Horizon to apply for an amendment to the county comprehensive plan from a Rural designation to a Wind Resource Overlay District. AR at 461-62, 6163-65.

¶ 19 The County began review of the application on January 10, 2006, at a joint hearing of the County Planning Commission (Commission) and the BOCC. The Commission and the BOCC decided to bifurcate the proceedings whereby the Commission would hold public hearings and make its recommendation. Next, the BOCC would hold its own hearings on the same application.

¶ 20 Horizon made an opening presentation at the initial joint hearing, including extensive testimony and documentation on various issues involving the effect of the Project, including the visual effects, property values, noise impact, insurance

coverage, and "shadow flicker" ^{FN4} effect. AR 7230-80. The commissioners had the opportunity to question each of Horizon's experts. Horizon noted that through negotiation it had reduced the original project proposal from 120 turbines to 64.

FN4. Horizon's expert explained "shadow flicker" as "the alternating changes in light intensity caused by wind turbine blade as it passes through the sun's line of sight, causing a passing shadow." AR at 7271 (presentation by Andrew Young).

¶ 21 The Commission held three additional hearings on the application, during which it received public comment and additional testimony from Horizon. After the fourth public hearing on January 30, 2006, the Commission recommended to deny the application.

¶ 22 Next, the BOCC held a series of its own hearings on March 29 and 30, April 27, and May 3 and 31. During the course of these proceedings it became apparent that the main point of contention between the parties involved the setback requirements of the turbines from the nonparticipating properties. The commissioners asked Horizon why it would not consider a 2,000-foot setback that it understood would eliminate any shadow flicker effect, or a 2,640-5,280-foot*290 setback that would further decrease the visual impact. They also asked if Horizon would consider reorganizing the proposed locations for the 64 turbines within the Project in order to increase setbacks from properties.

¶ 23 Regarding shadow flicker, Horizon explained that the effect diminishes over distance and disappears at 2,000 feet. Horizon stated that the 1,000-foot setback would adequately mitigate the shadow flicker. Horizon also indicated that the 1,000-foot setback represented a "self-imposed" international standard that related to the mitigation of noise impact. AR at 7837-38, 8135, 8275. Horizon pointed out that requiring a 2,000-foot setback would require it to eliminate rather than mitigate

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the effect.

¶ 24 Horizon further explained that it reduced the number of turbines almost by one-half of the original proposal in order to mitigate the visual impact. It pointed out that most of the turbines it proposed to eliminate **1161 were located around the periphery of the Project in order to enhance viewpoints. Based on the commissioners' requests, Horizon sent a letter to the BOCC on April 25, 2006, proposing to increase the setback distance from nonparticipating property owners to 1,320 feet. Horizon suggested any further setback requirement would render the Project "economically [un]viable." AR at 8275-76.

¶ 25 The BOCC again addressed the setback issue at a hearing on May 3, 2006. Based on his own personal observations of an existing wind turbine project, one commissioner suggested that the appropriate setback distance should be between 2,000 feet and 3,300 feet. Another commissioner proposed a 2,500-foot setback requirement based on his own observations at the same site. The third commissioner proposed a setback distance of 3,000 feet, based on his observations of noise and "looming" impact of the existing site. AR at 8151.

¶ 26 In response to the BOCC's suggestions, Horizon reiterated that the proposed setback of 2,500 feet would render the Project unviable. Horizon sent a letter to the BOCC on May 15, 2006, indicating that a setback requirement*291 between 2,000 feet and 3,000 feet would require it to eliminate an additional 43 percent of the already reduced Project.

¶ 27 On May 19, Horizon sent a letter to the County requesting clear direction as to which commissioner's setback standard to apply when attempting to reconfigure the Project. At a hearing on May 31, the County stated that it was not prepared to provide a specific setback requirement for the Project. Horizon claimed that the Project would not be economically viable if it were reduced in accordance with the BOCC's proposals. Horizon indicated

that a 2,000-foot setback from nonparticipating property lines would require Horizon to remove all but 15-20 turbines, which it concluded was not viable. Horizon also asserted that a 2,500-foot setback from nonparticipating residence structures similarly would reduce the project in half. The BOCC scheduled yet another meeting for June 6, 2006, at which time it formally denied the application.

¶ 28 After the BOCC denied its application, Horizon filed a second request for preemption with EFSEC. EFSEC conducted a series of adjudicative and public hearings in Kittitas County regarding Horizon's application and the preemption of the KCC. After the hearings, EFSEC voted six to one, with the county representative dissenting, to preempt the KCC and to recommend approval of the site certification. EFSEC issued a proposed site certification agreement and sent the recommendation to the governor. The proposed agreement provided for a setback requirement at a distance of four times the height of a turbine. ^{FN5}

FN5. For example, a 330-foot turbine (measured from the tip of the blade at its highest point) would require a 1,320-foot setback and a 440-foot turbine would require a 1,640-foot setback. AR at 11306.

¶ 29 The governor directed EFSEC to reconsider the proposed site certification agreement. The governor based her decision "solely ... on the need to determine on this particular Project whether additional setbacks beyond the four times height (4xh) requirement for non-participating *292 landowners are achievable while allowing the Project to remain economically viable." AR at 11390.

¶ 30 EFSEC held another public hearing on the issues of setbacks and viability. It purposefully avoided inquiry into economic viability because such a matter was beyond its statutory authority to provide environmental and ecological guidelines. Furthermore, EFSEC determined that additional setback requirements could not resolve the objec-

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tions of the 16 nonparticipating residents affected by the proposed locations. It concluded that the residents' objections could be satisfied only by cancellation of the Project, which presumably would be economically unviable. However, it did offer that Horizon could "micro-sit[e]" the location of the turbines with the "highest possible consideration" for the nonparticipating residents. AR at 14339-40. EFSEC sent its determination back to the governor with a proposed amendment to include the "micro-siting" process. AR at 11862-63. The governor accepted EFSEC's response and approved the site certification agreement.

****1162 III. Procedural History**

¶ 31 Petitioners filed petitions for review of the governor's final determination in Thurston County Superior Court.^{FN6} Petitioners alleged that EFSEC could not preempt county laws regarding the siting of a wind powered energy facility, that EFSEC's members violated the appearance of fairness doctrine, and that EFSEC's decision to preempt the County was not supported by substantial evidence.

FN6. The court consolidated the petitions.

¶ 32 EFSEC filed a motion to certify the petitions to this court pursuant to RCW 80.50.140. ROKT opposed the motion and claimed certain procedural irregularities in the administrative proceedings that were discovered after those proceedings. The County also alleged that EFSEC Chairman Jim Luce exhibited bias in favor of Horizon's application. The superior court allowed the parties to submit declarations and allowed Petitioners to take the depositions*293 of Chairman Luce and EFSEC member Chris Towne. The court found the declarations and depositions to be consistent and denied any further discovery or testimony. The court then determined that certification was warranted under RCW 80.50.140. The court supplemented the record with the additional testimony and certified the petitions to this court.

¶ 33 Petitioners have challenged this court's jurisdiction to review the petitions directly. The

court clerk requested additional briefing on the issue of jurisdiction and scheduled this case for oral argument on the merits as well as the jurisdictional issue.

ANALYSIS

I. Jurisdictional Issues

A. *The Certification Procedures Established in RCW 80.50.140 Do Not Violate Article IV of the State Constitution*

[1] ¶ 34 Petitioners challenge our jurisdiction to accept the superior court's certification of the petitions for review. Specifically, Petitioners contend that certification procedures under EFSLA violate article IV of the state constitution by conferring unauthorized original jurisdiction upon this court.

[2] ¶ 35 EFSLA authorizes judicial review of the governor's final decision on an application for a site certification. A petition for review must be filed in Thurston County Superior Court. RCW 80.50.140(1). That court shall certify the petition directly to this court if the court determines that certain conditions are met:

(a) Review can be made on the administrative record;

(b) Fundamental and urgent interests affecting the public interest and development of energy facilities are involved which require a prompt determination;

(c) Review by the supreme court would likely be sought regardless of the determination of the Thurston county superior court; and

*294 (d) The record is complete for review.

Id. These conditions facially limit certification to cases that do not require fact-finding or discovery. If the superior court determines that review cannot be limited to the administrative record because of procedural irregularities in the record, the court must take testimony and determine such fac-

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tual issues in question before certifying the petition to this court. *Id.* EFSLA instructs that review of the final administrative decision is made in accord with the procedures of the Washington Administrative Procedure Act (APA), chapter 34.05 RCW. RCW 80.50.140(1).^{FN7}

FN7. While such authorization may seem redundant as the APA provides the exclusive means of judicial review of agency action, the governor is not an “[a]gency” under the APA. RCW 34.05.010(2). Therefore, the power to review the governor's decision derives from EFSLA, not the APA.

¶ 36 Petitioners claim that RCW 80.50.140 violates article IV of the state constitution by attempting to expand this court's original jurisdiction. Article IV, section 4 provides, “[t]he supreme court shall have original jurisdiction**1163 in habeas corpus, and quo warranto and mandamus as to all state officers, and appellate jurisdiction in all actions and proceedings” where the amount in controversy does not exceed \$200. CONST. art. IV, § 4. Petitioners assert that the plain language of section 4 does not provide this court with original jurisdiction over the type of action in this case, but rather vests original jurisdiction in the superior courts under article IV, section 6. *Br. of Pet'rs ROKT & Lathrop* at 21.^{FN8}

FN8. EFSEC argues that article II, section 26 authorizes the legislature to determine in what courts suits against the State may be brought. *Br. of Resp'ts EFSEC & Gregoire* at 8-9. However, this provision relates to state immunity and does not directly address appellate and original jurisdiction. That section has traditionally been interpreted to determine in which county the state may be sued.

¶ 37 The review under EFSLA, however, invokes the superior court's appellate, not original, jurisdiction. This court has consistently held that a

right of direct review in superior court of an administrative decision invokes the limited appellate jurisdiction of the court. *Union Bay Pres. Coal. v. Cosmos Dev. & Admin. Corp.*, 127 Wash.2d 614, 617, 902 P.2d 1247 (1995); *295 *Mader v. Health Care Auth.*, 149 Wash.2d 458, 468, 70 P.3d 931 (2003); *Fay v. Nw. Airlines, Inc.*, 115 Wash.2d 194, 197, 796 P.2d 412 (1990). While the constitution does not expressly provide for appellate jurisdiction of agency action in superior court, this court has recognized that the superior courts have inherent authority to review administrative decisions for arbitrary and capricious action under the discretionary writ of certiorari. *Saldin Sec., Inc. v. Snohomish County*, 134 Wash.2d 288, 292, 949 P.2d 370 (1998); *Pierce County Sheriff v. Civil Serv. Comm'n*, 98 Wash.2d 690, 694, 658 P.2d 648 (1983); *Bridle Trails Cmty. Club v. City of Bellevue*, 45 Wash.App. 248, 251-52, 724 P.2d 1110 (1986) (“This review by ‘constitutional’ or ‘common law’ certiorari is not full appellate review on the merits.” (footnote omitted)); CONST. art. IV, § 6 (recognizing power of superior courts to issue writs). Allowing only limited appellate review over administrative decisions, rather than original or appellate jurisdiction as a matter of right, “serves an important policy purpose in protecting the integrity of administrative decisionmaking.” *King County v. Wash. State Boundary Review Bd.*, 122 Wash.2d 648, 668, 860 P.2d 1024 (1993).

[3] ¶ 38 The legislature may confer such limited appellate review by statute. *Union Bay*, 127 Wash.2d at 617, 902 P.2d 1247; *City of Seattle v. Pub. Employment Relations Comm'n*, 116 Wash.2d 923, 926, 809 P.2d 1377 (1991); *Deschenes v. King County*, 83 Wash.2d 714, 716, 521 P.2d 1181 (1974). For example, we have recognized that the review procedures established under the APA create appellate jurisdiction in the superior court, which requires compliance with all statutory procedural requirements before such jurisdiction is properly invoked. *Union Bay*, 127 Wash.2d at 617-18, 902 P.2d 1247.

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[4][5] ¶ 39 As the superior court asserts appellate jurisdiction to review administrative decisions, the certification of a petition for review of an administrative decision likewise invokes this court's appellate jurisdiction. Indeed, this court sits in the same place as the superior court when reviewing a superior court's direct review of an administrative decision. *296 *Heinmiller v. Dep't of Health*, 127 Wash.2d 595, 601, 903 P.2d 433, 909 P.2d 1294 (1995) (citing *Tapper v. Employment Sec. Dep't*, 122 Wash.2d 397, 402, 858 P.2d 494 (1993)). We apply the same review to administrative decisions as the superior courts. *Farm Supply Distribs., Inc. v. Utils. & Transp. Comm'n*, 83 Wash.2d 446, 448, 518 P.2d 1237 (1974) ("Each level of the judiciary actually reviews administrative decisions in an appellate capacity."). EFSLA's certification procedures do not change the nature of the jurisdiction used to review the administrative decision. In fact, the certification procedures further limit this court's review by requiring that the superior court determine all factual issues related to alleged procedural irregularities before certifying the petition to this court. RCW 80.50.140(1).

[6] ¶ 40 Article IV vests general appellate jurisdiction in this court. The plain language of the constitution provides appellate jurisdiction in this court over "all actions **1164 and proceedings." CONST. art. IV, § 4. As this provision is not self-executing, the legislature may properly confer appellate jurisdiction on this court. See *Robison v. La-Forge*, 170 Wash. 678, 679, 17 P.2d 843 (1932) ("The provision of our constitution, Art. IV, § 4, conferring the right of appeal, is not self-executing, but receives its vitality from legislative enactment."); *Kreidler v. Eikenberry*, 111 Wash.2d 828, 836, 766 P.2d 438 (1989). Therefore, our review of the administrative decision in this case is properly within our appellate jurisdiction.

¶ 41 Petitioners rely on *North Bend Stage Line, Inc. v. Department of Public Works*, 170 Wash. 217, 16 P.2d 206 (1932), in which this court struck down a statute that attempted to authorize direct re-

view in this court of an order of the Department of Public Works. The court held that review of the department's order constituted original rather than appellate jurisdiction. *Id.* at 222, 16 P.2d 206. The court opined that " 'all actions and proceedings' " in article IV, section 4 means jurisdiction over decisions "of a purely judicial nature, which have been determined in some judicial court established by the constitution or in pursuance *297 thereof." *Id.* Such jurisdiction did not include review of the department's order.

¶ 42 The court went on to explain that the constitution vested superior courts with original jurisdiction over " 'such special cases and proceedings as are not otherwise provided for.' " *Id.* at 225, 16 P.2d 206 (quoting *Winsor v. Bridges*, 24 Wash. 540, 547, 64 P. 780 (1901) (quoting CONST. art. IV, § 6)). Therefore, the legislature could not create jurisdiction over such matters in the supreme court as a matter of right to the extent that it would deprive the superior court of its exclusive jurisdiction. FN9 The court concluded that the statute in question violated article IV because it created a right to seek direct review of the department's order in this court, which necessarily deprived the superior court of its original jurisdiction. FN10 *Id.* at 227-28, 16 P.2d 206.

FN9. The parties do not raise and therefore we take no position on the issue of whether article IV actually prohibits the legislature from expanding the jurisdiction of this court where such expansion does not infringe on the exclusive jurisdiction of another court. See *In re Elliott*, 74 Wash.2d 600, 604, 446 P.2d 347 (1968) ("[T]he state constitution is a limitation upon the actions and powers of the legislature, instead of a grant of power. So far as the power of the legislature is not limited by the constitution, it is unrestrained.").

FN10. Petitioners also rely on *Department of Highways v. King County Chapter*, 82 Wash.2d 280, 510 P.2d 216 (1973), but

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mainly for its citations to *North Bend* in dicta. The holding in *Department of Highways* involved only an issue of statutory construction. The court held that the APA's procedures regarding direct review of agency actions controlled over another statute that permitted direct review to the Court of Appeals. After determining that the review procedure created by statute did not permit direct review of an administrative decision in the Court of Appeals, the court expressly declined not to reach the question of whether the legislature may provide for direct review of an administrative decision to the Court of Appeals. *Id.* at 287, 510 P.2d 216 ("Nor are we faced with the question whether the legislature may provide for an appeal direct to the Court of Appeals from an administrative decision and thus oust the superior court of original jurisdiction to review decisions of inferior tribunals.").

¶ 43 *North Bend* is distinguishable from the present case. Unlike the statute at issue in *North Bend*, EFSLA creates a right of direct review in superior court, not this court. As discussed above, such review invokes the superior court's appellate jurisdiction. Therefore, EFSLA does not invoke this court's original jurisdiction.

¶ 44 Furthermore, the *North Bend* court did not address the certification procedure at issue here. While the *298 certified petition does not present this court with review of a "purely judicial" decision, the certification procedure under RCW 80.50.140 merely provides a vehicle through which the superior court transfers cases of limited appellate jurisdiction to this court. We already have a rule that permits the Court of Appeals to take direct review of a final decision by an administrative agency. RAP 2.1(c). This rule permits direct review of an agency decision by the Court of Appeals under the procedures of the APA. RCW 34.05.518(2). The criteria for certification to the Court of Appeals

closely resemble the procedures established under EFSLA.^{FN11}

FN11. Pursuant to RCW 34.05.518(2):

The superior court may certify a case for direct review only if the judicial review is limited to the record of the agency proceeding and the court finds that:

(a) Fundamental and urgent issues affecting the future administrative process or the public interest are involved which require a prompt determination;

(b) Delay in obtaining a final and prompt determination of such issues would be detrimental to any party or the public interest;

(c) An appeal to the court of appeals would be likely regardless of the determination in superior court; and

(d) The appellate court's determination in the proceeding would have significant precedential value.

**1165 ¶ 45 Similarly, we have long asserted our own authority to review cases transferred from the Court of Appeals. RAP 4.4; *see* RCW 2.06.030 (authorizing the transfer of a case from the Court of Appeals in order to promote the "orderly administration of justice"). We also have upheld the statutorily created procedure for this court to accept certified questions from federal courts. *In re Elliott*, 74 Wash.2d 600, 604-05, 446 P.2d 347 (1968); *see* Federal Court Local Law Certificate Procedure Act, ch. 2.60 RCW. Because the superior court can certify direct review to the Court of Appeals under RAP 2.1(c) and this court can transfer a case from the Court of Appeals, RAP 4.4, this court already possesses the authority to apply direct review of final decisions of administrative agencies.

[7] ¶ 46 *299 On the other hand, the certification process under RCW 80.50.140 differs from the

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other certification procedures described above by suggesting that this court must review a petition certified from the superior court. That section provides that "[u]pon certification, the supreme court *shall* assign the petition for hearing at the earliest possible date, and it *shall* expedite its review and decision in every way possible." RCW 80.50.140(1) (emphasis added). This language is problematic because the constitution prohibits the legislature from depriving this court of its power to review a decision of the superior court. *Saldin Sec.*, 134 Wash.2d at 295-96, 949 P.2d 370 ("statutory limitation of judicial review cannot interfere with the court's constitutionally inherent power of review."). Under RCW 80.50.140(1), the superior court decides whether a petition meets certain criteria before certifying the case to this court. RCW 80.50.140(1)(a)(d). The legislature cannot deprive this court of its authority to review the superior court's decision to certify the case.

[8] ¶ 47 In order to avoid this apparent constitutional infirmity, we construe the mandatory "shall" under RCW 80.50.140 as permissive, in accord with this court's constitutional power to review a decision of the superior court. We may interpret the mandatory "shall" as permissive if it otherwise would render a statute unconstitutional. *Elliott*, 74 Wash.2d at 607, 446 P.2d 347 ("The word 'shall' must also be construed as permissive when the statute can thereby be upheld, if a construction to the contrary could render it unconstitutional." (quoting 82 C.J.S. *Statutes* § 380, at 882 (1953))). In *Elliott*, this court recognized that "even if the statute is intended to be imperative it will be construed as discretionary because the statute is subject to the implied limitations of the constitution as a matter of construction." *Id.* at 608, 446 P.2d 347. Under this permissible construction, RCW 80.50.140 does not require us to accept certification from the superior court, and we may determine whether or not to accept certification. This simply recognizes the constitutional limitations on the legislature's power and does not otherwise limit the legislative intent under EFSLA.

¶ 48 *300 We hold that the certification procedures under RCW 80.50.140 properly invoke this court's appellate jurisdiction. Furthermore, we hold that the procedures do not require us to accept certification from the superior court, and we retain the discretion to accept or decline certification from that court.

B. The Superior Court Properly Certified this Case for Review

[9] ¶ 49 Having determined that we have jurisdiction to review the certified petitions, we must decide whether to accept certification**1166 from the superior court. The superior court decided that the petitions met the four conditions under RCW 80.50.140(1) and certified the petitions to this court. As the trial court's decision to certify invokes this court's own discretion to accept jurisdiction, we review the superior court's decision de novo. See *Crosby v. Spokane County*, 137 Wash.2d 296, 301, 971 P.2d 32 (1999) ("The issue whether a court has jurisdiction is a question of law subject to de novo review.").

[10][11] ¶ 50 The superior court initially determined that review could be made on the administrative record, RCW 80.50.140(1)(a), because Petitioners had alleged procedural irregularities in the application process. Under RCW 80.50.140(1), if the court determines that review cannot be limited to the administrative record because of alleged irregularities in the administrative procedures, then it shall "take testimony and determine such factual issues raised by the alleged irregularities" before certifying the petition for review. Petitioners allege that the superior court erred in certifying the petitions because the superior court "failed to take the requisite testimony and make factual determinations" regarding their allegations of procedural irregularities. Br. of Pet'rs ROKT & Lathrop at 24. We review the trial court's decision to limit testimony under a relevance standard as that court received and evaluated the evidence in question. *Roberts v. Atl. Richfield Co.*, 88 Wash.2d 887, 893, 568 P.2d 764 (1977). While appellate *301 review

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of administrative decisions is generally limited to the administrative record, we will look to the superior court record where that court has taken additional evidence necessary for review or has examined an issue not raised in the administrative record. *See Waste Mgmt. of Seattle, Inc. v. Utils. & Transp. Comm'n*, 123 Wash.2d 621, 633-34, 869 P.2d 1034 (1994).

¶ 51 The substance of the alleged irregularities relate to Petitioners' claims that Chairman Luce engaged in a conflict of interest and improper ex parte communications and exhibited bias in favor of EFSEC's preemption authority. The court granted Petitioners the ability to supplement the record with the declarations and depositions obtained through discovery in order to support their allegations of irregularity. The court reviewed the evidence produced and found no material disputed issue of fact that would require further evidentiary hearings. The court did not make a specific finding of procedural irregularity but determined that the record was complete for this court's substantive review of Petitioners' allegations. The court entered an order to supplement with the testimony for certification.

[12] ¶ 52 A court may limit the amount of testimony that it will accept. The court's decision to receive testimony has practical limits. *Roberts*, 88 Wash.2d at 893, 568 P.2d 764 ("The elements by which relevancy is measured include whether the testimony would have a tendency to mislead, distract, waste time, confuse or impede the trial, or be too remote either as to issues or in point of time."). Given the court's authority to limit testimony on relevance grounds, we do not believe the court acted outside its discretion.

¶ 53 The court permitted Petitioners to supplement the record with declarations and deposition transcripts from the key people involved in the allegations. Declarations and depositions constitute testimony. BLACK'S LAW DICTIONARY 1514 (8th ed. 2004) ("[T]estimony" means "[e]vidence that a competent witness under oath or affirmation gives at trial or in an affidavit or deposition.");

*302 *Hohnsbehn v. Bd. of Trustees of Police Pension Fund*, 304 Ill.App.3d 564, 568, 711 N.E.2d 323, 238 Ill.Dec. 220 (1999) ("The word 'testimony' means much more than mere in-person testimony at the hearing." (citing BLACK'S LAW DICTIONARY 1476 (6th ed.1990))). Therefore, RCW 80.50.140(1) did not require the superior court to conduct an evidentiary hearing or to allow Petitioners' to conduct in-court interrogation of witnesses.

¶ 54 The testimony permitted by the court provided Petitioners with a sufficient record to make their allegations of impropriety against the EFSEC council members. Petitioners argue that they were entitled to take more testimony, but do not assert that they need to present additional facts in order to support their claims. The factual issues giving rise to their claim are documented in the supplemental record. The supplemental record **1167 establishes the acts taken by the EFSEC council members. The only question remaining is whether such conduct amounts to a violation of law as alleged by Petitioners. This is a purely legal question that can be determined from the existing record. Taking additional testimony is not required for such a decision and would only waste time. Therefore, the court did not err in limiting the testimony to the declarations and depositions.

[13] ¶ 55 Upon supplementing the record, the court determined that the record was complete for review in satisfaction of RCW 80.50.140(1)(d). The court went on to determine the remaining criteria under RCW 80.50.140(1). The court found that the petition involved fundamental and urgent interests under RCW 80.50.140(1)(b). We agree. The legislature has recognized public interests in providing energy at a reasonable cost, RCW 80.50.010(3), and avoiding costly duplication in the siting process and ensuring that decisions are made timely and without unnecessary delay, RCW 80.50.010(5). Such public interests are present in this case, requiring prompt review. Petitioners question the State's authority to site energy facilities under EF-

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SLA, which has been in effect for over 30 years. A delay in finally determining such authority will result in uncertainty for all existing and pending siting projects. Such uncertainty could lead to delay in the construction and operation of *303 energy facilities and ultimately restrict the availability of energy at reasonable costs in the state.

¶ 56 The superior court also determined that the parties would likely seek review in this court regardless of its determination. RCW 80.50.140(c). Again, we agree. The stakes in this case are high, pitting the jurisdiction of a multidepartment state council against county jurisdiction over siting energy facilities. The winner gets control over the siting of energy facilities. Whoever lost in superior court would have great motivation to seek review in this court in order to preserve its jurisdiction.

¶ 57 We hold that the testimony taken in superior court sufficiently supplemented the record for effective review by this court and does not require us to remand for further fact-finding on alleged procedural irregularities. We further hold that the petitions for review meet the conditions under RCW 80.50.140(1), and therefore we accept certification from the superior court. We will review Petitioners' substantive claims on the record certified by the superior court.

III. Substantive Issues

A. Scope of Review under the APA

[14] ¶ 58 Petitioners raise several challenges regarding the authority and propriety of the State's decision to preempt the County's land use laws in order to site an energy facility. Before reaching Petitioners' substantive claims, we must determine the scope of our review of that decision. EFSLA creates a right of judicial review of the "final decision" made on an application for site certification, pursuant to the procedures of the APA. RCW 80.50.140(1). However, that section does not define whether the final decision relates only to the governor's actual decision itself or also includes review of the

administrative process followed by EFSEC in making its recommendation to the governor.

¶ 59 The governor makes the very last decision on an application for certification, which simply requires her to *304 approve or reject the application in her discretion. RCW 80.50.100(2). However, EFSLA provides no guidelines or procedures for how the governor may exercise her discretion to finally approve or reject the application. Therefore, if review were limited to the actual last decision made, there would essentially be nothing to review.

¶ 60 As EFSLA does not determine the scope of review, we look to the APA for guidance. Under the APA, the approval of a site certification falls within the definition of a "[l]icense." RCW 34.05.010(9)(a). " 'Licensing' includes the agency process respecting the issuance ... of a license." RCW 34.05.010(9)(b). Licensing focuses on the process or procedures used by the issuing agency. In addition, an "[a]djudicative proceeding" includes "all cases of licensing ... in which the granting of an application [for a license] is contested by a person having **1168 standing to contest under the law." RCW 34.05.010(1). Therefore, we consider the governor's approval of the certification as an "[a]djudicative proceeding" under the APA. As such, this court's review should include the process used in approving the certification.

¶ 61 The APA provides standards for reviewing orders issued in adjudicative proceedings. RCW 34.05.570(3). While EFSEC did not technically issue an order after holding its public hearing, EFSLA required EFSEC to conduct the hearing as an adjudicative proceeding. RCW 80.50.090(3). Under the APA, review of adjudicative proceedings is limited to the following concerns:

- (a) The order, or the statute or rule on which the order is based, is in violation of constitutional provisions on its face or as applied;
- (b) The order is outside the statutory authority or jurisdiction of the agency conferred by any

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provision of law;

(c) The agency has engaged in unlawful procedure or decision-making process, or has failed to follow a prescribed procedure;

(d) The agency has erroneously interpreted or applied the law;

*305 (e) The order is not supported by evidence that is substantial when viewed in light of the whole record before the court, which includes the agency record for judicial review, supplemented by any additional evidence received by the court under this chapter;

(f) The agency has not decided all issues requiring resolution by the agency;

....

(h) The order is inconsistent with a rule of the agency unless the agency explains the inconsistency by stating facts and reasons to demonstrate a rational basis for inconsistency; or

(i) The order is arbitrary or capricious.

RCW 34.05.570(3). This list governs the scope of our review of Petitioners' substantive claims. We address each claim individually.

B. EFSLA Governs the Siting of an Energy Facility that Exclusively Uses Wind Power

[15] ¶ 62 Petitioners claim that EFSLA does not confer jurisdiction on EFSEC to preempt the County's land use and zoning laws regarding the siting of wind energy facilities. This issue falls within RCW 34.05.570(3)(b), regarding the statutory authority or jurisdiction of an agency.

¶ 63 By its very terms, EFSLA applies to an energy facility that exclusively uses wind power, regardless of generating capacity. EFSLA defines the scope of energy facilities covered by the statute. It expressly applies "to the construction, reconstruction, or enlargement of a new or existing en-

ergy facility that *exclusively uses alternative energy resources* and chooses to receive certification under this chapter, regardless of the generating capacity of the project." RCW 80.50.060(2) (emphasis added). The "alternative energy resources" language was added in 2001. Laws of 2001, ch. 214, § 2. The same year, the legislature defined "[a]lternative energy resource" as "(a) Wind; (b) solar energy; (c) geothermal energy; (d) landfill gas; (e) wave or tidal action; or (f) biomass energy based on solid organic *306 fuels from wood, forest, or field residues, or dedicated energy crops." RCW 80.50.020(18). The KVVPP proposes to use wind energy to generate electricity and therefore falls within the plain meaning of RCW 80.50.060(2). *See Dep't of Ecology v. Campbell & Gwinn, LLC*, 146 Wash.2d 1, 9-10, 43 P.3d 4 (2002) ("[I]f the statute's meaning is plain on its face, then the court must give effect to that plain meaning as an expression of legislative intent.").

¶ 64 Petitioners take a different view. Their interpretation would have us look to the definition of an "energy facility" as defining the scope of projects covered under EFSLA because RCW 80.50.060(2) applies to an "energy facility that exclusively uses alternative energy resources." (Emphasis added.) In their view, any facility that uses an alternative energy resource still must fit within the meaning of an energy facility, as defined under EFSLA.

**1169 ¶ 65 EFSLA defines an "[e]nergy facility" as "an energy plant or transmission facilities." RCW 80.50.020(11). The definition for a "[t]ransmission facility" is totally inapplicable here. RCW 80.50.020(7). EFSLA defines an "[e]nergy plant" as one of five kinds of facilities distinguished by the kind of energy used and the output generated. RCW 80.50.020(15)(a)-(e). Subsection (a) refers to a thermal power plant, subsections (b) and (d) refer to facilities that use natural gas, and subsections (c) and (e) refer to facilities that use petroleum. The definition makes no reference to any of the "[a]lternative energy re-

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source[s]' ” defined in RCW 80.50.020(18).

¶ 66 Petitioners' reading of RCW 80.50.060(2) would exclude at least wind and wave action projects from coverage under EFSLA. Under Petitioners' reading, RCW 80.50.060(2) would limit an energy facility that exclusively uses alternative resources to a facility that uses thermal, petroleum, or natural gas. While several of the alternative energy resources enumerated in RCW 80.50.020(18) arguably could fit into the meaning of thermal power, resources such as wind and wave action would not.

¶ 67 *307 We cannot accept Petitioners' interpretation as it would render meaningless the legislature's explicit inclusion of wind as an alternative energy resource, as well as any other alternative energy that was not a thermal, gas, or petroleum based energy resource. The definition of an energy facility that uses alternative energy resources must apply to those alternative energy resources expressly defined in EFSLA in order to give the statute meaning. *State v. J.P.*, 149 Wash.2d 444, 450, 69 P.3d 318 (2003). EFSLA instructs that the definitions section applies throughout the statute “unless the context clearly requires otherwise.” RCW 80.50.020. The context of RCW 80.50.060(2) clearly requires that an “energy facility that exclusively uses alternative energy resources” applies to a wind energy facility.^{FN12}

FN12. Furthermore, the legislature amended the definition section in 2007 to indicate that alternative energy resources apply beyond the strict definitional limits of an energy facility. EFSLA now defines a “[s]ite” as “any proposed or approved location of an energy facility, alternative energy resource, or electrical transmission facility.” RCW 80.50.020(4); LAWS of 2007, ch. 325, § 1.

¶ 68 Petitioners argue that the phrase “alternative energy resources” must relate to the existing definition of an energy facility because RCW 80.50.060(2) exempts such resources from the out-

put requirements for energy facilities under RCW 80.50.020(11), (15). However, our interpretation does not render meaningless the last phrase of RCW 80.50.060(2). The exemption from any output requirement simply makes clear the legislature's intent to apply EFSLA's siting procedures to all alternative energy projects. The language expressly defines the scope of coverage rather than implying the scope of coverage by silence. In other words, the legislature intended to be as clear as possible that no alternative energy project would be too small for EFSLA's siting process.

¶ 69 We hold that EFSLA applies to energy facilities that exclusively use wind power. As such, EFSLA governs the KVVWPP application.

**308 C. The Growth Management Act Did Not Supersede EFSEC's Preemption Authority under EFSLA*

[16] ¶ 70 Petitioners argue that EFSEC could not exercise its preemption authority over the County because the Growth Management Act (GMA), chapter 36.70A RCW, required EFSEC to comply with the County's comprehensive land use plan and regulations. Respondents EFSEC and Sagebrush contend that the GMA did not repeal EFSLA, and therefore the specific preemption authority under EFSLA governs over the GMA. Review of this issue also falls within RCW 34.05.570(3)(b).

¶ 71 EFSLA provides that “[t]he state hereby preempts the regulation and certification of the location, construction, and operational conditions of certification of the energy facilities included under RCW 80.50.060 as now or hereafter amended.” RCW 80.50.110(2). As discussed above, RCW 80.50.060(2) includes energy facilities that use alternative energy resources, including wind **1170 power. EFSEC relied on this authority to preempt the County's land use laws in this case.

¶ 72 Twenty years after enacting EFSLA, the legislature enacted the GMA in order to coordinate and plan economic growth and development among communities, local governments, and corporations.

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RCW 36.70A.010. The legislature amended the GMA in 2002 to recognize the importance of protecting rural lands and economies. RCW 36.70A.011. The GMA requires that “[s]tate agencies shall comply with the local comprehensive plans and development regulations and amendments thereto adopted pursuant to this chapter except as otherwise provided in [provisions under chapter 71.09 RCW].” RCW 36.70A.103. Petitioners contend that this language supersedes and therefore governs over the preemption language in EFSLA.

[17] ¶ 73 We attempt to read statutes governing the same subject matter in *pari materia*. *Hallauer v. Spectrum Props., Inc.*, 143 Wash.2d 126, 146, 18 P.3d 540 (2001) (“Such statutes ‘must be construed together.’ ” (internal quotation *309 marks omitted) (quoting *In re Pers. Restraint of Yim*, 139 Wash.2d 581, 592, 989 P.2d 512 (1999))). However, these two statutes present an apparent contradiction. A state agency cannot both preempt local laws and comply with such laws at the same time.

[18][19][20] ¶ 74 Fortunately, the rules of statutory construction provide a way to resolve this tension. Under the general-specific rule, a specific statute will prevail over a general statute. *Wark v. Wash. Nat'l Guard*, 87 Wash.2d 864, 867, 557 P.2d 844 (1976) (“It is the law in this jurisdiction, as elsewhere, that where concurrent general and special acts are in *pari materia* and cannot be harmonized, the latter will prevail, unless it appears that the legislature intended to make the general act controlling.”). As this court recognized in *Wark*, “It is a fundamental rule that where the general statute, if standing alone, would include the same matter as the special act and thus conflict with it, the special act will be considered as an exception to, or qualification of, the general statute, whether it was passed before or after such general enactment.” *Id.*; see *State v. Conte*, 159 Wash.2d 797, 803, 154 P.3d 194, *cert. denied*, 552 U.S. 992, 128 S.Ct. 512, 169 L.Ed.2d 342 (2007). Furthermore, if the general statute was enacted after the specific statute, this court will construe the original specific statute as

an exception to the general statute, unless expressly repealed. *Wark*, 87 Wash.2d at 867, 557 P.2d 844 (“If it was passed before the general statute, the special statute will be construed as remaining an exception to its terms, unless it is repealed by express words or by necessary implication.”); *State ex rel. Dep't. of Pub. Serv. v. N. Pac. Ry. Co.*, 200 Wash. 663, 668, 94 P.2d 502 (1939) (“‘It is elementary that a general statute or rule, though subsequently enacted or promulgated, does not affect a special statute or rule.’ ” (quoting *In re W. Barton St. Sewer*, 163 Wash. 645, 647, 1 P.2d 858 (1931))).

¶ 75 Applying the general-specific rule to statutes at issue, EFSLA represents the specific statute and the GMA represents the general one. EFSLA governs a discrete and *310 specific function of certifying sites for the construction and operation of energy facilities. On the other hand, the GMA applies to the comprehensive planning and management of land within counties and cities. RCW 36.70A.040. Therefore, EFSLA can be properly read as a specific exception to the general goals and procedures of the GMA.

¶ 76 The GMA does not expressly repeal EFSEC's preemption power under RCW 80.50.110(2). The GMA provides that the State maintains “authority to site any other essential public facility under RCW 36.70A.200 in conformance with local comprehensive plans and development regulations adopted pursuant to chapter 36.70A RCW.” RCW 36.70A.103. RCW 36.70A.200(1) requires a county's comprehensive plan to include a process for siting “essential public facilities,” which it refers to as airports, schools, transportation, correctional, waste, inpatient, substance abuse, mental health, group home, and transitional facilities. The GMA makes no mention of an energy facility nor gives any express indication that the legislature intended to repeal EFSEC's preemption power to site energy facilities.

**1171 ¶ 77 The regulations adopted by CTED pursuant to the GMA further support this conclu-

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sion. The legislature designated CTED with the authority to promulgate regulations implementing the GMA. RCW 36.70A.190(4)(b). The legislature also assigned CTED to provide administrative and staff support for EFSEC. RCW 80.50.030(2)(b). CTED's duties under both statutes give it a unique and authoritative perspective of the relationship between EFSLA and the GMA. We afford deference to such an agency's rules. *Green River Cmty. Coll. Dist. No. 10 v. Higher Educ. Personnel Bd.*, 107 Wash.2d 427, 438, 730 P.2d 653 (1986) (“[A] heightened degree of deference is appropriate where the agency's construction of a statute is within the agency's field of expertise.”).

¶ 78 Within its authority to promulgate the regulations for the GMA, CTED recognized that its regulations “should accommodate situations where the state has explicitly preempted all local land use regulations, as for example, in *311 the siting of major energy facilities under RCW 80.50.110.” WAC 365-195-745(1). Therefore, CTED expressly recognizes that the GMA must be read in conformity with EFSLA.^{FN13} This recognition confirms our interpretation that the GMA does not supersede or repeal EFSEC's preemption powers under EFSLA.

FN13. In 2006, the legislature amended EFSLA in conformity with CTED's interpretation. EFSLA now expressly requires EFSEC to determine whether a project is consistent with laws adopted under the GMA as the initial step in the preemption analysis. Under RCW 80.50.090(2), EFSEC must hold “a public hearing to determine whether or not the proposed [project] is consistent and in compliance with city, county, or regional land use plans or zoning ordinances” before making its decision to preempt such laws. The 2006 amendment specifically added the GMA to the definitions for “[l]and use plan” and “[z]oning ordinance.” RCW 80.50.020(16), (17).

D. The Final Environmental Impact Statement Adequately Considered the Mitigation of Visual Impact Caused by the KVVPP

[21][22] ¶ 79 The County argues that EFSEC violated the State Environmental Policy Act (SEPA), chapter 43.21 C RCW, by producing an inadequate final environmental impact statement (FEIS) for consideration of the KVVPP application. Review of this issue falls within RCW 34.05.570(3)(c), (f). This court evaluates the adequacy of a FEIS under the “rule of reason” standard. *Klickitat County Citizens Against Imported Waste v. Klickitat County*, 122 Wash.2d 619, 633, 860 P.2d 390, 866 P.2d 1256 (1993). Under this standard, a FEIS “must present decisionmakers with a ‘reasonably thorough discussion of the significant aspects of the probable environmental consequences’ of the agency's decision.” *Id.* (citing *Cheney v. City of Mountlake Terrace*, 87 Wash.2d 338, 344-45, 552 P.2d 184 (1976) (quoting *Trout Unlimited v. Morton*, 509 F.2d 1276, 1283 (9th Cir.1974))).

[23][24] ¶ 80 The County alleges that the FEIS is deficient because it does not analyze specific turbine setback distances as a mitigation measure for the visual impact of the turbines. The County notes that WAC 197-11-440(6) mandates that the “[a]ffected environment, significant impacts, *312 and mitigation measures” section of a FEIS discuss reasonable measures that would significantly mitigate significant environmental impacts of the project and indicate the intended environmental benefits of those mitigation measures. However, a FEIS does not require inclusion of specific remedies of each environmental impact. The basic purpose for requiring a FEIS is “to require local governments to consider total environmental and ecological factors to the fullest extent when taking ‘major actions significantly affecting the quality of the environment.’ ” *Wash. State Boundary Review Bd.*, 122 Wash.2d at 659, 860 P.2d 1024 (quoting *Lassila v. City of Wenatchee*, 89 Wash.2d 804, 813, 576 P.2d 54 (1978) (quoting RCW 43.21C.030(c))).

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¶ 81 The FEIS establishes the elementary fact that greater distances mitigate the visual impact of turbines. The FEIS submitted for the KVVPP carefully discusses the turbines' potential visual impacts in a 43-page section. AR at 10065-107. That section clearly indicates that locating turbines at greater distances from viewers reduces visual impact of those turbines. It determines that the turbines have a greater impact on viewers the **1172 closer they are located to the viewer. AR at 10066 (designating 0.5 miles or fewer "[h]igh" viewer sensitivity, 0.5 to 5 miles "[m]oderate," and greater than 5 miles "[l]ow."); AR at 10096-97 (noting that certain turbines would be "highly visible" because viewers would see them at "relatively close range"). The FEIS specifically evaluated more than a dozen viewpoints, which accounted for the distance of the viewers from the turbines. *See* AR at 10073-99.

¶ 82 The FEIS does not violate the "rule of reason" merely because it does not list "moving turbines away from every possible viewpoint" as a potential mitigation measure. The FEIS served its function of presenting "decisionmakers with a 'reasonably thorough discussion' " of the visual impact of the project. *Klickitat County*, 122 Wash.2d at 633, 860 P.2d 390 (quoting *Cheney*, 87 Wash.2d at 344-45, 552 P.2d 184). Therefore, we hold that the FEIS did not fail to address the mitigation of visual impact of the KVVPP.

[25] ¶ 83 *313 EFSEC's use of evidence outside the FEIS in its final certification decision does not render the FEIS inadequate. The County points out that EFSEC eventually approved a setback of four times turbine height, relying on testimony from the applicant's expert. County's Opening Br. at 40-41. The County takes issue with the fact that such a setback distance was not specifically discussed in the FEIS. FEIS's are critical evaluative tools for decision makers, but nothing in SEPA requires decision makers to rely solely on the information contained in the FEIS's when making decisions. The FEIS here was adequate, and EFSEC used it properly.

E. EFSEC Members DNR, CTED, and Chairman Luce Did Not Violate the Appearance of Fairness Doctrine

¶ 84 Petitioners allege that participation by DNR and CTED on EFSEC violated the appearance of fairness doctrine. Petitioners also allege that Chairman Luce violated the doctrine by engaging in ex parte communications and making biased statements in favor of EFSEC's preemption authority. Review of this issue falls within RCW 34.05.570 (3)(c) for engaging in unlawful decision making or failing to follow prescribed procedures.

[26][27][28] ¶ 85 The appearance of fairness doctrine provides that "[m]embers of commissions with the role of conducting fair and impartial fact-finding hearings must, as far as practical, be open-minded, objective, impartial, free of entangling influences, capable of hearing the weak voices as well as the strong and must also give the appearance of impartiality." *Narrowsview Pres. Ass'n v. City of Tacoma*, 84 Wash.2d 416, 420, 526 P.2d 897 (1974). The doctrine applies only "as far as practical" to ensure fair and objective decision making by administrative bodies. *Id.* The practicality of the appearance of fairness will largely be determined by the procedures being applied.

[29] ¶ 86 Petitioners claim that DNR violated the doctrine by participating on EFSEC when it had a financial interest in the KVVPP. This claim relates to the fact that DNR leased *314 state land to Horizon as part of the Project. Petitioners further claim that CTED violated the doctrine by participating on EFSEC while participating as a party intervenor in the site certification application process. Before reaching the substance of these allegations, we must first determine if the doctrine applies to the participation of the departmental seats created by EFSLA.

[30] ¶ 87 The appearance of fairness does not protect constitutional rights.^{FN14} *City of Bellevue v. King County Boundary Review Bd.*, 90 Wash.2d 856, 863, 586 P.2d 470 (1978) ("Our appearance of fairness doctrine, though related to concerns deal-

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ing with due process considerations, is not constitutionally based.”). Therefore, the fairness of a decision-making body is measured by how the legislature chose to structure the administrative body.

FN14. The heading of the ROKT brief on this issue claims “EFSEC Violated Established Appearance of Fairness and Due Process Requirements of Fair and Impartial Hearing.” Br. of Pet’rs ROKT & Lathrop at 25. However, its entire argument is premised on the appearance of fairness doctrine, without any mention of the constitution or due process.

¶ 88 DNR and CTED participated on EFSEC by statutory mandate. **1173RCW 80.50.030(3)(a) provides that “[t]he council *shall* consist of ... (iii) Department of community, trade, and economic development; ... (v) Department of natural resources.” (Emphasis added.) Therefore, the legislature intended for DNR and CTED to participate on the council and EFSEC does not have the authority to determine its own membership. The appearance of fairness doctrine does not override the legislature’s decision to include these agencies on EFSEC.

¶ 89 The legislature did not intend to exclude interested parties from sitting on EFSEC. The legislature provided a right for a county to appoint a representative to EFSEC when it considered an application located in that county. RCW 80.50.030(4). Without question, any county in which an energy facility is proposed would have a great interest in the decision whether to preempt the county’s authority to site such a facility. Indeed, in this case, the County appointed*315 a representative to EFSEC and later intervened as an interested party. The presence of the County on EFSEC demonstrates that the legislature envisioned EFSEC to include a variety of perspectives and interested parties in the decision-making process. We will not disturb the legislature’s decision.

¶ 90 Of course, the appearance of fairness doctrine certainly can be used to challenge an individu-

al’s participation as an administrative decision maker. EFSLA does not mandate the appointment of a particular *person* by DNR or CTED. However, Petitioners do not challenge the individual representatives of DNR or CTED that sat on the council.

FN15

FN15. During EFSEC’s proceedings, Petitioners moved for disqualification of DNR and CTED. EFSEC followed the procedures of the APA and determined not to disqualify either member. RCW 34.05.425(3). Petitioners do not seek review of that determination.

[31] ¶ 91 Petitioners allege that Luce himself violated the appearance of fairness on several grounds related to correspondence that they discovered after the application process had been completed. Petitioners point to an e-mail sent from Luce on February 24, 2004, which they claim indicated his bias and prejudice in this case. Ex. 14 to Dep. of Luce (Jan. 18, 2008). However, Petitioners merely parse out words from this document without explaining their meaning in context. For example, the County refers to Luce’s comments that the KCC “ ‘circumvented’ ” and “ ‘subverted’ ” EFSEC, “and so warranted preemption.” County’s Opening Br. at 15; Ex. 14 to Dep. of Luce. Petitioners fail to explain how these comments allegedly show bias or prejudice.

¶ 92 The record indicates that the KCC Wind Farm Resource Overlay Zone ordinance clearly conflicted with EFSEC’s jurisdiction, which is the very reason why EFSEC required Horizon to seek compliance with the County before requesting preemption. Furthermore, the County simply refers to a comment made by Luce characterizing the County’s position as “ ‘very unpersuasive,’ ” but the County *316 fails to explain anything about the context in which that comment was made. County’s Opening Br. at 15. The superior court provided Petitioners the opportunity to depose Luce regarding these comments to allow Petitioners to follow up on their claims of bias and partiality. This court need not in-

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dulge Petitioners in searching for any bias or prejudice in these comments.

¶ 93 Petitioners cite to another e-mail sent by Luce in which he wrote, "if we don't preempt we are effectively out of business as a 'State siting Council.'" Ex. 8 to Dep. of Luce. In his deposition, Luce explained that the facts of this case so clearly required preemption as authorized under EFSLA that if it did not preempt the County, then EFSEC would not be following its legislative mandate and should close down. Dep. of Luce at 36-37. Such comments accurately reflect the law under which EFSEC was created. RCW 80.50.010(5) specifically instructs EFSEC to avoid costly duplication in the siting process, presumably through its preemption power. Petitioners' other examples of bias are similarly unpersuasive. *See, e.g.,* County's Opening Br. at 15-16 (indicating Luce's belief that the County's Wind Farm Resource Overlay Zone ordinance " 'improperly usurps and unnecessarily duplicates EFSEC's statutory role in the siting of energy facilities and ... must therefore be ****1174** preempted' " (alteration in original) (quoting Ex. 1 to Dep. of Luce at 69)). This does not show any bias against the County.

¶ 94 Petitioners also claim that Luce violated the doctrine by engaging in ex parte communications with the governor, counsel for Horizon (Darrell Peeples), and a representative for party Renewable Northwest Project (RNP). The allegations relate to comments made by the governor at the dedication of a previously sited wind project in Kittitas County. Dep. of Luce at 17-20. Those comments were interpreted in a newspaper editorial as reflecting the governor's general policy about preemption in the siting process. Luce expressed concern to the governor's office that her remarks at the dedication needed clarification based on ***317** the editorial. *Id.* at 20. Luce admitted that he sent a proposed draft letter to the governor. *Id.* at 115. Peeples and a representative of RNP asked Luce for a copy of any written clarification from the governor if she made it. *Id.* at 17-18. When the gov-

ernor wrote a letter to Luce explaining her position on preemption, Luce distributed it at EFSEC's regular public meeting. He also sent a copy to Peeples and RNP as requested. *Id.* Luce denied that Peeples ever asked him to contact the governor or that Peeples requested that the governor clarify her position. *Id.* at 20.

¶ 95 This unremarkable exchange suggests no bias or prejudice. A simple request for a document that was made public does not indicate any impermissible ex parte communication. The communication did not relate to any proceeding regarding Horizon's application.

¶ 96 We hold that the participation by DNR and CTED, as statutorily mandated members of EFSEC, did not violate the appearance of fairness doctrine. Furthermore, we hold that Petitioners have presented no evidence in the administrative record and evidence produced in the superior court to show that Luce violated the appearance of fairness doctrine. Furthermore, Petitioners do not argue that further discovery or evidentiary hearings in the superior court would make an adequate showing of bias or prejudice.

F. Substantial Evidence Supports EFSEC's Decision To Grant Horizon's Request for Preemption

[32] ¶ 97 ROKT argues that EFSEC's decision to preempt the KCC is unsupportable under EFSLA and EFSEC's own regulations. This court may review the decision to determine if it is "supported by evidence that is substantial when viewed in light of the whole record before the court." RCW 34.05.570 (3)(e). "[S]ubstantial evidence is 'a sufficient quantity of evidence to persuade a fair-minded person of the truth or correctness of the order.'" *City of Redmond v. Cent. Puget Sound Growth Mgmt. Hearings Bd.*, 136 Wash.2d 38, 46, 959 P.2d 1091 (1998) (quoting *Callecod v. Wash. State Patrol*, 84 Wash.App. 663, 673, 929 P.2d 510 (1997)).

¶ 98 ***318** EFSLA requires EFSEC to determine if an application complies with a local government's land use laws. RCW 80.50.090. If not, EF-

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SEC's rules (at the time of the KVVPP application) required the applicant to make all reasonable efforts to resolve the noncompliance. Former WAC 463-28-030(1). EFSEC would stay its own proceedings while the applicant sought compliance with the local government. Former WAC 463-28-030(2). The applicant had to submit regular reports to EFSEC regarding the status of negotiations with the local government. Former WAC 463-28-030(3). ROKT does not allege that Horizon did not meet these requirements.

¶ 99 If the applicant reported that efforts to resolve the noncompliance were not successful, then it could file a request for preemption. Former WAC 463-28-040. The request had to address the following issues:

(1) That the applicant has demonstrated a good faith effort to resolve the noncompliance issues.

(2) That the applicant and the local authorities are unable to reach an agreement which will resolve the issues.

(3) That alternate locations which are within the same county and city have been reviewed and have been found unacceptable.

(4) Interests of the state as delineated in RCW 80.50.010.

****1175** *Id.* In this case, Horizon requested preemption with EFSEC, addressing all four issues. After conducting a series of hearings, EFSEC entered an order recommending that the governor approve Horizon's application. The order included findings of fact and conclusions of law on Horizon's request for preemption.

[33] ¶ 100 ROKT contends that Horizon did not demonstrate good faith in its four-year negotiations with the County. Specifically, ROKT asserts that Horizon "had absolutely no interest in finding any level of compromise with Kittitas County." Br. of Pet'rs ROKT & Lathrop at 46.

¶ 101 In its order recommending approval, EFSEC recognized that its rule contained no definition of good faith. It ***319** went on to determine that good faith includes a showing that (1) the applicant worked as extensively as possible to resolve inconsistencies, up to the point where further negotiations would be futile, and (2) reasonable compromises have been explored by both sides. In addition, it determined that good faith did not require resolution of all disputes. Applying this standard, EFSEC determined that Horizon demonstrated good faith.

¶ 102 We believe that EFSEC properly applied its standard in finding that Horizon acted in good faith in trying to resolve its noncompliance with the KCC. The KCC Wind Farm Resource Overlay Zone ordinance required Horizon to apply for site-specific exceptions to both the County zoning ordinance and comprehensive plan and to seek approval from two county boards. Horizon actively participated in numerous hearings over a five-month period in an attempt to comply with the ordinance requirements. Horizon submitted reports and presented expert testimony on the various impacts of the Project. Such extensive participation facially demonstrates good faith negotiation.

¶ 103 The record does not support ROKT's claim that Horizon had no interest in finding compromise with the County. The parties engaged in extensive negotiations with both County boards, through which Horizon made many substantial amendments to its original application in order to comply with the KCC. Indeed, even ROKT asserts that "[f]rom the time it first filed its Application, the Applicant had been constantly modifying the scope of the project, the location and number of turbines, and the terms and conditions to which it agrees to be bound." Br. of Pet'rs ROKT & Lathrop at 62. This does not indicate a failure to seek a compromise. Instead, it supports EFSEC's finding that Horizon made continuous attempts to accommodate the County's concerns. The "modifications" referred to by ROKT directly relate to Horizon's

proposals to reduce the size of the Project in order to mitigate the noise and visual effects of the Project.

¶ 104 *320 In the end, the only issue that remained in contention was the setback distance of the turbines from nonparticipating resident properties. *See id.* at 48 (referring to setbacks as “the central issue at the County level”).^{FN16} At a height of over 400 feet, the BOCC and County residents expressed concern over the visual and noise impact the KVVWPP would have on the affected properties.

FN17

FN16. As EFSEC's order recommending preemption states, “[a]lthough the BOCC does not explicitly state as much in Resolution 2006-90, it would appear to the Council that the BOCC concluded that the proposed Project complied with the County's Wind Farm [Resource] Overlay [Zone] Ordinance in nearly all respects, excepting concerns for height, visual impacts and shadow flicker effects.” AR at 1472 (Council Order No. 826, at 16 n. 33).

FN17. Indeed, the very thought of such imposing structures across the landscape conjures up one of the most enduring literary scenes. “‘It is very evident,’ answered Don Quixote, ‘that thou art not versed in the business of adventures: they are giants: and, if thou art afraid, get thee aside and pray, whilst I engage with them in fierce and unequal combat.’” Miguel De Cervantes Saavedra, *Don Quixote De La Mancha* 59 (Motteux, Jarvis, & Smollett rev. trans., New York: D. Appleton & Co. 1863) (1605).

¶ 105 Horizon made several substantial concessions on this issue. As mentioned, Horizon offered a sizable reduction of the Project from 120 turbines to 45-60 turbines in order to accommodate the County's concerns. In addition, Horizon offered to increase its proposed setback distance from **1176

1,000 feet to 1,320 feet from nonparticipating residents in order to alleviate the County's concerns over noise and visual effects of the turbines. The BOCC proposed various alternative distances from 2,000 feet to 3,000 feet based largely on each commissioner's personal observations at an existing wind project site. The record reflects that Horizon attempted to address each proposal that was made and followed up with responses in correspondence with the County and at later meetings with the BOCC.

¶ 106 Ultimately, Horizon testified that an increase in setbacks to a distance of 2,500 feet would force Horizon to reduce the Project in half. Horizon claimed that such a drastic reduction would make the Project economically unviable. The BOCC requested that Horizon offer some economic data to show at what size the Project would lose viability. Horizon responded by explaining that it could not *321 reduce the Project within the BOCC's proposals because such a reduction would decrease Horizon's chances to sell the energy in a highly competitive utilities market. When Horizon did not provide the BOCC with its financial information, the BOCC denied the application.

¶ 107 ROKT argues that Horizon did not seek a compromise as to the setback distance because it refused to provide any economic data to support its assertion that further setbacks from 1,320 feet would render the Project economically unviable. However, EFSEC determined that it would not require Horizon to disclose such information because economic analysis was beyond its expertise. EFSLA requires EFSEC to develop environmental and ecological guidelines regarding energy facility siting. RCW 80.50.040(2). As economic analysis does not relate to environmental or ecological concerns, we believe EFSEC was within its authority to refuse to review the economic viability of the KVVWPP. Furthermore, we believe that Horizon presented a sufficient explanation that reducing the Project to over one-half of its original size would substantially decrease its chances to sell electricity.

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[34] ¶ 108 ROKT also argues that EFSEC did not properly evaluate alternative locations under its third criterion for preemption. EFSEC determined that no alternative site would satisfy the requirements for the KVVPP. ROKT argues that EFSEC applied the wrong standard for review of this issue by focusing on alternatives available to Horizon, rather than focusing on the State's energy needs. Br. of Pet'rs ROKT & Lathrop at 65. However, the criteria under former WAC 463-28-040 referred to issues that the applicant must address. It would be unreasonable to require Horizon to address any alternatives that were not available to it in making a request for preemption.

[35][36] ¶ 109 Lastly, ROKT claims that EFSEC did not properly evaluate the fourth criterion relating to the State's interest in siting energy facilities. The record indicates that EFSEC adequately addressed the fourth criterion regarding the State's interests. We consider the evaluation of the *322 State's interest in providing abundant and affordable energy largely a matter of public interest, and we afford great deference to EFSEC's expertise in this field. *Hillis v. Dep't of Ecology*, 131 Wash.2d 373, 396, 932 P.2d 139 (1997); *Schuh v. Dep't of Ecology*, 100 Wash.2d 180, 187, 667 P.2d 64 (1983).

¶ 110 Based on our review of this record, including the numerous public hearings and correspondence between Horizon and the County, we hold that substantial evidence supports EFSEC's conclusion to recommend preemption based on the criteria under former WAC 463-28-040.

CONCLUSION

¶ 111 We have appellate jurisdiction to review administrative decisions and we accept review of this case pursuant to the certification procedures established under RCW 80.50.140. Applying the review standards under the APA, we hold that EFSLA governs the siting of wind energy facilities and that EFSEC's preemption power does not violate the GMA. Furthermore, we hold that the FEIS produced in this case adequately considered the

mitigation of visual impacts for the Project. We also hold that EFSEC members did not violate the appearance of fairness doctrine. And finally, we hold that substantial evidence supports EFSEC's decision**1177 to preempt the County's land use and zoning laws. For these reasons, we affirm the governor's final decision to approve the KVVPP site certification application.

WE CONCUR: STEPHENS, C. JOHNSON, MADSEN, SANDERS, CHAMBERS, FAIRHURST, J. JOHNSON, JJ., and BROWN, J.P.T.

Wash., 2008.

Residents Opposed to Kittitas Turbines v. State Energy Facility Site Evaluation Council (EFSEC)
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END OF DOCUMENT

Wind Energy Technology



photo of Judith Gap Wind Project by Pat Judge

Harnessing the wind for our power is cost-competitive today. The region has a good start in developing wind projects, but we could be doing much more with very little effort.



[Potential](#) · [Cost](#) · [Economic Benefits](#) · [How It Works](#) ·
[System Integration](#) · [Environmental Impacts](#) ·
[Incentive Programs](#) · [More Information](#)

[Download this Wind fact sheet here.](#) (536kB PDF file)

Wind energy resources in the Northwest

	Potential	Installed Capacity
Oregon	7,991 aMW	((place PHP code here))
Washington factor	7,078 aMW	((place PHP code here))
Idaho	5,594 aMW	((place PHP code here))
Montana factor	116,438 aMW	((place PHP code here))
Resource type:		Variable, predictable
Capacity factor:		28-36%
Real levelized cost (2006\$):		4-7¢/kWh
Construction lead time:		1-3 years
<i>MW = Megawatts (capacity),</i>		
<i>aMW = average MW</i>		

sources: see endnote 1.

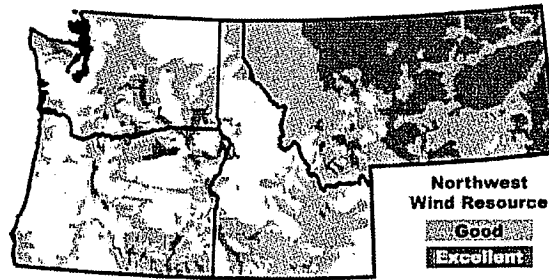
Potential

As the above table shows, the Pacific Northwest has the potential to generate over 137,000 aMW of electricity from wind power. This is enough to provide nearly four times the current electricity consumption in the region. The majority of the region's

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potential wind resources are in Montana, which alone has enough potential wind resources to supply one quarter of the electricity needs of the United States.²

Nearly 2,300 MW of nameplate wind power capacity is currently generated at Northwest wind farms and projects currently in development could triple that figure over the next several years.³ Texas leads the United States in wind development with over 4,350 MW of currently installed capacity each. California, has nearly 2,500 MW of installed capacity and Colorado, Minnesota, and Iowa are also making rapid investments in wind power, with over 1,000 MW currently in service in each state.⁴

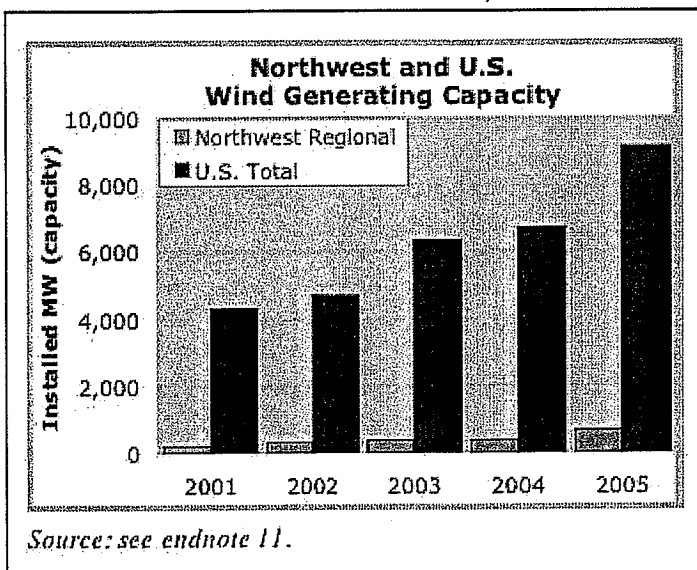


Between 2001 and 2007, the U.S. wind generating capacity expanded at a remarkable rate of 49% per year on average. By the end of 2007, the U.S. had over 16,800 MW of wind capacity online, enough to power over 1.5 million homes for the entire year!⁵

However, Europe currently remains far ahead of the U.S. in wind development, with 56,535 MW of wind capacity online as of the end of 2007.⁶

Cost

Advances in technology and increased experience have made wind power competitive with many traditional sources of electricity, especially when factoring in risk factors for traditional generation resources such as fuel volatility and future environmental regulation. The price of wind-generated electricity has decreased approximately 90% from the early 1980s; modern wind farms now generally have leveled costs in the range of 4-7 cents per kilowatt-hour over the life of a project (excluding any tax credits) making them competitive with many new coal or natural gas facilities. Costs for individual projects vary and depend on the strength and consistency of the wind, financing terms, and transmission



infrastructure. All else being equal, the cost effectiveness of wind farms generally increases with the turbines' capacity factor, the size of the turbines, and number of turbines installed.⁷

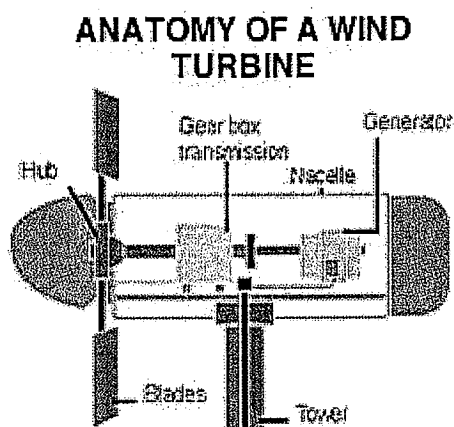
Economic Benefits

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Tapping our domestic wind resources brings a host of economic benefits. Since the strongest wind resources are often located in rural areas, rural counties and landowners can benefit from wind power. Wind farms are capital intensive, infusing money into the local economy during construction phases and paying property taxes to the host county and royalties to local landowners during operation. At the 24 MW Klondike Phase I Wind Farm in Sherman County, Oregon, the wind project contributes 10% of the county's property tax base. Wind turbines are also compatible with rural land uses like farming and ranching and can provide extra income to property owners via power sales or royalty payments. On average, landowners make between \$2,000 and \$7,000 annually for each modern wind turbine located on their land.

In contrast, a natural gas plant drains an estimated \$200,000-\$350,000 per MW of capacity out of the regional economy annually for fuel imports. Additionally, wind energy produces 27% more jobs per kilowatt-hour than coal plants, and 66% more jobs than natural gas plants.⁹

Wind energy is clearly a homegrown energy source that strengthens the economy and increases the nation's energy security.



Source: see endnote 8

How it Works

Turbine blades, modeled after airplane wings, rotate due to a pressure differential caused by air moving over the surface of the blade. The blades cause a rotor to turn, which drives an electrical generator. Turbines can adjust so that they always face toward the wind.

Wind turbines can be designed to operate either at variable speeds or at a single, fixed speed. The variable speed designs are more complex but they convert wind power into electricity more efficiently.

Most wind turbines are designed to use wind blowing anywhere from 8 to 56 mph. Sizes for new U.S. utility-scale turbines for onshore sites range from 850 kW to 2.5 MW and turbines rated 3.5 MW and larger are being used in offshore wind projects.

System Integration

While variable, wind energy can be integrated into a utility system using existing load-matching capabilities for a minimal cost of 0-0.5 cents/kWh.¹⁰ Weather forecasting can predict wind power output with a fair degree of confidence. Additionally, multiple wind sites in different locations can be combined to create a relatively stable power supply curve.

Environmental Impacts

Wind turbines generate electricity without producing any pollutant emissions. In contrast, fossil fuel plants emit toxic mercury, nitrous oxides that cause smog, sulfur dioxide that causes acid rain and large quantities of carbon dioxide, the main greenhouse gas. Although wind is one of the most benign power sources, if not properly sited, it too may have environmental impacts. Wildlife and avian impacts are

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often the greatest concern. New tower, blade and turbine designs and careful siting help minimize environmental impacts.

Incentive Programs

The federal production tax credit offers an important tax credit to new wind production. Each state in the region offers several additional incentives for wind development, from residential projects to utility-scale developments. Oregon, for example, provides personal and business tax credits and low-cost financing for renewable energy projects, while Washington provides small wind turbine owners a strong production incentive and grants sales tax exemptions for renewable energy equipment. Idaho offers a residential tax deduction and a sales tax exemption for renewable energy systems as well as low-interest loans for small-scale wind installations and state-backed bonds for utility-scale wind projects. Finally, Montana offers corporate income and property tax incentives and a residential tax credit for renewable energy installations. Additional incentives are offered as well.



More Information

- National Renewable Energy Laboratory: www.nrel.gov/wind/
- Northwest SEED: www.nwseed.org
- National Wind Technology Center: www.nrel.gov/wind/
- Renewable Energy Research Laboratory Fact Sheets: www.ceere.org/rerl/about_wind/
- American Wind Energy Association: www.awea.org
- DSIRE: Database of State Incentives for Renewable Energy: www.dsireusa.org/

See AWEA's map of wind projects in the US:

www.awea.org/projects/index.html

Updated February 19, 2008

Sources and Notes:

1. Wind potential from Renewable Energy Atlas of the West, Land and Water Fund of the Rockies, et al. (July 2002).

- Installed capacity from RNP's list of Northwest renewable energy projects, **((add link to project list here))**.

- Capacity factor from Fifth Northwest Electric Power and Conservation Plan, Northwest Power and Conservation Council (NWPCC) (May, 2005). See Appendix I.

- Levelized costs include transmission and integration costs and the federal Production Tax Credit.

2. 2005 Northwest consumption from NWPCC, op. cit. note 1.

- 2004 total U.S. electricity generation from Annual Energy Outlook 2006, Energy Information Administration (Feb. 2006). See Table A8.

3. Installed capacity and projects in development from RNP, op. cit. note 1.

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4. "U.S. Wind Energy Projects". American Wind Energy Association (AWEA) (Jan 16, 2008). www.awea.org/projects/ accessed 2/19/08
5. Annual growth figures from "Wind Power, U.S. Installed Capacity", AWEA, www.awea.org/fag/instcap.html, accessed 2/19/08.
 - 2007 year-end installed capacity from "Installed US Wind Power Capacity Surged 45% in 2007", AWEA (Jan 17, 2008).
6. "Statistics", European Wind Energy Association, www.ewea.org/index.php?id=180, accessed 2/19/09.
7. Cost trends from "The Economics of Wind Energy", AWEA (Feb 2005).
 - Levelized costs include transmission and integration costs and the federal Production Tax Credit.
8. Graphic from "Renewable Energy", New South Wales Department of Energy, Utilities and Sustainability. www.seda.nsw.gov.au/ren_wind_body.asp, accessed 9/27/06 .
9. Natural gas fuel cost assumes a 55% efficient combined cycle plant with a 90% capacity factor using natural gas at \$4-\$7/mmBtu.
 - Jobs figures from "Wind Energy for Rural Economic Development", US Department of Energy, EERE (2003).
10. Wind Taskforce Report, Western Governor's Association (March 2006).
11. U.S. from "U.S. Installed Capacity", AWEA. NW from RNP, op. cit. note 1.

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Oregon's Statewide Planning Goals & Guidelines

GOAL 2: LAND USE PLANNING

OAR 660-015-0000(2)

PART I -- PLANNING

To establish a land use planning process and policy framework as a basis for all decision and actions related to use of land and to assure an adequate factual base for such decisions and actions.

City, county, state and federal agency and special district plans and actions related to land use shall be consistent with the comprehensive plans of cities and counties and regional plans adopted under ORS Chapter 268.

All land use plans shall include identification of issues and problems, inventories and other factual information for each applicable statewide planning goal, evaluation of alternative courses of action and ultimate policy choices, taking into consideration social, economic, energy and environmental needs. The required information shall be contained in the plan document or in supporting documents. The plans, supporting documents and implementation ordinances shall be filed in a public office or other place easily accessible to the public. The plans shall be the basis for specific implementation measures. These measures shall be consistent with and adequate to carry out the plans. Each plan and related implementation measure shall be coordinated with the plans of affected governmental units.

All land-use plans and implementation ordinances shall be adopted by the governing body after

public hearing and shall be reviewed and, as needed, revised on a periodic cycle to take into account changing public policies and circumstances, in accord with a schedule set forth in the plan. Opportunities shall be provided for review and comment by citizens and affected governmental units during preparation, review and revision of plans and implementation ordinances.

Affected Governmental Units -- are those local governments, state and federal agencies and special districts which have programs, land ownerships, or responsibilities within the area included in the plan.

Comprehensive Plan -- as defined in ORS 197.015(5).

Coordinated -- as defined in ORS 197.015(5). Note: It is included in the definition of comprehensive plan.

Implementation Measures -- are the means used to carry out the plan. These are of two general types: (1) management implementation measures such as ordinances, regulations or project plans, and (2) site or area specific implementation measures such as permits and grants for construction, construction of public facilities or provision of services.

Plans -- as used here encompass all plans which guide land-use decisions, including both comprehensive and single-purpose plans of cities, counties, state and federal agencies and special districts.

PART II -- EXCEPTIONS

A local government may adopt an exception to a goal when:

(a) The land subject to the exception is physically developed to the extent that it is no longer available for uses allowed by the applicable goal;

(b) The land subject to the exception is irrevocably committed to uses not allowed by the applicable goal because existing adjacent uses and other relevant factors make uses allowed by the applicable goal impracticable; or

(c) The following standards are met:

(1) Reasons justify why the state policy embodied in the applicable goals should not apply;

(2) Areas which do not require a new exception cannot reasonably accommodate the use;

(3) The long-term environmental, economic, social and energy consequences resulting from the use of the proposed site with measures designed to reduce adverse impacts are not significantly more adverse than would typically result from the same proposal being located in areas requiring a goal exception other than the proposed site; and

(4) The proposed uses are compatible with other adjacent uses or will be so rendered through measures designed to reduce adverse impacts.

Compatible, as used in subparagraph (4) is not intended as an absolute term meaning no interference or adverse impacts of any type with adjacent uses.

A local government approving or denying a proposed exception shall set forth findings of fact and a statement of reasons which demonstrate that the

standards for an exception have or have not been met.

Each notice of a public hearing on a proposed exception shall specifically note that a goal exception is proposed and shall summarize the issues in an understandable manner.

Upon review of a decision approving or denying an exception:

(a) The commission shall be bound by any finding of fact for which there is substantial evidence in the record of the local government proceedings resulting in approval or denial of the exception;

(b) The commission shall determine whether the local government's findings and reasons demonstrate that the standards for an exception have or have not been met; and

(c) The commission shall adopt a clear statement of reasons which sets forth the basis for the determination that the standards for an exception have or have not been met.

Exception means a comprehensive plan provision, including an amendment to an acknowledged comprehensive plan, that;

(a) Is applicable to specific properties or situations and does not establish a planning or zoning policy of general applicability;

(b) Does not comply with some or all goal requirements applicable to the subject properties or situations; and

(c) Complies with standards for an exception.

PART III -- USE OF GUIDELINES

Governmental units shall review the guidelines set forth for the goals and either utilize the guidelines or develop alternative means that will achieve the

goals. All land-use plans shall state how the guidelines or alternative means utilized achieve the goals.

Guidelines -- are suggested directions that would aid local governments in activating the mandated goals. They are intended to be instructive, directional and positive, not limiting local government to a single course of action when some other course would achieve the same result. Above all, guidelines are not intended to be a grant of power to the state to carry out zoning from the state level under the guise of guidelines. (Guidelines or the alternative means selected by governmental bodies will be part of the Land Conservation and Development Commission's process of evaluating plans for compliance with goals.)

GUIDELINES

A. PREPARATION OF PLANS AND IMPLEMENTATION MEASURES

Preparation of plans and implementation measures should be based on a series of broad phases, proceeding from the very general identification of problems and issues to the specific provisions for dealing with these issues and for interrelating the various elements of the plan. During each phase opportunities should be provided for review and comment by citizens and affected governmental units.

The various implementation measures which will be used to carry out the plan should be considered during each of the planning phases.

The number of phases needed will vary with the complexity and size of the area, number of people involved, other governmental units to be

consulted, and availability of the necessary information.

Sufficient time should be allotted for:

- (1) collection of the necessary factual information
- (2) gradual refinement of the problems and issues and the alternative solutions and strategies for development
- (3) incorporation of citizen needs and desires and development of broad citizen support
- (4) identification and resolution of possible conflicts with plans of affected governmental units.

B. REGIONAL, STATE AND FEDERAL PLAN CONFORMANCE

It is expected that regional, state and federal agency plans will conform to the comprehensive plans of cities and counties. Cities and counties are expected to take into account the regional, state and national needs. Regional, state and federal agencies are expected to make their needs known during the preparation and revision of city and county comprehensive plans. During the preparation of their plans, federal, state and regional agencies are expected to create opportunities for review and comment by cities and counties. In the event existing plans are in conflict or an agreement cannot be reached during the plan preparation process, then the Land Conservation and Development Commission expects the affected government units to take steps to resolve the issues. If an agreement cannot be reached, the appeals procedures in ORS Chapter 197 may be used.

C. PLAN CONTENT

1. Factual Basis for the Plan

Inventories and other forms of data are needed as the basis for the policies and other decisions set forth in the plan. This factual base should include data on the following as they relate to the goals and other provisions of the plan:

- (a) Natural resources, their capabilities and limitations
- (b) Man-made structures and utilities, their location and condition
- (c) Population and economic characteristics of the area
- (d) Roles and responsibilities of governmental units.

2. Elements of the Plan

The following elements should be included in the plan:

- (a) Applicable statewide planning goals
- (b) Any critical geographic area designated by the Legislature
- (c) Elements that address any special needs or desires of the people in the area
- (d) Time periods of the plan, reflecting the anticipated situation at appropriate future intervals.

All of the elements should fit together and relate to one another to form a consistent whole at all times.

D. FILING OF PLANS

City and county plans should be filed, but not recorded, in the Office of the County Recorder. Copies of all plans should be available to the public and to affected governmental units.

E. MAJOR REVISIONS AND MINOR CHANGES IN THE PLAN AND IMPLEMENTATION MEASURES

The citizens in the area and any affected governmental unit should be given an opportunity to review and

comment prior to any changes in the plan and implementation ordinances. There should be at least 30 days notice of the public hearing on the proposed change.

1. Major Revisions

Major revisions include land use changes that have widespread and significant impact beyond the immediate area, such as quantitative changes producing large volumes of traffic; a qualitative change in the character of the land use itself, such as conversion of residential to industrial use; or a spatial change that affects large areas or many different ownerships.

The plan and implementation measures should be revised when public needs and desires change and when development occurs at a different rate than contemplated by the plan. Areas experiencing rapid growth and development should provide for a frequent review so needed revisions can be made to keep the plan up to date; however, major revisions should not be made more frequently than every two years, if at all possible.

2. Minor Changes

Minor changes, i.e., those which do not have significant effect beyond the immediate area of the change, should be based on special studies or other information which will serve as the factual basis to support the change. The public need and justification for the particular change should be established. Minor changes should not be made more frequently than once a year, if at all possible.

F. IMPLEMENTATION MEASURES

The following types of measure should be considered for carrying out plans:

1. Management Implementation Measures

(a) Ordinances controlling the use and construction on the land, such as building codes, sign ordinances, subdivision and zoning ordinances. ORS Chapter 197 requires that the provisions of the zoning and subdivision ordinances conform to the comprehensive plan.

(b) Plans for public facilities that are more specific than those included in the comprehensive plan. They show the size, location, and capacity serving each property but are not as detailed as construction drawings.

(c) Capital improvement budgets which set out the projects to be constructed during the budget period.

(d) State and federal regulations affecting land use.

(e) Annexations, consolidations, mergers and other reorganization measures.

2. Site and Area Specific implementation Measures

(a) Building permits, septic tank permits, driveway permits, etc; the review of subdivisions and land partitioning applications; the changing of zones and granting of conditional uses, etc.

(b) The construction of public facilities (schools, roads, water lines, etc.).

(c) The provision of land-related public services such as fire and police.

(d) The awarding of state and federal grants to local governments to provide these facilities and services.

(e) Leasing of public lands.

G. USE OF GUIDELINES FOR THE STATEWIDE PLANNING GOALS

Guidelines for most statewide planning goals are found in two sections-planning and implementation. Planning guidelines relate primarily to the process of developing plans that incorporate the provisions of the goals. Implementation guidelines should relate primarily to the process of carrying out the goals once they have been incorporated into the plans. Techniques to carry out the goals and plans should be considered during the preparation of the plan.

Oregon's Statewide Planning Goals & Guidelines

GOAL 5: NATURAL RESOURCES, SCENIC AND HISTORIC AREAS, AND OPEN SPACES

OAR 660-015-0000(5)

(Please Note: Amendments Effective 08/30/96)

To protect natural resources and conserve scenic and historic areas and open spaces.

Local governments shall adopt programs that will protect natural resources and conserve scenic, historic, and open space resources for present and future generations. These resources promote a healthy environment and natural landscape that contributes to Oregon's livability.

The following resources shall be inventoried:

- a. Riparian corridors, including water and riparian areas and fish habitat;
- b. Wetlands;
- c. Wildlife Habitat;
- d. Federal Wild and Scenic Rivers;
- e. State Scenic Waterways;
- f. Groundwater Resources;
- g. Approved Oregon Recreation Trails;
- h. Natural Areas;
- i. Wilderness Areas;
- j. Mineral and Aggregate Resources;
- k. Energy sources;
- l. Cultural areas.

Local governments and state agencies are encouraged to maintain

current inventories of the following resources:

- a. Historic Resources;
- b. Open Space;
- c. Scenic Views and Sites.

Following procedures, standards, and definitions contained in commission rules, local governments shall determine significant sites for inventoried resources and develop programs to achieve the goal.

GUIDELINES FOR GOAL 5

A. PLANNING

1. The need for open space in the planning area should be determined, and standards developed for the amount, distribution, and type of open space.

2. Criteria should be developed and utilized to determine what uses are consistent with open space values and to evaluate the effect of converting open space lands to inconsistent uses. The maintenance and development of open space in urban areas should be encouraged.

3. Natural resources and required sites for the generation of energy (i.e. natural gas, oil, coal, hydro, geothermal, uranium, solar and others) should be conserved and protected;

reservoir sites should be identified and protected against irreversible loss.

4. Plans providing for open space, scenic and historic areas and natural resources should consider as a major determinant the carrying capacity of the air, land and water resources of the planning area. The land conservation and development actions provided for by such plans should not exceed the carrying capacity of such resources.

5. The National Register of Historic Places and the recommendations of the State Advisory Committee on Historic Preservation should be utilized in designating historic sites.

6. In conjunction with the inventory of mineral and aggregate resources, sites for removal and processing of such resources should be identified and protected.

7. As a general rule, plans should prohibit outdoor advertising signs except in commercial or industrial zones. Plans should not provide for the reclassification of land for the purpose of accommodating an outdoor advertising sign. The term "outdoor advertising sign" has the meaning set forth in ORS 377.710(23).

B. IMPLEMENTATION

1. Development should be planned and directed so as to conserve the needed amount of open space.

2. The conservation of both renewable and non-renewable natural resources and physical limitations of the land should be used as the basis for determining the quantity, quality, location, rate and type of growth in the planning area.

3. The efficient consumption of energy should be considered when utilizing natural resources.

4. Fish and wildlife areas and habitats should be protected and managed in accordance with the Oregon Wildlife Commission's fish and wildlife management plans.

5. Stream flow and water levels should be protected and managed at a level adequate for fish, wildlife, pollution abatement, recreation, aesthetics and agriculture.

6. Significant natural areas that are historically, ecologically or scientifically unique, outstanding or important, including those identified by the State Natural Area Preserves Advisory Committee, should be inventoried and evaluated. Plans should provide for the preservation of natural areas consistent with an inventory of scientific, educational, ecological, and recreational needs for significant natural areas.

7. Local, regional and state governments should be encouraged to investigate and utilize fee acquisition, easements, cluster developments, preferential assessment, development rights acquisition and similar techniques to implement this goal.

8. State and federal agencies should develop statewide natural resource, open space, scenic and historic area plans and provide technical assistance to local and regional agencies. State and federal plans should be reviewed and coordinated with local and regional plans.

9. Areas identified as having non-renewable mineral and aggregate resources should be planned for interim,

transitional and "second use" utilization
as well as for the primary use.

Oregon's Statewide Planning Goals & Guidelines

GOAL 13: ENERGY CONSERVATION

OAR 660-015-0000(13)

To conserve energy.

Land and uses developed on the land shall be managed and controlled so as to maximize the conservation of all forms of energy, based upon sound economic principles.

GUIDELINES

A. PLANNING

1. Priority consideration in land use planning should be given to methods of analysis and implementation measures that will assure achievement of maximum efficiency in energy utilization.

2. The allocation of land and uses permitted on the land should seek to minimize the depletion of non-renewable sources of energy.

3. Land use planning should, to the maximum extent possible, seek to recycle and re-use vacant land and those uses which are not energy efficient.

4. Land use planning should, to the maximum extent possible, combine increasing density gradients along high capacity transportation corridors to achieve greater energy efficiency.

5. Plans directed toward energy conservation within the planning area should consider as a major determinant the existing and potential capacity of the renewable energy sources to yield useful energy output. Renewable energy sources include water, sunshine, wind, geothermal heat and municipal, forest and farm waste. Whenever possible,

land conservation and development actions provided for under such plans should utilize renewable energy sources.

B. IMPLEMENTATION

1. Land use plans should be based on utilization of the following techniques and implementation devices which can have a material impact on energy efficiency:

a. Lot size, dimension, and siting controls;

b. Building height, bulk and surface area;

c. Density of uses, particularly those which relate to housing densities;

d. Availability of light, wind and air;

e. Compatibility of and competition between competing land use activities; and

f. Systems and incentives for the collection, reuse and recycling of metallic and nonmetallic waste.

ENERGY CONSERVATION

The era of inexpensive and unlimited energy has come to an end. Since support and service systems transporting energy are essential to land development, and most urban patterns are dependent upon non-renewable energy sources, conservation measures are needed in order to maintain improve the present standards of living. Energy conservation policies in the Comprehensive Plan therefore become a desirable objective.

Rapid growth in Umatilla County necessitates a comprehensive, realistic approach to future land use patterns that relate to energy utilization and conservation.

FINDING	POLICY
1. Escalating cost of depleting non-renewable energy sources make renewable energy source alternatives (e.g. solar, wind) increasingly more economical, and help conserve existing energy supplies.	1. Encourage rehabilitation /weatherization of older structures and the utilization of locally-feasibly renewable energy resources through use of tax and permit incentives.
2. Appropriate planning reduce energythe Development Standards, consumption and make more efficient use of existing and potential energy sources.	2. Strive for energy efficient policies, building code
3. Existing building code regulations require minimal insulation and do not address solar utilization.	3. Initiate a county building code which recognizes local peculiarities and situations relating to energy conservation.

- | | |
|---|---|
| 4. Quantities of reusable/recyclable metallic-non metallic wastes do not presently allow economical conservation efforts. | 4. Encourage systems and/or efforts for the economical collection, reuse, and recycling of metallic-nonmetallic wastes. |
| 5. Present laws do not adequately protect access sunlight for users of solar energy. | 5. Encourage federal and state measures that protect users to of solar energy (e.g. restrictive covenants, solar sky space easement). |
| 6. Travel distances for frequently purchased goods, areas' (gasoline and groceries) may be reduced by locally situated rural commercial facilities. | 6. Recognize rural residential local retail service needs. |
| 7. Until recent fuel cost increases, travel to work by private auto was acceptable and the primary means used. | 7. Recognize that fuel costs impact work force availability and encourage larger firms to cooperate in commuter bus-shared ride programs. |
| 8. Hot springs in this county are indicative of geothermal potential. | 8. Facilitate land use proposals directed toward geothermal energy utilization. |

NOTE: See Technical Report, Section K for background data.

permit, limited land use decision or zone change within 120 days or 150 days, as applicable, after the application is deemed complete, the county shall refund to the applicant either the unexpended portion of any application fees or deposits previously paid or 50 percent of the total amount of such fees or deposits, whichever is greater. The applicant is not liable for additional governmental fees incurred subsequent to the payment of such fees or deposits. However, the applicant is responsible for the costs of providing sufficient additional information to address relevant issues identified in the consideration of the application.

(I) A county may not compel an applicant to waive the period set in division (A) of this section or to waive the provisions of division (H) of this section or ORS 215.429 as a condition for taking any action on an application for a permit, limited land use decision or zone change except when such applications are filed concurrently and considered jointly with a plan amendment.

(J) The provisions outlined in division (A) shall have the following exceptions:

(1) Any continuance or extension of the record requested by an applicant shall result in a corresponding extension of the time limitations of division (A) as provided in § 152.771 (E) and (I) of this chapter.

(2) The request to keep the record open for seven days after the first evidentiary hearing.

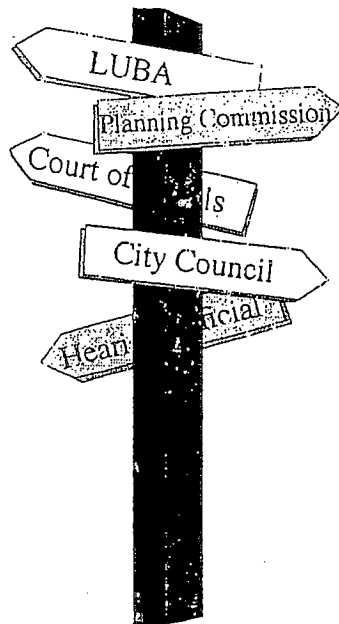
§ 152.616 STANDARDS FOR REVIEW OF CONDITIONAL USES AND LAND USE DECISIONS.

The following standards shall apply for review by the Hearings Officer, the Planning Director or appropriate planning authority of the specific conditional uses and land use decisions listed in this chapter:

(HHH) Wind Power Generation Facility

(2) The following information shall be provided as part of the application:

(J) If the All Wind Power Generation Facilities must show compliance with the standards exceeds 20 acres in size, a Goal 3 exception is required as found in OAR 660-033-0130 (22) (37).



PLANNING BASICS

LEGAL REQUIREMENTS OF THE PLANNING OFFICE

M-56

Prepared by
Gary Darnielle

Lane Council of Governments
September 2006

00004118

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adopted the regulation after 45 days, LUBA held that the notice was defective because the City failed to send notice of the date of the new hearing. Whether LUBA will extend the logic of this case to the amended version of ORS 197.610 is any one's guess. *Old Town Cornelius Neighborhood Association v. City of Cornelius*, 38 Or LUBA 921, 926 (2000)

C. Ballot Measure 56 Notice

Ballot Measure 56, codified in ORS 215.503 and 227.186, requires notice to all owners whose property will be "rezoned." "Rezoned" is defined as when the base zoning classification of property is changed or where land uses previously allowed in an affected zone are limited or prohibited. The definition is broad enough to be applied to ordinances that increase setbacks, change siting requirements, increase open space or landscaping requirements or even change building codes, fire codes, tree cutting ordinances and sign codes. As a result of this ordinance, all legislative acts relating to comprehensive plans, land use planning and zoning must be adopted by ordinance. Notice must be provided at least 30 days prior to adoption.

- Consistent with Ballot Measure 56 notice requirements, Multnomah County sent individual notice to property owners affected by a plan and zone change. Unfortunately, the county did not provide advance published notice of the public hearing as required by ORS 215.060. Absence of published notice was found to be substantive error, resulting in the ordinance having "no legal effect." *Ramsey v. Multnomah County*, 43 Or LUBA 25, 31 (2002). On remand the county readopted the ordinance after publishing notice of the public hearing. The county did not repeat its individual mailing of notice. Again, the ordinance was challenged, this time on the basis that no individual notice was given. LUBA held that just because the ordinance had no legal effect that didn't mean that the procedures followed and the notices provided had no effect. State statutes did not require a second notice and therefore the notice was adequate. *Ramsey v. Multnomah County (Ramsey II)*, LUBA No. 2002-157 (June 18, 2003).

D. Post-Decision Notice

ORS 197.830(2) provides that any person who "[a]ppeared before the local government ... orally or in writing" may petition LUBA for review of a land use decision. ORS 197.830(7) provides that any person who has made such an appearance may intervene in such a review proceeding.

- The appeal of decision on the application of a land use regulation must be filed with LUBA within 21 days of its becoming final. *Wicks-Snodgrass v. City of Reedsport*, 148 Or App 217, 224 (1997)



2010-5640354 1 of 3

RECORDING REQUESTED BY
AND WHEN RECORDED
RETURN TO:

RES North America Leasing, LLC
700 SW Taylor St., Suite 210
Portland, OR 97205
Attn: Sean Bell

RECEIVED

APR 09 2010

UMATILLA COUNTY
RECORDS

(Space Above for Recorder's Use Only)

State of Oregon)
County of Umatilla)This instrument was received
and recorded on

04-09-10 at 9:30

In the record of instrument
code type DE-MLInstrument Number 2010-5640354
Fee 51.00

Office of County Records

Records Officer

MEMORANDUM OF LEASE

THIS MEMORANDUM OF LEASE ("Memorandum") is made and entered into as of April 5, 2010, by and between **Cunningham Sheep & Land Company**, an Oregon corporation ("Landlord"), and **RES North America Leasing, LLC**, a Delaware limited liability company ("Tenant").

1. Lease. For the term and upon the provisions set forth in that Wind Energy Ground Lease of even date herewith between Landlord and Tenant (the "Lease"), all of which provisions are specifically made a part hereof as though fully and completely set forth herein, Landlord hereby leases to Tenant, and Tenant hereby leases from Landlord, that certain real property (the "Premises") located in Umatilla County, Oregon, as more particularly described in Exhibit "A" attached hereto, together with all rights of ingress and egress and all other rights appurtenant to the Premises, as more particularly described in the Lease.

2. Term. The term of the Lease shall expire three (3) years from the date of this Memorandum unless sooner terminated or extended pursuant to the Lease, and which is subject to possible extension for up to an additional thirty-three (33) years.

3. Notice. This Memorandum is prepared for the purpose of giving notice of the Lease and in no way modifies the express provisions of the Lease. This Memorandum shall continue to constitute notice of the Lease, even if the Lease is subsequently amended.

IN WITNESS WHEREOF this Memorandum of Lease has been executed as of the date first written above.

[signatures on following page]



2010-5640354 2 of 3

LANDLORD:

Cunningham Sheep & Land Company, an
Oregon corporation

By: [Signature]
Its: Secretary

TENANT:

RES North America Leasing, LLC,
a Delaware limited liability company

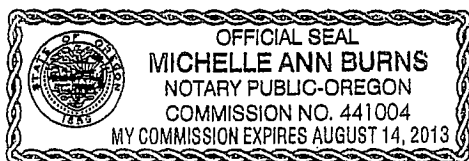
By: RES America Developments Inc.
Its: Member

By: [Signature]
E. S. Piscitello
Senior Vice President

STATE OF OREGON)
COUNTY OF Umatilla)

I certify that I know or have satisfactory evidence that Steven H. Corey Secretary of
Cunningham Sheep & Land Company is the person who appeared before me, and said person
acknowledged that he/she signed this instrument, on oath stated that he/she is authorized to execute the
instrument and acknowledged it to be the free and voluntary act of such party for the uses and purposes
mentioned in the instrument.

SUBSCRIBED TO and sworn before me on April 5, 2010.

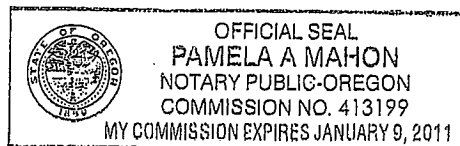


[Signature]
Notary Public for Oregon
My commission expires 8/14/13

STATE OF OREGON)
COUNTY OF MULTNOMAH)

I certify that I know or have satisfactory evidence that **E. S. Piscitello**, Senior Vice President of RES
America Developments, Inc., the member of RES North America Leasing, LLC, a Delaware limited
liability company, is the person who appeared before me, and said person acknowledged that he signed
this instrument, on oath stated that he is authorized to execute the instrument and acknowledged it to be
the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

SUBSCRIBED TO and sworn before me on MARCH 17, 2010.



[Signature]
Pamela A. Mahon
Notary Public, State of Oregon
My commission expires January 9, 2011

EXHIBIT "A"

All that real property located in Umatilla County, Oregon, described as follows:

Township 2 South, Range 30 East, W.M.

Section 25: SE $\frac{1}{2}$ E $\frac{1}{2}$ NE $\frac{1}{4}$, E $\frac{1}{2}$ SW $\frac{1}{4}$, SE $\frac{1}{4}$
 Section 36: All

Township 2 South, Range 30 $\frac{1}{2}$ East, W.M.

Section 23: Lot 4, excepting therefrom a tract of land described as follows: commencing 1.17 chains West of the Northeast corner of said Lot 4; thence West to the Northwest corner of said Lot 4; thence South to the Southwest corner of said Lot 4; thence North 27°50' East 22.82 chains to the point of beginning.
 Section 24: E $\frac{1}{2}$ NE $\frac{1}{4}$, W $\frac{1}{2}$ NW $\frac{1}{4}$, SE $\frac{1}{4}$ NW $\frac{1}{4}$, E $\frac{1}{2}$ SE $\frac{1}{4}$, SW $\frac{1}{4}$, SW $\frac{1}{4}$ SE $\frac{1}{4}$, excepting therefrom a tract of land described as follows: commencing at the Northwest corner of said Section 24; thence East 20 chains to the Northeast corner of the Northwest Quarter of the Northwest Quarter of said Section 24; thence South 17.90 chains; thence North 80°35' West 11.90 chains; thence North 70°30' West 8.70 chains; thence North 13.18 chains to the point of beginning.
 Section 25: All except SE $\frac{1}{4}$ SW $\frac{1}{4}$
 Section 26: Lots 1, 2, 3, 4
 Section 35: Lots 1, 2, 3, 4
 Section 36: All

Township 3 South, Range 30 East, W.M.

Section 25: S $\frac{1}{2}$ SE $\frac{1}{4}$, NW $\frac{1}{4}$ SE $\frac{1}{4}$
 Section 36: S $\frac{1}{2}$, NE $\frac{1}{4}$

Township 3 South, Range 30 $\frac{1}{2}$ East, W.M.

Section 13: S $\frac{1}{2}$
 Section 24: N $\frac{1}{2}$ N $\frac{1}{2}$, S $\frac{1}{2}$ NE $\frac{1}{4}$, SE $\frac{1}{4}$
 Section 25: All except NE $\frac{1}{4}$ NW $\frac{1}{4}$
 Section 26: Lots 1, 2, 4
 Section 36: All

Township 3 South, Range 31 East, W.M.

Section 18: Lots 3, 4, S $\frac{1}{2}$ NE $\frac{1}{4}$ SW $\frac{1}{4}$, S $\frac{1}{2}$ NW $\frac{1}{4}$ SE $\frac{1}{4}$, SE $\frac{1}{4}$ SW $\frac{1}{4}$
 Section 19: Lots 1, 2, 3, 4
 Section 29: All that portion of the NW $\frac{1}{4}$ SW $\frac{1}{4}$ west of Highway 395
 Section 30: Lots 1, 2, 3, 4, E $\frac{1}{2}$ SW $\frac{1}{4}$, SE $\frac{1}{4}$ except that portion east of Highway 395
 Section 31: Lots 1, 2, 3, 4, E $\frac{1}{2}$ W $\frac{1}{2}$, E $\frac{1}{2}$ except that portion east of Highway 395

2010 5640355



2010-5640355 1 of 6

RECORDING REQUESTED BY
AND WHEN RECORDED
RETURN TO:

RES North America Leasing, LLC
700 SW Taylor St., Suite 210
Portland, OR 97205
Attn: Sean Bell

RECEIVED

APR 09 2010

UMATILLA COUNTY
RECORDS

(Space Above for Recorder's Use Only)

State of Oregon)
County of Umatilla)

This instrument was received
and recorded on

04-09-10 at 9:30

in the record of instrument
code type DE-ML

Instrument Number 2010-5640355
Fee 66.00

Office of County Records

Sean Hampshire
Records Officer

MEMORANDUM OF LEASE

THIS MEMORANDUM OF LEASE ("Memorandum") is made and entered into as of April 5, 2010, by and between **Pendleton Ranches, Inc.**, an Oregon corporation, and **Cunningham Sheep & Land Company**, an Oregon corporation (together, "Landlord"), and **RES North America Leasing, LLC**, a Delaware limited liability company ("Tenant").

1. Lease. For the term and upon the provisions set forth in that Wind Energy Ground Lease of even date herewith between Landlord and Tenant (the "Lease"), all of which provisions are specifically made a part hereof as though fully and completely set forth herein, Landlord hereby leases to Tenant, and Tenant hereby leases from Landlord, that certain real property (the "Premises") located in Umatilla County, Oregon, as more particularly described in Exhibit "A" attached hereto, together with all rights of ingress and egress and all other rights appurtenant to the Premises, as more particularly described in the Lease.

2. Term. The term of the Lease shall expire three (3) years from the date of this Memorandum unless sooner terminated or extended pursuant to the Lease, and which is subject to possible extension for up to an additional thirty-three (33) years.

3. Notice. This Memorandum is prepared for the purpose of giving notice of the Lease and in no way modifies the express provisions of the Lease. This Memorandum shall continue to constitute notice of the Lease, even if the Lease is subsequently amended.

IN WITNESS WHEREOF this Memorandum of Lease has been executed as of the date first written above.

[signatures on following page]

STATE OF OREGON)
COUNTY OF Umatilla)

I certify that I know or have satisfactory evidence that Steven H. Corey, Secretary of Cunningham Sheep & Land Company is the person who appeared before me, and said person acknowledged that he/she signed this instrument, on oath stated that he/she is authorized to execute the instrument and acknowledged it to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

SUBSCRIBED TO and sworn before me on April 5, 2010.

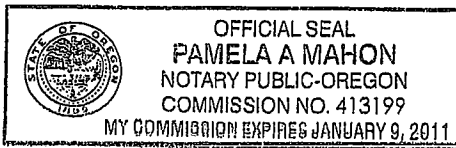


Michelle Burns
Notary Public for Oregon
My commission expires 8/14/13

STATE OF OREGON)
COUNTY OF MULTNOMAH)

I certify that I know or have satisfactory evidence that **E. S. Piscitello**, Senior Vice President of RES America Developments, Inc., the member of RES North America Leasing, LLC, a Delaware limited liability company, is the person who appeared before me, and said person acknowledged that he signed this instrument, on oath stated that he is authorized to execute the instrument and acknowledged it to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

SUBSCRIBED TO and sworn before me on MARCH 17, 2010.



Pamela A. Mahon
Notary Public, State of Oregon
My commission expires January 9, 2011

EXHIBIT A

All that real property located in Umatilla County, State of Oregon, more fully described as follows:

Township 1 South, Range 30 East, W.M.

- Section 16: SE $\frac{1}{4}$ SW $\frac{1}{4}$, S $\frac{1}{2}$ SE $\frac{1}{4}$
 Section 19: Lots 3, 4, E $\frac{1}{2}$ SW $\frac{1}{4}$, SE $\frac{1}{4}$ NW $\frac{1}{4}$, S $\frac{1}{2}$ NE $\frac{1}{4}$, SE $\frac{1}{4}$
 Section 20: N $\frac{1}{2}$ S $\frac{1}{2}$, S $\frac{1}{2}$ N $\frac{1}{2}$, NE $\frac{1}{4}$ NE $\frac{1}{4}$, S $\frac{1}{2}$ S $\frac{1}{2}$
 Section 21: All, EXCEPTING THEREFROM, beginning at a point 7.5 chains (495 feet) West of the Southeast corner of the Southeast Quarter of the Northwest Quarter of said Section 21; thence North 3 chains (198 feet) and 17.5 links (6.70 inches); thence West 209 feet, 6.70 inches; thence South 209 feet, 6.70 inches; thence East 209 feet, 6.70 inches to the point of beginning; ALSO EXCEPTING THEREFROM Main Street in Town of Buttercreek now called Vinson; ALSO EXCEPTING THEREFROM, beginning at a point on the Southerly right of way line of County Road No. 831 where it intersects the Easterly right of way line of County Road No. 58 and 859; thence Southeasterly along the Southerly line of County Road No. 831 a distance of 200 feet; thence Southwesterly, parallel to County Road No. 45 and 859 a distance of 900 feet, more or less, to a point on the Easterly right of way line of County Road No. 859; thence Northeasterly along County Road No. 45 to the point of beginning.
 Section 22: All
 Section 27: All
 Section 28: All
 Section 29: All
 Section 30: All
 Section 31: All
 Section 32: All
 Section 33: W $\frac{1}{2}$, W $\frac{1}{2}$ E $\frac{1}{2}$
 Section 34: All

Township 2 South, Range 30 East, W.M.

- Section 4: NW $\frac{1}{4}$ NE $\frac{1}{4}$
 Section 5: NW $\frac{1}{4}$ NE $\frac{1}{4}$, NW $\frac{1}{4}$
 Section 6: N $\frac{1}{2}$, NW $\frac{1}{4}$ SW $\frac{1}{4}$
 Section 18: Lots 3, 4, E $\frac{1}{2}$ SW $\frac{1}{4}$, SE $\frac{1}{4}$
 Section 19: All
 Section 20: W $\frac{1}{2}$ W $\frac{1}{2}$
 Section 29: W $\frac{1}{2}$ W $\frac{1}{2}$
 Section 30: All
 Section 31: Lot 1, NE $\frac{1}{4}$ NW $\frac{1}{4}$, N $\frac{1}{2}$ NE $\frac{1}{4}$

Township 3 South, Range 30 East, W.M.



2010-5640356 1 of 3

RECORDING REQUESTED BY
AND WHEN RECORDED
RETURN TO:

RES North America Leasing, LLC
700 SW Taylor St., Suite 210
Portland, OR 97205
Attn: Sean Bell

RECEIVED

APR 09 2010

UMATILLA COUNTY
RECORDSState of Oregon)
County of Umatilla)This instrument was received
and recorded on

04-09-10 at 9:30

In the record of instrument
code type DE-MLInstrument Number 2010-5640356
Fee 51.00

Office of County Records

Records Officer

(Space Above for Recorder's Use Only)

MEMORANDUM OF LEASE

THIS MEMORANDUM OF LEASE ("Memorandum") is made and entered into as of April 5, 2010, by and between **Cunningham Sheep Company**, an Oregon corporation ("Landlord"), and **RES North America Leasing, LLC**, a Delaware limited liability company ("Tenant").

1. Lease. For the term and upon the provisions set forth in that Wind Energy Ground Lease of even date herewith between Landlord and Tenant (the "Lease"), all of which provisions are specifically made a part hereof as though fully and completely set forth herein, Landlord hereby leases to Tenant, and Tenant hereby leases from Landlord, that certain real property (the "Premises") located in Umatilla County, Oregon, as more particularly described in Exhibit "A" attached hereto, together with all rights of ingress and egress and all other rights appurtenant to the Premises, as more particularly described in the Lease.

2. Term. The term of the Lease shall expire three (3) years from the date of this Memorandum unless sooner terminated or extended pursuant to the Lease, and which is subject to possible extension for up to an additional thirty-three (33) years.

3. Notice. This Memorandum is prepared for the purpose of giving notice of the Lease and in no way modifies the express provisions of the Lease. This Memorandum shall continue to constitute notice of the Lease, even if the Lease is subsequently amended.

IN WITNESS WHEREOF this Memorandum of Lease has been executed as of the date first written above.

[signatures on following page]



2010-5640356 2 of 3

LANDLORD:

Cunningham Sheep Company, an Oregon corporation

By: Steven H. Corey
Its: Secretary

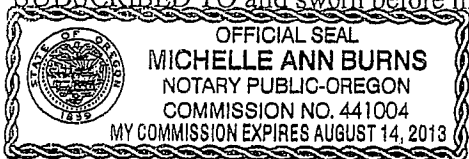
TENANT:

RES North America Leasing, LLC,
a Delaware limited liability companyBy: RES America Developments Inc.
Its: MemberBy: E. S. Piscitello
E. S. Piscitello
Senior Vice President

STATE OF OREGON)

COUNTY OF Umatilla)

I certify that I know or have satisfactory evidence that Steven H. Corey Secretary of Cunningham Sheep Company is the person who appeared before me, and said person acknowledged that he/she signed this instrument, on oath stated that he/she is authorized to execute the instrument and acknowledged it to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

SUBSCRIBED TO and sworn before me on April 5, 2010.Michelle Burns
Notary Public for Oregon
My commission expires 8/14/13

STATE OF OREGON)

COUNTY OF MULTNOMAH)

I certify that I know or have satisfactory evidence that E. S. Piscitello, Senior Vice President of RES America Developments, Inc., the member of RES North America Leasing, LLC, a Delaware limited liability company, is the person who appeared before me, and said person acknowledged that he signed this instrument, on oath stated that he is authorized to execute the instrument and acknowledged it to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

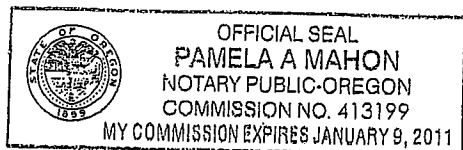
SUBSCRIBED TO and sworn before me on MARCH 17, 2010.Pamela A. Mahon
Pamela A. Mahon
Notary Public, State of Oregon
My commission expires January 9, 2011

EXHIBIT "A"

All that real property located in Umatilla County, Oregon, described as follows:

Township 1 South, Range 30 East, W.M.

Section 33: SE $\frac{1}{4}$ SE $\frac{1}{4}$

Township 2 South, Range 30 East, W.M.

Section 1: All

Section 2: E $\frac{1}{2}$, SW $\frac{1}{4}$

Section 3: E $\frac{1}{2}$ SE $\frac{1}{4}$

Section 10: E $\frac{1}{2}$ E $\frac{1}{2}$

Section 11: All

Section 12: All

Section 13: NW $\frac{1}{4}$ NW $\frac{1}{4}$, N $\frac{1}{2}$ NE $\frac{1}{4}$

Section 14: NE $\frac{1}{4}$ NW $\frac{1}{4}$, N $\frac{1}{2}$ NE $\frac{1}{4}$, N $\frac{1}{2}$ SW $\frac{1}{4}$ NE $\frac{1}{4}$

Township 3 South, Range 30 East, W.M.

Section 24: S $\frac{1}{2}$ NE $\frac{1}{4}$

Township 2 South, Range 30 $\frac{1}{2}$ East, W.M.

Section 2: Lots 1, 2, 3, 4

Section 11: Lots 1, 2, 3, 4

Section 12: All

Section 13: NE $\frac{1}{4}$, N $\frac{1}{2}$ NW $\frac{1}{4}$, SE $\frac{1}{4}$ NW $\frac{1}{4}$

Section 14: Lot 1

Section 24: NE $\frac{1}{4}$ NW $\frac{1}{4}$, W $\frac{1}{2}$ NE $\frac{1}{4}$, NW $\frac{1}{4}$ SE $\frac{1}{4}$

Township 3 South, Range 30 $\frac{1}{2}$ East, W.M.

Section 23: Lots 2, 3, 4

Section 24: SW $\frac{1}{4}$, S $\frac{1}{2}$ NW $\frac{1}{4}$

Section 25: NE $\frac{1}{4}$ NW $\frac{1}{4}$

2010 5640 57



2010-5640357 1 of 3

RECORDING REQUESTED BY
AND WHEN RECORDED
RETURN TO:

RES North America Leasing, LLC
700 SW Taylor St., Suite 210
Portland, OR 97205
Attn: Sean Bell

RECEIVED

APR 09 2010

UMATILLA COUNTY
RECORDS

(Space Above for Recorder's Use Only)

State of Oregon)
County of Umatilla)

This instrument was received
and recorded on

04-09-10 at 9:30

In the record of instrument
code type DE-ML

Instrument Number 2010-5640357
Fee 51.00

Office of County Records

Sean Hampshire
Records Officer

MEMORANDUM OF LEASE

THIS MEMORANDUM OF LEASE ("Memorandum") is made and entered into as of April 5, 2010, by and between **Pendleton Ranches, Inc.**, an Oregon corporation ("Landlord"), and **RES North America Leasing, LLC**, a Delaware limited liability company ("Tenant").

1. Lease. For the term and upon the provisions set forth in that Wind Energy Ground Lease of even date herewith between Landlord and Tenant (the "Lease"), all of which provisions are specifically made a part hereof as though fully and completely set forth herein, Landlord hereby leases to Tenant, and Tenant hereby leases from Landlord, that certain real property (the "Premises") located in Umatilla County, Oregon, as more particularly described in Exhibit "A" attached hereto, together with all rights of ingress and egress and all other rights appurtenant to the Premises, as more particularly described in the Lease.

2. Term. The term of the Lease shall expire three (3) years from the date of this Memorandum unless sooner terminated or extended pursuant to the Lease, and which is subject to possible extension for up to an additional thirty-three (33) years.

3. Notice. This Memorandum is prepared for the purpose of giving notice of the Lease and in no way modifies the express provisions of the Lease. This Memorandum shall continue to constitute notice of the Lease, even if the Lease is subsequently amended.

IN WITNESS WHEREOF this Memorandum of Lease has been executed as of the date first written above.

[signatures on following page]

00004130

00004130



2010-5640357

2 of 3

LANDLORD:

Pendleton Ranches, Inc., an Oregon corporation

By: [Signature]

Its: _____

By: Steven H. GreyIts: Secretary

TENANT:

RES North America Leasing, LLC,
a Delaware limited liability company

By: RES America Developments Inc.

Its: Member

By: E. S. Piscitello

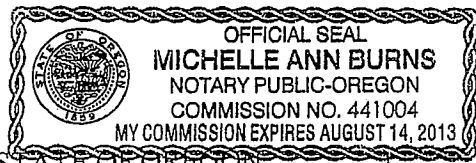
E. S. Piscitello

Senior Vice President

STATE OF OREGON)

COUNTY OF Umatilla)

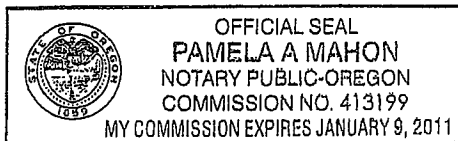
I certify that I know or have satisfactory evidence that Steven H. Grey Secretary of Pendleton Ranches, Inc. is the person who appeared before me, and said person acknowledged that he/she signed this instrument, on oath stated that he/she is authorized to execute the instrument and acknowledged it to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

SUBSCRIBED TO and sworn before me on April 5, 2010.

STATE OF OREGON)

COUNTY OF MULTNOMAH)

I certify that I know or have satisfactory evidence that **E. S. Piscitello**, Senior Vice President of RES America Developments, Inc., the member of RES North America Leasing, LLC, a Delaware limited liability company, is the person who appeared before me, and said person acknowledged that he signed this instrument, on oath stated that he is authorized to execute the instrument and acknowledged it to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

SUBSCRIBED TO and sworn before me on MARCH 29, 2010.[Signature]
Pamela A. Mahon

Notary Public, State of Oregon

My commission expires January 9, 2011

00004131



2010-5640357 3 of 3

EXHIBIT A

All that real property located in Umatilla County, State of Oregon, more fully described as follows:

Township 2 South, Range 30 East, W.M.

Section 21: SE $\frac{1}{4}$ SE $\frac{1}{4}$
Section 22: SW $\frac{1}{4}$ SW $\frac{1}{4}$
Section 26: W $\frac{1}{2}$ SW $\frac{1}{4}$
Section 27: W $\frac{1}{2}$, S $\frac{1}{2}$ SE $\frac{1}{4}$
Section 28: E $\frac{1}{2}$ NE $\frac{1}{4}$
Section 34: NE $\frac{1}{4}$ NW $\frac{1}{4}$, N $\frac{1}{2}$ NE $\frac{1}{4}$, SE $\frac{1}{4}$ NE $\frac{1}{4}$
Section 35: All

033420/00018/2129809v1

00004132

RECORDING REQUESTED BY
AND WHEN RECORDED
RETURN TO:

Tonkon Torp LLP
1600 Pioneer Tower
888 SW Fifth Avenue
Portland, OR 97204
Attn: David J. Petersen

(Space Above for Recorder's Use Only)

**MEMORANDUM OF LEASE AND
RIGHT OF FIRST REFUSAL**

THIS MEMORANDUM OF LEASE AND RIGHT OF FIRST REFUSAL ("Memorandum") is made and entered into as of April 23, 2010, by and between **Cunningham Sheep Company**, an Oregon corporation ("Landlord"), and **Element Power Wind Development, LLC**, a Delaware limited liability company ("Tenant").

1. Lease. For the term and upon the provisions set forth in that Renewable Energy Lease of even date herewith between Landlord and Tenant (the "Lease"), all of which provisions are specifically made a part hereof as though fully and completely set forth herein, Landlord hereby leases to Tenant, and Tenant hereby leases from Landlord, that certain real property (the "Premises") located in Umatilla County, Oregon, as more particularly described in Exhibit "A" attached hereto, together with all rights of ingress and egress and all other rights appurtenant to the Premises, as more particularly described in the Lease.

2. Term; Right of First Refusal. The term of the Lease shall expire five (5) years from the date of this Memorandum unless sooner terminated or extended pursuant to the Lease, and which is subject to possible extension for up to an additional thirty-two (32) years. Further, if Landlord receives an offer to lease the Premises or a portion thereof for wind energy purposes, commencing at or within eighteen (18) months after the end of the term of the Lease, Tenant shall have a right of first refusal for sixty (60) days thereafter to further extend the term of this Lease on the same material terms and conditions as the third-party offer.

3. Notice. This Memorandum is prepared for the purpose of giving notice of the Lease and in no way modifies the express provisions of the Lease. This Memorandum shall continue to constitute notice of the Lease, even if the Lease is subsequently amended.

IN WITNESS WHEREOF this Memorandum has been executed as of the date first written above.

[signatures on following page]

LANDLORD:

Cunningham Sheep Company, an Oregon corporation

By: Steven H. Corey
Its: Secretary

TENANT:

Element Power Wind Development, LLC, a Delaware limited liability company

By: Element Power US, LLC, a Delaware limited liability company

Its: Manager

By: Chris Taylor
Its: Chris Taylor

STATE OF OREGON)

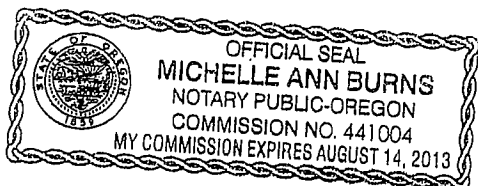
COUNTY OF Umatilla)

Chris Taylor
Chief Development Officer

I certify that I know or have satisfactory evidence that Steven H. Corey, Secretary of Cunningham Sheep Company, an Oregon corporation, is the person who appeared before me, and said person acknowledged that he signed this instrument, on oath stated that he is authorized to execute the instrument and acknowledged it to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

SUBSCRIBED TO and sworn before me on April 5, 2010.

Michelle Burns
Notary Public for Oregon
My commission expires 8/14/13

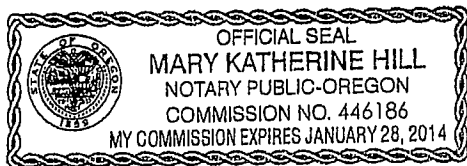


STATE OF OREGON

COUNTY OF MULTNOMAH

I certify that I know or have satisfactory evidence that Chris Taylor, Chief Dev. Officer of Element Power US, LLC, the manager of Element Power Wind Development, LLC, a Delaware limited liability company, is the person who appeared before me, and said person acknowledged that he signed this instrument, on oath stated that he is authorized to execute the instrument and acknowledged it to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

SUBSCRIBED TO and sworn before me on April 23, 2010.



Mary Katherine Hill
Notary Public for Oregon
My commission expires 1/28/2014

00004135

EXHIBIT A

All that real property located in Umatilla County, Oregon, described as follows:

TRACT I:

The South Half of the Southeast Quarter of Section 5, and the North Half of the Northeast Quarter of Section 8, in Township 2 North, Range 30.

EXCEPTING rights of way and portions conveyed to O.R. & N. Company by Right of Way Deed recorded in Book "H", Page 746, of the Deed Records of Umatilla County, Oregon; and by Right of Way Deed recorded in Book 36, Page 64, of the said Deed Records.

ALSO EXCEPTING rights of way and portions conveyed to Oregon-Washington Railroad & Navigation Company, a corporation, by Warranty Deed recorded in Book 90, Page 430, of the said Deed Records.

ALSO EXCEPTING portions conveyed to William Slusher and S. P. Gould, by Warranty Deeds recorded in Book 37, Pages 589 and 590, of the said Deed Records.

All being East of the Willamette Meridian, in the County of Umatilla and State of Oregon.

TRACT II:

TOWNSHIP 1 NORTH, RANGE 29, EAST OF THE WILLAMETTE MERIDIAN:

Section 1: All;

Section 12: North Half;

Section 22: All that portion of the North Half of the Northeast Quarter lying Northerly of Ridge Road.

TOWNSHIP 1 NORTH, RANGE 30, EAST OF THE WILLAMETTE MERIDIAN:

Section 1: That portion of the Southeast Quarter lying West of the County Road;

Section 3: South Half of the Southwest Quarter of the Southeast Quarter;
Southwest Quarter of the Southwest Quarter of the Southwest Quarter;
Southeast Quarter of the Southeast Quarter of the Southwest Quarter;
South Half of the Southwest Quarter of the Southeast Quarter of the Southwest Quarter;
South Half of the Southeast Quarter of the Southwest Quarter of the Southwest Quarter;

Section 4: South Half of the South Half of the South Half;

Section 5: West Half;
West Half of the East Half;
South Half of the Southeast Quarter of the Southeast Quarter.

Section 6: All;

Section 7: All;

Section 8: All;
Section 9: All;
Section 10: West Half;
Northwest Quarter of the Northeast Quarter;
Section 15: West Half of the Northeast Quarter;
Northwest Quarter;
North Half of the Southwest Quarter;
Southeast Quarter;
Section 16: North Half;
Southwest Quarter;
Section 17: All;
Section 18: East Half;
East Half of the West Half;
Section 19: Northeast Quarter;
East Half of the Northwest Quarter;
Northeast Quarter of the Southeast Quarter;
Section 20: North Half;
Southwest Quarter;
Section 21: All;
Section 29: West Half of the Northwest Quarter;

TOWNSHIP 2 NORTH, RANGE 29, EAST OF THE WILLAMETTE MERIDIAN:

Section 3: All;
Section 11: All;
Section 12: Northeast Quarter;
North Half of the Northwest Quarter;
Southwest Quarter of the Northwest Quarter;
Northwest Quarter of the Southwest Quarter;
North Half of the Southeast Quarter;
Section 23: Northeast Quarter;
Section 24: East Half;

00004137

TOWNSHIP 2 NORTH, RANGE 30, EAST OF THE WILLAMETTE MERIDIAN:

- Section 5: North Half;
Southwest Quarter;
North Half of the Southeast Quarter;
- Section 6: Southwest Quarter of the Southwest Quarter;
East Half of the Southwest Quarter;
Southeast Quarter;
- Section 7: Northeast Quarter;
West Half;
Northwest Quarter of the Southeast Quarter;
- Section 8: West Half;
Southeast Quarter;
Southwest Quarter of the Northeast Quarter;
West Half of the Southeast Quarter of the Northeast Quarter;
- Section 18: West Half of the Northwest Quarter;
West Half of the East Half of the Northwest Quarter;
Southwest Quarter;
- Section 19: All;
- Section 20: West Half;
Southeast Quarter;
- Section 22: Southeast Quarter of the Southeast Quarter;
- Section 23: West Half of the Northeast Quarter;
- Section 24: Southwest Quarter of the Southwest Quarter;
- Section 29: West Half of the West Half;
- Section 30: East Half;
East Half of the Southwest Quarter;
- Section 31: All;

Section 32: West Half of the Northeast Quarter;
West Half of the Southeast Quarter of the Northeast Quarter;
South Half of the Southwest Quarter;
West Half of the Southeast Quarter;
West Half of the Northeast Quarter of the Southeast Quarter;
Northwest Quarter of the Southeast Quarter of the Southeast Quarter;

Excepting therefrom those tracts of land conveyed in Deeds recorded in Reel 22, Page 1722, and in Reel 236, Page 786, Umatilla County Microfilm Records.

TRACT III:

Commencing at a point 8.00 chains East of the center of Section 6, Township 2 North, Range 30; and running thence East 15.39 chains to the Southwest corner of the land conveyed to School District #28 by Deed recorded in Book 97, Page 449 of the Deed Records of Umatilla County Oregon; thence North along the West line of said School tract 60 feet; thence East along the North line of said School tract 3.50 chains; thence North 40° East 282 feet, more or less, along the Northwest line of said school tract to a point 31 rods and 220 feet West and 198 feet North of the Southeast corner of the Northeast Quarter of said Section 6; thence East along the North line of said School tract 220 feet to the Northeast corner thereof; thence North .40 chains, more or less, to the Southwesterly line of the land conveyed by the Oregon Railroad & Navigation Company to O.F. Steele, by Deed recorded in Book 56, Page 49 of the said Deed Records; thence along said Southwesterly line North 33° West 5.31 chains; thence North 24° West 10.73 chains to the Northwest corner of said lands so conveyed to Steele; thence at right angles Easterly 3.03 chains to the Southwesterly line of the

right of way of the O.R. & N. Railway Company (now O.W.R. & N. Co.); thence Northwesterly along said South Westerly right of way line 6.96 chains, more or less, to the center of the channel of the Umatilla River, as the same was on January 11, 1906; thence down the center of the channel of said river, as it was on said date to a point 8 chains East of the line running North and South through the center of said Section 6; thence South 19.65 chains, more or less, to the place of beginning.

Also: Beginning at the quarter post at the Southeast corner of the Northeast Quarter of Section 6, Township 2 North, Range 30; thence North on the East line of said Section 6, 80 feet, more or less, to a point in said east line that is 100 feet distant Southwesterly measured at right angles from the center line of the Main tract of the Railroad of The Oregon Railroad & Navigation Company, as said center line is now located and established; thence Northwesterly parallel to said center line and 100 feet distant at right angles therefrom to intersect a straight line drawn at right angles to said center line through a point in the same 1433 feet Northwesterly as measured on said center line from its intersection with said East line of said Section 6; thence Southwesterly at right angles to said center line 150 feet; thence Southeasterly and parallel to said center line to the South line of said Section 6; thence East on said South line to the point of beginning.

Excepting therefrom:

Commencing at a point 31 rods West of the Southeast corner of the Northeast Quarter of Section 6, Township 2 North, Range 30; thence North 240 feet; thence East 20 feet to the point of beginning; thence North 50 feet; thence East 100 feet; thence South 50 feet; thence West 100 feet to the point of beginning.

All being East of the Willamette Meridian, in the County of Umatilla and State of Oregon.

TRACT IV:

Beginning 31 rods West of the Southeast corner of the Southeast Quarter of the Northeast Quarter of Section 6, Township 2 North, Range 30, East of the Willamette Meridian; thence North 198 feet; thence West 220 feet; thence South 198 feet; thence East 220 feet to the place of beginning;

Excepting therefrom the following described tract of land:

Beginning 31 rods West of the Southeast corner of the Southeast Quarter of the Northeast Quarter of Section 6, Township 2 North, Range 30, East of the Willamette Meridian; thence North 198 feet; thence West 173 feet; thence South 198 feet; thence East 173 feet to the point of beginning;

All being East of the Willamette Meridian, in the County of Umatilla and State of Oregon.

TRACT V:

Beginning 31 rods West of the Southeast corner of the Southeast Quarter of the Northeast Quarter of Section 6, Township 2 North, Range 30, East of the Willamette Meridian; thence North 198 feet; thence West 173 feet; thence South 198 feet; thence East 173 feet to the point of beginning.

All being East of the Willamette Meridian, in the County of Umatilla and State of Oregon.

TRACT VI:

Commencing at a point 31 rods West of the Southeast corner of the Northeast Quarter of Section 6, Township 2 North, Range 30; thence North 240 feet; thence East 30 feet to the point of beginning; thence North 50 feet; thence East 100 feet; thence South 50 feet; thence West 100 feet to the point of beginning.

All being East of the Willamette Meridian, in the County of Umatilla and State of Oregon.

034640/00042/2130944v1

RECORDING REQUESTED BY
AND WHEN RECORDED
RETURN TO:

Tonkon Torp LLP
1600 Pioneer Tower
888 SW Fifth Avenue
Portland, OR 97204
Attn: David J. Petersen

(Space Above for Recorder's Use Only)

**MEMORANDUM OF LEASE AND
RIGHT OF FIRST REFUSAL**

THIS MEMORANDUM OF LEASE AND RIGHT OF FIRST REFUSAL ("Memorandum") is made and entered into as of April 23, 2010, by and between **Hoke Ranches**, an Oregon partnership which also took title as Hoke Ranches, a partnership consisting of Joan Hoke Corey, George H. Corey, Helen Hoke Levy and Louis Levy ("Landlord"), and **Element Power Wind Development, LLC**, a Delaware limited liability company ("Tenant").

1. Lease. For the term and upon the provisions set forth in that Renewable Energy Lease of even date herewith between Landlord and Tenant (the "Lease"), all of which provisions are specifically made a part hereof as though fully and completely set forth herein, Landlord hereby leases to Tenant, and Tenant hereby leases from Landlord, that certain real property (the "Premises") located in Umatilla County, Oregon, as more particularly described in Exhibit "A" attached hereto, together with all rights of ingress and egress and all other rights appurtenant to the Premises, as more particularly described in the Lease.

2. Term; Right of First Refusal. The term of the Lease shall expire five (5) years from the date of this Memorandum unless sooner terminated or extended pursuant to the Lease, and which is subject to possible extension for up to an additional thirty-two (32) years. Further, if Landlord receives an offer to lease the Premises or a portion thereof for wind energy purposes, commencing at or within eighteen (18) months after the end of the term of the Lease, Tenant shall have a right of first refusal for sixty (60) days thereafter to further extend the term of this Lease on the same material terms and conditions as the third-party offer.

3. Notice. This Memorandum is prepared for the purpose of giving notice of the Lease and in no way modifies the express provisions of the Lease. This Memorandum shall continue to constitute notice of the Lease, even if the Lease is subsequently amended.

IN WITNESS WHEREOF this Memorandum has been executed as of the date first written above.

[signatures on following page]

LANDLORD:

Hoke Ranches, an Oregon partnership
by Steven H. Corey and Robert L. Levy,
Authorized Agents

Steven H. Corey
Steven H. Corey, Authorized Agent

Robert L. Levy
Robert L. Levy, Authorized Agent

TENANT:

Element Power Wind Development, LLC, a
Delaware limited liability company

By: Element Power, US, LLC, a Delaware
limited liability company

Its: Manager

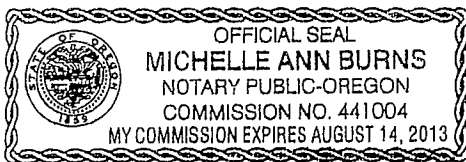
By: Chris Taylor
Its: _____

Chris Taylor
Chief Development Officer

STATE OF OREGON)
 : ss.
County of Umatilla)

I certify that I know or have satisfactory evidence that Steven H. Corey is the person who
appeared before me, and said person acknowledged that he signed this instrument as his free and
voluntary act and deed.

SUBSCRIBED TO and sworn before me on April 19, 2010.

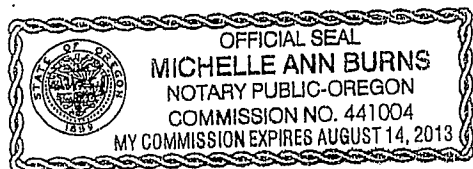


Michelle Burns
Notary Public for Oregon
My Commission Expires: 8/14/13

STATE OF OREGON)
 : ss.
County of Umatilla)

I certify that I know or have satisfactory evidence that Robert L. Levy is the person who appeared before me, and said person acknowledged that he signed this instrument as his free and voluntary act and deed.

SUBSCRIBED TO and sworn before me on April 19, 2010.



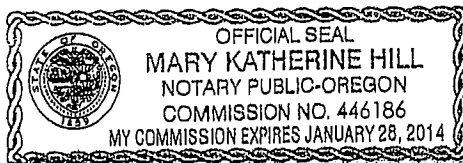
Michelle Burns
Notary Public for Oregon
My Commission Expires: 8/14/13

STATE OF OREGON)

COUNTY OF MULTNOMAH)

I certify that I know or have satisfactory evidence that Chris Taylor, Chief Dev. Officer of Element Power US, LLC, the manager of Element Power Wind Development, LLC, a Delaware limited liability company, is the person who appeared before me, and said person acknowledged that he signed this instrument, on oath stated that he is authorized to execute the instrument and acknowledged it to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

SUBSCRIBED TO and sworn before me on April 23, 2010.



Mary Katherine Hill
Notary Public for Oregon
My commission expires 1/28/2014

EXHIBIT A

All that real property located in Umatilla County, Oregon, described as follows:

TRACT I (MAP NO. IN-30, TAX LOT NO. 1800)

TOWNSHIP 1 NORTH, RANGE 30, E.W.M.

SECTION 27: NORTH HALF.

EXCEPTING THEREFROM, BEGINNING AT A POINT 87 RODS (1,435.5 FEET) EAST OF THE CENTER OF SAID SECTION 27; THENCE EAST 73 RODS (1,204.5 FEET) TO THE EAST LINE OF SAID SECTION 27; THENCE NORTH ALONG SAID EAST LINE, 80 RODS (1,320 FEET) THENCE IN A SOUTHWESTERLY DIRECTION TO THE POINT OF BEGINNING.

SECTION 27: ALL THAT PORTION OF THE SOUTHWEST QUARTER LYING WESTERLY OF COUNTY ROAD NO. 781.

SECTION 28: NORTHEAST QUARTER.
SOUTH HALF.

SECTION 33: NORTH HALF.

EXCEPTING THEREFROM ANY PORTION LYING WITHIN THE COUNTY ROAD RIGHT-OF-WAY.

ALL BEING EAST OF THE WILLAMETTE MERIDIAN, UMATILLA COUNTY, OREGON.

TRACT II (MAP NO. 2N-30A, TAX LOT NO. 1600 AND 2000)

TOWNSHIP 2 NORTH, RANGE 30, E.W.M.

SECTION 2: ALL THAT PORTION OF THE SOUTH HALF OF THE SOUTH HALF LYING SOUTHERLY OF THE O.W.R. & N. CO. RIGHT-OF-WAY.

SECTION 10: NORTHEAST QUARTER OF THE SOUTHEAST QUARTER.

SECTION 11: EAST HALF OF THE NORTHWEST QUARTER.
SOUTHWEST QUARTER OF THE NORTHWEST QUARTER.
ALL THAT PORTION OF THE NORTHEAST QUARTER LYING SOUTHWESTERLY OF THE O.W.R. & N. CO. RIGHT-OF-WAY.

SOUTHWEST QUARTER.
ALL THAT PORTION OF THE NORTHEAST QUARTER OF THE SOUTHEAST QUARTER LYING SOUTHERLY AND WESTERLY OF THE O.W.R. & N. CO. RIGHT-OF-WAY.

SECTION 12: ALL THAT PORTION OF THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER LYING SOUTHERLY OF THE O.W.R. & N. CO. RIGHT-OF-WAY.

SECTION 13: ALL THAT PORTION OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER LYING SOUTHWESTERLY OF A STRAIGHT LINE DRAWN FROM THE SOUTHEAST CORNER OF SAID SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER TO THE NORTHWEST CORNER OF SAID SOUTHEAST QUARTER OF

THE SOUTHWEST QUARTER.

SECTION 14: NORTHWEST QUARTER OF THE NORTHWEST QUARTER.
SOUTH HALF OF THE NORTHWEST QUARTER.

ALL BEING EAST OF THE WILLAMETTE MERIDIAN, UMATILLA COUNTY, OREGON.

034640/00042/2130662v1

00000000

RECORDING REQUESTED BY
AND WHEN RECORDED
RETURN TO:

Tonkon Torp LLP
1600 Pioneer Tower
888 SW Fifth Avenue
Portland, OR 97204
Attn: David J. Petersen

(Space Above for Recorder's Use Only)

**MEMORANDUM OF LEASE AND
RIGHT OF FIRST REFUSAL**

THIS MEMORANDUM OF LEASE AND RIGHT OF FIRST REFUSAL ("Memorandum") is made and entered into as of April 23, 2010, by and between **Mud Springs Ranches**, an Oregon corporation ("Landlord"), and **Element Power Wind Development, LLC**, a Delaware limited liability company ("Tenant").

1. Lease. For the term and upon the provisions set forth in that Renewable Energy Lease of even date herewith between Landlord and Tenant (the "Lease"), all of which provisions are specifically made a part hereof as though fully and completely set forth herein, Landlord hereby leases to Tenant, and Tenant hereby leases from Landlord, that certain real property (the "Premises") located in Umatilla County, Oregon, as more particularly described in Exhibit "A" attached hereto, together with all rights of ingress and egress and all other rights appurtenant to the Premises, as more particularly described in the Lease.

2. Term; Right of First Refusal. The term of the Lease shall expire five (5) years from the date of this Memorandum unless sooner terminated or extended pursuant to the Lease, and which is subject to possible extension for up to an additional thirty-two (32) years. Further, if Landlord receives an offer to lease the Premises or a portion thereof for wind energy purposes, commencing at or within eighteen (18) months after the end of the term of the Lease, Tenant shall have a right of first refusal for sixty (60) days thereafter to further extend the term of this Lease on the same material terms and conditions as the third-party offer.

3. Notice. This Memorandum is prepared for the purpose of giving notice of the Lease and in no way modifies the express provisions of the Lease. This Memorandum shall continue to constitute notice of the Lease, even if the Lease is subsequently amended.

IN WITNESS WHEREOF this Memorandum has been executed as of the date first written above.

[signatures on following page]

00004147

LANDLORD:

Mud Springs Ranches, an Oregon corporation

By: Steven H. Cory
Its: Secretary

TENANT:

Element Power Wind Development, LLC, a
Delaware limited liability company

By: Element Power US, LLC, a Delaware
limited liability company
Its: Manager

By: Chris Taylor
Its: Chris Taylor

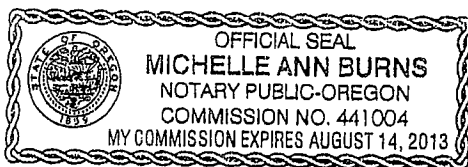
Chris Taylor
Chief Development Officer

STATE OF OREGON)

COUNTY OF Umatilla)

I certify that I know or have satisfactory evidence that Steven H. Cory Secretary
of Mud Springs Ranches, an Oregon corporation, is the person who appeared before me, and said
person acknowledged that he signed this instrument, on oath stated that he is authorized to
execute the instrument and acknowledged it to be the free and voluntary act of such party for the
uses and purposes mentioned in the instrument.

SUBSCRIBED TO and sworn before me on April 5, 2010.



Michelle Burns
Notary Public for Oregon
My commission expires 8/14/13

STATE OF OREGON

COUNTY OF MULTNOMAH

I certify that I know or have satisfactory evidence that Chris Taylor, Chief Dev. Officer of Element Power US, LLC, the manager of Element Power Wind Development, LLC, a Delaware limited liability company, is the person who appeared before me, and said person acknowledged that he signed this instrument, on oath stated that he is authorized to execute the instrument and acknowledged it to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

SUBSCRIBED TO and sworn before me on April 23, 2010.



Mary Katherine Hill
Notary Public for Oregon
My commission expires 1/28/2014

EXHIBIT A

All that real property located in Umatilla County, Oregon, described as follows:

Township 2 North, Range 30, E.W.M.

Section 10: Northwest Quarter of the Southeast Quarter. South Half of the South Half.

Section 13: All that portion of the Southeast Quarter of the Southwest Quarter lying Southwesterly of a straight line drawn from the Southeast corner of said Southeast Quarter of the Southwest Quarter to the Northwest corner of said Southeast Quarter of the Southwest Quarter.

Section 14: South Half of the South Half. Northwest Quarter of the Southwest Quarter.

Section 15: East Half. Northwest Quarter.

Section 22: East Half of the Northeast Quarter. Southwest Quarter of the Northeast Quarter. Northeast Quarter of the Southeast Quarter. Southwest Quarter of the Southeast Quarter. South Half of the Southwest Quarter. Northwest Quarter of the Southwest Quarter.

Section 23: West Half. East Half of the East Half.

Section 24: West Half of the Northeast Quarter.

Excepting therefrom that tract of land conveyed to Bill Wolfe Ranches, Inc., an Oregon corporation by Deed recorded in Instrument No. 2003-4350090, Office of Umatilla County Records.

Section 25: West Half. Southeast Quarter.

Section 26: North Half of the Northeast Quarter. Southeast Quarter of the Northeast Quarter. North Half of the Southeast Quarter. Southwest Quarter of the Southeast Quarter. East Half of the Southwest Quarter.

Section 27: All.

Section 35: North Half of the North Half.

Section 36: All.

Excepting therefrom any portion of the described lands lying within the County Road right-of-ways.

All being East of the Willamette Meridian, Umatilla County, Oregon.

Township 1 North, Range 30, E.W.M.

Section 1: All that portion of the North Half, lying Westerly of County Road right-of-way.

Section 2: Northeast Quarter.

Excepting therefrom any portion of the described lands lying within the County Road right-of-ways.

All being East of the Willamette Meridian, Umatilla County, Oregon.

RECORDING REQUESTED BY
AND WHEN RECORDED
RETURN TO:

Tonkon Torp LLP
1600 Pioneer Tower
888 SW Fifth Avenue
Portland, OR 97204
Attn: David J. Petersen

(Space Above for Recorder's Use Only)

**MEMORANDUM OF LEASE AND
RIGHT OF FIRST REFUSAL**

THIS MEMORANDUM OF LEASE AND RIGHT OF FIRST REFUSAL ("Memorandum") is made and entered into as of April 23, 2010, by and between **Pendleton Ranches, Inc.**, an Oregon corporation ("Landlord"), and **Element Power Wind Development, LLC**, a Delaware limited liability company ("Tenant").

1. Lease. For the term and upon the provisions set forth in that Renewable Energy Lease of even date herewith between Landlord and Tenant (the "Lease"), all of which provisions are specifically made a part hereof as though fully and completely set forth herein, Landlord hereby leases to Tenant, and Tenant hereby leases from Landlord, that certain real property (the "Premises") located in Umatilla County, Oregon, as more particularly described in Exhibit "A" attached hereto, together with all rights of ingress and egress and all other rights appurtenant to the Premises, as more particularly described in the Lease.

2. Term; Right of First Refusal. The term of the Lease shall expire five (5) years from the date of this Memorandum unless sooner terminated or extended pursuant to the Lease, and which is subject to possible extension for up to an additional thirty-two (32) years. Further, if Landlord receives an offer to lease the Premises or a portion thereof for wind energy purposes, commencing at or within eighteen (18) months after the end of the term of the Lease, Tenant shall have a right of first refusal for sixty (60) days thereafter to further extend the term of this Lease on the same material terms and conditions as the third-party offer.

3. Notice. This Memorandum is prepared for the purpose of giving notice of the Lease and in no way modifies the express provisions of the Lease. This Memorandum shall continue to constitute notice of the Lease, even if the Lease is subsequently amended.

IN WITNESS WHEREOF this Memorandum has been executed as of the date first written above.

[signatures on following page]

00004151

00004151

LANDLORD:

Pendleton Ranches, Inc., an Oregon corporation

By: [Signature]
Its: Steven H. Corey
Secretary

TENANT:

Element Power Wind Development, LLC, a Delaware limited liability company

By: Element Power US, LLC, a Delaware limited liability company
Its: Manager

By: [Signature]
Its: [Signature]

STATE OF OREGON

COUNTY OF Umatilla

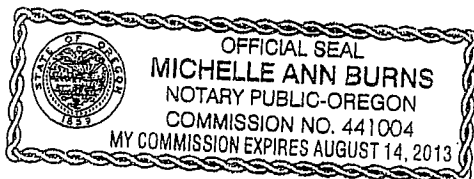
)
)
)

Chris Taylor
Chief Development Officer

I certify that I know or have satisfactory evidence that Steven H. Corey, Secretary of Pendleton Ranches, Inc., an Oregon corporation, is the person who appeared before me, and said person acknowledged that he signed this instrument, on oath stated that he is authorized to execute the instrument and acknowledged it to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

SUBSCRIBED TO and sworn before me on April 5, 2010.

Michelle Burns
Notary Public for Oregon
My commission expires 8/14/13



8/14/13

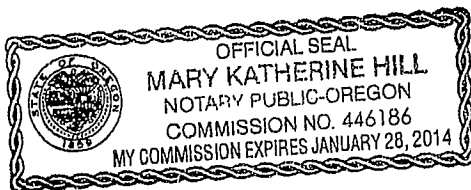
00004152

STATE OF OREGON)

COUNTY OF MULTNOMAH)

I certify that I know or have satisfactory evidence that Chris Taylor, Chief Dev. Officer of Element Power US, LLC, the manager of Element Power Wind Development, LLC, a Delaware limited liability company, is the person who appeared before me, and said person acknowledged that he signed this instrument, on oath stated that he is authorized to execute the instrument and acknowledged it to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

SUBSCRIBED TO and sworn before me on April 23, 2010.



Mary Katherine Hill
Notary Public for Oregon
My commission expires 11/28/2014

00004153

EXHIBIT A

All that real property located in Umatilla County, Oregon, described as follows:

Township 1 North, Range 29 East, W.M.

Section 12: S $\frac{1}{2}$
Section 13: All
Section 14: All
Section 15: E $\frac{1}{2}$
Section 23: All
Section 24: All
Section 25: All
Section 26: All
Section 35: N $\frac{1}{2}$

Township 2 North, Range 29 East, W.M.

Section 1: NW $\frac{1}{4}$, S $\frac{1}{2}$
Section 2: E $\frac{1}{2}$, E $\frac{1}{2}$ W $\frac{1}{2}$
Section 10: All
Section 12: SE $\frac{1}{4}$ NW $\frac{1}{4}$, NE $\frac{1}{4}$ SW $\frac{1}{4}$, S $\frac{1}{2}$ S $\frac{1}{2}$
Section 13: All
Section 14: All
Section 15: All
Section 22: N $\frac{1}{2}$ N $\frac{1}{2}$
Section 23: NW $\frac{1}{4}$
Section 24: W $\frac{1}{2}$
Section 25: All
Section 36: All

Township 1 North, Range 30 East, W.M.

Section 1: SW $\frac{1}{4}$
Section 2: W $\frac{1}{2}$, SE $\frac{1}{4}$
Section 3: NE $\frac{1}{4}$, N $\frac{1}{2}$ SE $\frac{1}{4}$, N $\frac{1}{2}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$, SE $\frac{1}{4}$ SE $\frac{1}{4}$, NW $\frac{1}{4}$, N $\frac{1}{2}$ SW $\frac{1}{4}$, N $\frac{1}{2}$ S $\frac{1}{2}$ SW $\frac{1}{4}$,
N $\frac{1}{2}$ SE $\frac{1}{4}$ SW $\frac{1}{4}$ SW $\frac{1}{4}$, N $\frac{1}{2}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$ SW $\frac{1}{4}$
Section 4: N $\frac{1}{2}$, N $\frac{1}{2}$ S $\frac{1}{2}$, N $\frac{1}{2}$ S $\frac{1}{2}$ S $\frac{1}{2}$
Section 5: N $\frac{1}{2}$ SE $\frac{1}{4}$ SE $\frac{1}{4}$, E $\frac{1}{2}$ NE $\frac{1}{4}$, NE $\frac{1}{4}$ SE $\frac{1}{4}$
Section 10: E $\frac{1}{2}$ NE $\frac{1}{4}$, SW $\frac{1}{4}$ NE $\frac{1}{4}$
Section 11: S $\frac{1}{2}$ N $\frac{1}{2}$, N $\frac{1}{2}$ S $\frac{1}{2}$
Section 12: N $\frac{1}{2}$, N $\frac{1}{2}$ SW $\frac{1}{4}$, SE $\frac{1}{4}$ except that portion of the E $\frac{1}{2}$ lying Easterly of County Road
No. 1361 (781), and Northerly of County Road No. 1350 (780)
Section 18: W $\frac{1}{2}$ W $\frac{1}{2}$
Section 19: W $\frac{1}{2}$ NW $\frac{1}{4}$, SW $\frac{1}{4}$, W $\frac{1}{2}$ SE $\frac{1}{4}$, SE $\frac{1}{4}$ SE $\frac{1}{4}$
Section 20: SE $\frac{1}{4}$
Section 28: NW $\frac{1}{4}$
Section 29: E $\frac{1}{2}$, E $\frac{1}{2}$ NW $\frac{1}{4}$, SW $\frac{1}{4}$

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Section 30: All
Section 31: All
Section 32: All

Township 2 North, Range 30 East, W.M.

Section 7: E $\frac{1}{2}$ SE $\frac{1}{4}$, SW $\frac{1}{4}$ SE $\frac{1}{4}$
Section 9: S $\frac{1}{2}$
Section 11: S $\frac{1}{2}$ SE $\frac{1}{4}$, NW $\frac{1}{4}$ SE $\frac{1}{4}$
Section 12: All that portion of the SW $\frac{1}{4}$ SW $\frac{1}{4}$ lying Southerly of the O.W.R.&N Co. right of way
Section 13: W $\frac{1}{2}$ W $\frac{1}{2}$
Section 14: NE $\frac{1}{4}$, NE $\frac{1}{4}$ NW $\frac{1}{4}$, NE $\frac{1}{4}$ SW $\frac{1}{4}$, N $\frac{1}{2}$ SE $\frac{1}{4}$
Section 15: SW $\frac{1}{4}$
Section 16: All
Section 17: All
Section 18: NE $\frac{1}{4}$, E $\frac{1}{2}$ E $\frac{1}{2}$ NW $\frac{1}{4}$
Section 20: NE $\frac{1}{4}$
Section 21: All
Section 22: NW $\frac{1}{4}$ NE $\frac{1}{4}$, NW $\frac{1}{4}$, NW $\frac{1}{4}$ SE $\frac{1}{4}$, NE $\frac{1}{4}$ SW $\frac{1}{4}$
Section 24: NW $\frac{1}{4}$ NW $\frac{1}{4}$, S $\frac{1}{2}$ NW $\frac{1}{4}$, N $\frac{1}{2}$ SW $\frac{1}{4}$
Section 28: All
Section 29: E $\frac{1}{2}$, E $\frac{1}{2}$ W $\frac{1}{2}$
Section 30: NW $\frac{1}{4}$, W $\frac{1}{2}$ SW $\frac{1}{4}$
Section 32: NE $\frac{1}{4}$ NE $\frac{1}{4}$, E $\frac{1}{2}$ SE $\frac{1}{4}$ NE $\frac{1}{4}$, E $\frac{1}{2}$ E $\frac{1}{2}$ SE $\frac{1}{4}$, SW $\frac{1}{4}$ SE $\frac{1}{4}$ SE $\frac{1}{4}$, NW $\frac{1}{4}$, N $\frac{1}{2}$ SW $\frac{1}{4}$
Section 33: All
Section 34: W $\frac{1}{2}$, SE $\frac{1}{4}$

Township 3 North, Range 29 East, W.M.

Section 36: SW $\frac{1}{4}$ SW $\frac{1}{4}$

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