# Other Groups Comments

Letter OG1

BURNEY
CHAMBER OF COMMERCE
37098 Main Street • P.O. Box 36 • Burney, CA 96013
(530) 335-2111

January 14, 2008

Shasta County Department of Resource Management
Planning Division
Attn: Mr. Bill Walker
1855 Placer Street, #103
Redding, CA 96001

Dear Mr. Walker:

At the general meeting of the Chamber of Commerce this date, the Officers, Board of Directors, and Chamber members present discussed the Hatchet Ridge Wind Project. After much discussion, the decision was made to support the Project. OG1-1

At a public meeting held last year, a second meeting was to be held in Burney scheduled by Shasta County officials to discuss the financial impact on the community. This is of great concern to many residents and we feel the meeting should be soon.

If you have any questions or concerns, please feel free to contact me at 335-3636. I will be out of the office until January 28, 2008. OG1-2

Kindest regards,

Pam Giacomini

Pam Giacomini
President

DEPARTMENT OF RESOURCE MANAGEMENT RECEIVED
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PLANNING/BUILDING DIVISIONS

# Letter OG1 Burney Chamber of Commerce

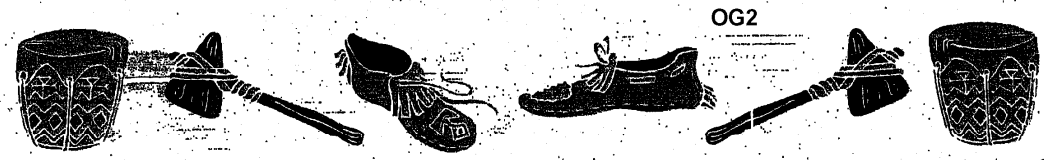
## Response to Comment OG1-1

It is noted that the Burney Chamber of Commerce supports approval of the proposed project.

## Response to Comment OG1-2

This comment supports additional public hearings on the project in the near future.

OG2



Pit River Tribe
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# Fax Transmittal Form

Number of Pages 4 (including Cover Page)

To: Bill Walker – Senior Planner

From: Natural Resources Dept. of Pit River Tribe

Date: 1-28-08

Fax #: 530-245-6468

Message: Please see attached comments from the Pit River Tribe regarding the Proposed Windmill Project.
Thank you.
Rae

Have A Good Day

**JESSICA JIM**
**TRIBAL CHAIRMAN**

**IDA RIGGINS**
**VICE-CHAIR**

**SHONDA ANNIS**
**TRIBAL SECRETARY**

PIT RIVER TRIBE

**PIT RIVER TRIBE**
**37118 Main Street**
**Burney, CA 96013**

**Telephone**
**(530) 335 5421**
**(530) 335 3140 FAX**

**ELEVEN AUTONOMOUS BANDS**

ATWAMSINI ASTARAWI ATSUGEWI APORIGE AJUMAWI

HEWISEDAWI ILLMAWI ITSATAWI KOSEALEKTE HAMMAWI

1/28/2008

Bill Walker, Senior Planner
Shasta County Department of Resource Management, Planning Division
Suite 103
1855 Placer Street
Redding CA 96001
530-225-5532

**Re: Hatchet Ridge Windmill Project**

Dear Mr. Walker,

The purpose of these comments to Shasta County and future licensee is to reveal the Pit River Indian Tribe concerns in the project area that is being prepared for development. The Tribe has some serious concerns regarding the project and its impacts on the natural and cultural resources at this site held sacred to the Itsatawi and Atsugewi Bands of the Pit River Nation. OG2-1

This document is not an opposition letter to alternative forms of energy to reduce cumulative effects of nonrenewable energy resources. The Tribe will however take the position that takes into account the Bald and Golden Eagle Act as well as the Migratory Bird Treaty Act. Based on the information provided within the report, it is the Tribe's opinion that the windmill project will result in a violation of both of these Acts. However, given the nature of these Acts and violations by other windmill projects (ie Altamont Pass), the Tribe still has some serious questions with EIR and what the cumulative impacts might be to the areas bird populations. OG2-2

**BRIEF HISTORY OF THE PIT RIVER INDIAN and THE WIND MILL PROJECT AREA**

Pit River Indians traditionally utilized this area for their subsistence and spirituality for thousands of years. Their existence was only one part of the watershed's ecosystem life cycle. Until disease, murder, and removal to reservations reduced the Pit River Indian population, a handful struggled to continue this cycle harmoniously with the earth. The project area is well-documented in ethnographic studies. Projects, such as these that propose to kill the eagles and other birds in the Pit River Indian's ecosystem is another direct threat to their religious freedom. OG2-3

**MADESI**

During the period of major hydropower development and rapid destruction of the fishery, many of the Pit Rivers greatest warriors were adopted by the United States government to fight battles in Europe, Japan, Vietnam, and Korea. Ironically, while their warriors were away fighting the United States battles, the remaining Pit Rivers, like many other California Indians, were still practicing the Native American's traditional way-of-life and fighting for land claims. Although they were seen as homeless, occupiers, and trespassers on their own traditional lands, they struggled to practice the cultural ways that allowed them to exist in the Pit River Watershed for over 8000 years. Between 1910 and 1940, the federal government finally deeded Rancherias and a large Reservation to the "homeless Pit River Indian." At the same time several thousands of acres were put into trust with the federal government. It is these lands that compose the sovereign nation of the Pit River Tribe. In 1967 the Tribe formed its constitution. In 1984 the Pit River Nation became federally recognized. Since 1995, the Tribe engaged in building program capacity to manage natural and cultural resources recognized in Docket 347 of the Department of Interior Land Claims Commission and their 1967 constitution. The programs are responsible for several thousands of acres within the Pit River and McCloud watersheds. Cultural and watershed restoration projects on these lands are often inter-agency efforts. This windmill project occurs within the lands recognized in Docket 347.

OG2-4

HABITAT IMPROVEMENT PROJECTS UNDONE?

Within the past 10 years, the Tribe has proposed and implemented many habitat improvement projects for the bald eagle, greater sandhill cranes, and other birds that will likely be killed by the windmill project. The Tribe has concerns that this windmill project will undo such habitat improvement work on Tribal Land. Additionally, due to the migratory nature of birds, other Tribal and sovereign nations may be impacted by the project. We believe that this concern can be alleviated if Shasta County and the future licensee receive meaningful input from the Tribe, state and federal agencies, conservation groups, raptor biologists, and leaders of other sovereign nations. We suggest to Shasta County and the future licensee to fund a stakeholders group. Once a stakeholder group is organized, we propose that Shasta County and the future windmill licensee fund extensive and long-term monitoring at the project site and within the Pit River Watershed to determine impact to bird populations on Tribal and public lands.

OG2-5

ECONOMIC IMPACTS

Since the federal and state governments have subsidized several conservation easements and habitat improvement projects, we would like the County to address the economic impacts to these conservation easements and other subsidy programs that promote special-status bird habitat protection. We would like some guarantee that habitat improvement projects will continue to be funded even if birds are continually killed. Perhaps the funded stakeholder group can act as a third party that guarantees that Shasta County and the licensee will be responsible to pay for habitat improvement projects to promote a "no-net loss-of-bird-life" policy. Of course, research and monitoring would have to be funded and conducted to determine what the baseline populations might be.

OG2-6

BALD AND GOLDEN EAGLE ACT and MIGRATORY BIRD TREATY ACT

The Tribe requests pre and post-construction quantitative and qualitative information to gauge cumulative impacts regarding impacts to bird populations listed in the Bald and Golden Eagle Act and Migratory Bird Treaty Act. In other words, does Shasta County or

OG2-7

**MADESI**

the future licensee see a future "take" from these populations? Will a decline be measurable or observable in the species in these Acts? Is Shasta County or the project licensee prepared to fund monitoring efforts for qualitative and quantitative monitoring efforts?

Because of the nature of migratory birds, several nest on Tribal jurisdictional lands in the Upper and Lower Pit River Watershed. Is Shasta County or the future licensee prepared to fund monitoring and mitigate bird population loss on Tribal Lands?

OG2-7 cont.

GOVERNMENT-TOGOVERNMENT CONSULTATION

In addition to these scientific questions, we have some concerns with Shasta County's diplomacy experience or knowledge of government-to-government consultations. Is Shasta County prepared to work with the Tribe and leaders of other sovereign nations? We believe that this project warrants a government-to-government consultation with the Pit River Tribal government and Shasta County Board of Supervisors.

OG2-8

CULTURAL RESOURCES

Cultural resources can be found within this unit. The cultural resources include, but are not limited to, sacred sites, traditional and medicinal plants, Native American artifacts, and human remains. The Tribe maintains that the artifacts and human remains are their responsibility. The Tribe will utilize all laws to protect these resources. The Tribe will want to work with Shasta County and develop to assure all artifacts are curated by the Pit River Tribe.

OG2-9

NOXIOUS WEEDS

The Tribe request's that best management practices outline practices that control the spread of noxious weeds within the project area.

OG2-10

Respectfully,

Natural Resources and Roads Program

**MADESI**

# Letter OG2 Pit River Tribe

## Response to Comment OG2-1

This comment expresses the Pit River Tribe's serious concerns about the project's impacts on natural and cultural resources.

## Response to Comment OG2-2

The Tribe suggests its support of renewable resources, but it also has concerns related to the possible violation of the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act.

## Response to Comment OG2-3

The Tribe notes its historic use of the project area and the project's potential to pose a "direct threat to their religious freedom."

## Response to Comment OG2-4

This comment provides background information regarding the Pit River Tribe and its federal status under Docket 347 of the Department of Interior Land Claims Commission.

## Response to Comment OG2-5

Neither the County nor consulting state agencies are aware of habitat restoration efforts by the Pit River Tribe conducted in the project area. As addressed in the responses to comments submitted by the California Department of Fish and Game and the Wintu Audubon Society, formation of a stakeholder group does not mitigate or lessen the significance of potential impacts, and is, therefore, not proposed as mitigation in the Draft EIR. However, as part of the proposed mitigation, a monitoring/adaptive management program and formation of a Technical Advisory Committee are included in revised Mitigation Measure BIO-6.

## Response to Comment OG2-6

CEQA does not require an assessment of the economic impacts of a proposed project in an EIR. While the County could consider conservation easements and stakeholder groups as a condition of approval of the proposed project, as suggested by the Pit River Tribe in this comment, these activities have not been included in the Draft EIR because neither would substantially lessen any identified environmental impacts, such as avian mortality. Neither Shasta County nor the project applicant has announced any plans "to fund monitoring or mitigation for bird population loss on Tribal lands" as expressed in the comment. However, offsite mitigation for habitat has been added as part of revised Mitigation Measure BIO-6.

## Response to Comment OG2-7

The EIR sets forth extensive monitoring requirements to determine if the impacts resulting from project operations are substantially different from those predicted in the Draft EIR, and has identified mitigation measures to minimize those impacts if they exceed predictions. See also the responses to Comment PA1-4 which summarizes the additional mitigation requirements determined in consultation with the California Department of Fish and Game. Please refer to revised Mitigation Measure BIO-6 in Chapter 3 of the Final EIR.

## Response to Comment OG2-8

Relationships between the Tribe and the County are beyond the scope of environmental analysis as mandated by CEQA; accordingly, this issue is not addressed in the Draft EIR.

## Response to Comment OG2-9

Comment noted. Impacts on cultural resources and coordination with the Pit River Tribe are disclosed in Section 3.5 of the Draft EIR.

## Response to Comment OG2-10

Measures to control the spread of noxious weeds are provided in Mitigation Measure BIO-2 in the Draft EIR.

**Letter OG3**

**REMY, THOMAS, MOOSE and MANLEY, LLP**
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VIA FACSIMILE
Original to follow by Federal Express

January 28, 2008

Mr. Bill Walker
Senior Planner, Planning Division
Shasta County Dept. of Resource Management
1855 Placer Street, Suite 103
Redding, California 96001

Re: Comments on Draft EIR for the Hatchet Ridge Wind Project

Dear Mr. Walker:

On behalf of the applicant, Hatchet Ridge Wind LLC (HRW), I submit the following comments on the Draft EIR for the Hatchet Ridge Wind Project. HRW appreciates the hard work by you and your staff to prepare and produce the EIR for this important project for the County.

In general, HRW agrees with most of the County's analysis and conclusions regarding the potential impacts of the project. There are, however, several important clarifications HRW requests to make in the analysis and recommended mitigation measures that will be presented in the Final EIR.

**OG3-1**

Biological Resources

Under separate cover, HRW's biological consultant, Dave P. Young, of Western Ecosystems Technology, Inc. (WEST) is submitting his comments on the Draft EIR's biological resources analysis and recommended mitigation. As his comments explain, HRW believes that the Draft EIR overstates the magnitude of the potential impacts to the Butte County morning glory, and that the impacts are likely to be much less severe than

**OG3-2**

the Draft EIR's analysis suggests. Mr. Young's conclusions are not based on the wishful thinking of the applicant, but rather, the most recent and site-specific information available. Additionally, Mr. Young suggests several refinements to the thresholds of significance and resulting mitigation proposed for impacts to avian and bat species (Mitigation Measure BIO-6). HRW, through Mr. Young, has provided substantial evidence in support of the revised significance conclusions and mitigation measures proposed in his letter. HRW respectfully requests that the County and EIR consultant carefully consider the evidence and comments submitted so that the biological resource analysis and resulting recommendations for mitigation in the Final EIR are as accurate and fair as possible.

**OG3-2 cont.**

**OG3-3**

Cultural Resources

I am also enclosing the comments of Nicole Hughes, an experienced Registered Professional Archaeologist, for Renewable Energy Systems Americas Inc., HRW's affiliate company, regarding the Draft EIR's analysis and proposed mitigation for cultural resources. RES's most significant concern about the cultural resources analysis is the recommendation to record the project site as a "traditional cultural property." As Ms Hughes explains, this designation is a creature of federal law, not CEQA or any other state law. The recommendation to record the property with a federal designation is inappropriate and excessive because federal regulations pertaining to cultural resources are not applicable to this project due to the lack of jurisdiction of federal permitting agencies over the project. The analysis and proposed mitigation should be revised to properly investigate whether the property meets the criteria for eligibility to the *state* Register of Historical Resources, as explained by Ms. Hughes.

**OG3-4**

Ms. Hughes also describes RES's extensive previous and ongoing efforts to work with the Pit River Tribe to operate the wind power project with sensitivity to the Tribe's concerns. As a lessee and not the owner of the project property, however, RES cannot agree to implement mitigation that would allow access and property rights to third parties that the property owners will not grant.

**OG3-5**

Feasibility of Project Alternatives

Although the goal under CEQA is for a lead agency to analyze a wide range of potentially feasible alternatives to a project that would result in significant impacts, the site- and fact-specific circumstances of individual projects sometimes lead the agency to the unavoidable but proper conclusion that no other project alternative is feasible. This project is such an example, as the alternatives analysis of the Draft EIR explains. RES, through its earlier communications and the additional information presented in Ms. Hughes' second letter attached hereto, has provided substantial evidence to the County

**OG3-6**

explaining how the unique physical constraints of the project site and the economic considerations of wind power generation result in the proposed project being the only feasible design and configuration the applicant can build. As Ms. Hughes' letter explains, RES has investigated the suggestion of the Wintu Audubon Society in its January 22, 2008 comments to use vertical axis wind turbines (VAWT) at the project site, but found that VAWT technology is not without its own flaws and potentially significant effects at this site. For example, the footprint of such turbines is much larger than the turbines proposed to be used, thereby potentially increasing the scope of the impact on Butte County morning glory that the Draft EIR considered. Furthermore, the height of VAWTs is only 29 meters, which would not work well in the timberland setting of the Hatchet Ridge project site, where trees will interfere with the wind at that lower height. Moreover, the company that manufactures the VAWT Audubon recommends currently does not have a turbine that even produces 1 MW; thus, HRW would need to install almost three times as many turbines as proposed for this project to produce 102 MW, the minimum capacity project size that is economically feasible for HRW to construct. The design of the VAWTs Audubon recommends also have a much bulkier silhouette than the traditional design HRW proposes, and could therefore result in significantly different and more adverse visual effects if VAWTs were installed on the project site.

**OG3-6 cont.**

**OG3-7**

RES has further investigated the specifications of the various models of turbines that would work for the site, and has settled on a 2.4 MW turbine because this model would allow the fewest number of turbines to be installed to achieve the minimum feasible 102 MW project capacity. Using the 2.4 MW turbines, HRW could install just 43 turbines, the lowest end in the range analyzed in the EIR, thereby keeping the project's visual impacts, as well as the footprint-related impacts on vegetation like the Butte County morning glory, to the minimum level possible. HRW would also have to remove fewer trees to install and maintain the turbines than it would if it selected lower-megawatt producing turbines. The most beneficial aspect of using these few turbines is that the potential for avian and bat strikes would be kept to the lowest possible level.

**OG3-8**

Greenhouse Gas Emission Comparisons

The Draft EIR notes that the project's cumulative contribution to air quality impacts is considered beneficial (DEIR, p. 4-4), but HRW believes that more details on this point are warranted in the Final EIR. The proposed project would help reduce the state's dependence on energy derived from fossil fuels, ultimately reducing cumulative greenhouse gas emissions. By generating energy from the proposed project in lieu of construction of a coal-, oil-, or natural-gas-burning facility to meet increased energy needs, the proposed project would help to reduce dependency on fossil fuels that have significantly greater operational emissions of $CO_2$, the leading greenhouse gas associated with global warming. For example, for every kilowatt-hour (kWh) generated, 2.13, 1.03,

**OG3-9**

and 1.56 pounds of $CO_2$ are produced from coal, natural gas, and oil burning, respectively. (Wind Energy Fact Sheet, by American Wind Energy Association, attached.) By comparison, wind power generates no $CO_2$. A single 750-kW wind turbine, operated for one year at a site with Class 4 wind speeds (winds averaging 12.5-13.4 mph at 10 meters height), can be expected to displace a total of 2,697,175 pounds of $CO_2$, 14, 172 pounds of $SO_2$, and 8,688 pounds of NOx, based on the U.S. average utility generation fuel mix. (*Ibid*.) The larger 2.4 mW turbines proposed to be used at the Hatchet Ridge project site could be expected to achieve even greater savings. **OG3-9 cont.**

According to the American Wind Energy Association, emissions from the manufacture and installation of wind turbines are negligible. The measure of how long a wind farm must operate to generate the amount of electricity required for its manufacture and construction is 3 to 8 months, depending on the wind speed at the site – one of the shortest of any energy technology.

As the attached materials from the U.S. Department of Energy and American Wind Energy Association explain, the air pollutant and greenhouse gas emissions savings of wind power are significant as compared to energy generated from fossil fuel combustion. Therefore, HRW believes that the operation of the Hatchet Ridge Wind Project will cumulatively benefit air quality in the Sacramento Valley Air Basin and that this beneficial impact should be further explained in the Final EIR. **OG3-10**

Other Considerations

At two other points in the EIR, HRW requests minor clarifications or revision to the proposed mitigation. First, for Mitigation Measure AES-1 (page 3.1-13), the Draft EIR proposes to require the applicant to use a "rapid-discharge flashing red light" on each of the end turbines along the ridgeline, rather than a single incandescent light. As the Draft EIR notes, the FAA dictates the type of safety lighting that must be installed to reduce hazards to aircraft and HRW must consult with FAA prior to project construction regarding the type of light FAA will require. HRW is not in a position to agree to a condition that may be contrary to what FAA will require; thus, HRW requests that the mitigation measure be revised to state that while a rapid-discharge flashing red light is preferred by the County and that preference will be communicated to FAA, HRW will be required to install whatever type of light is ultimately required by FAA. **OG3-11**

Second, in Mitigation Measure AIR-1 (page 3.3-11), one of the "Standard Mitigation Measures" listed for control of particulate matter is to suspend all land clearing, grading, earth moving, and excavation activities on the project when winds are expected to exceed 20 miles per hour. Given that a wind power project was proposed for this site precisely *because* the winds regularly exceed 20 miles per hour, this restriction could result in **OG3-12**

making it extremely difficult to complete construction of the project within the short summer construction season afforded by the local weather and site altitude. In order to ensure adequate $PM_{10}$ control if this restriction were deleted, HRW proposes to increase the frequency of watering of the construction site and material stockpiles during windy conditions.

**OG3-12 cont.**

Conclusion

Again, HRW agrees with and supports most of the Draft EIR's analysis and proposed mitigation as adequate and consistent with CEQA's requirements. On these few but important points, however, HRW respectfully requests that the County consider the expert evidence submitted with these letters in preparing responses to comments and revising the analysis and mitigation presented in the Final EIR.

**OG3-13**

Please do not hesitate to contact me if you have any questions regarding these comments. Thank you for your consideration of these matters.

Sincerely,

Sabrina Teller

Sabrina V. Teller

Enclosures

WIND ENERGY FACT SHEET

American Wind Energy Association
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# Comparative Air Emissions Of Wind and Other Fuels

Wind energy's most important environmental benefit is its lack of emissions of both air pollutants and greenhouse gases when compared with alternative methods of generating electricity.

The American Wind Energy Association (AWEA) has developed a set of statistics to quantify the comparative emissions of wind and other fuels, based on data gathered by the U.S. Department of Energy's Energy Information Administration (EIA)[1], which collects information on the U.S. utility industry.

This, and similar fact sheets, can be found online at http://www.awea.org/pubs/factsheets.html.

**For carbon dioxide ($CO_2$), the leading greenhouse gas associated with global warming, comparative emissions during electricity generation are as follows:**

| Fuel | $CO_2$ Emitted Per Kilowatt-hour (kWh) Generated (in pounds) | KWh Generated, 1997 (billions) | $CO_2$ Emitted, Total Generation (billion pounds) |
|---|---|---|---|
| Coal | 2.13 | 1,788 | 3,807 |
| Natural Gas | 1.03 | 283.6 | 291 |
| Oil | 1.56 | 77.8 | 122 |
| U.S. Average Fuel Mix [2] | 1.52 | 3,494 | 5,313 |
| Wind | --0-- | 3.4 | --0-- |

**For sulfur dioxide ($SO_2$), the leading precursor of acid rain:**

| Fuel | $SO_2$ Emitted Per Kilowatt-hour (kWh) Generated (in pounds) | KWh Generated, 1997 (billions) | $SO_2$ Emitted, Total Generation (million pounds) |
|---|---|---|---|
| Coal | 0.0134 | 1,788 | 24,028 |
| Natural Gas | 0.000007 | 283.6 | 2 |
| Oil | 0.0112 | 77.8 | 870 |
| U.S. Average Fuel Mix [2] | 0.0080 | 3,494 | 27,914 |
| Wind | --0-- | 3.4 | --0-- |

**For nitrogen oxides (NOx), another acid rain precursor and the leading component of smog:**

| Fuel | NOx Emitted Per Kilowatt-hour (kWh) Generated (in pounds) | KWh Generated, 1997 (billions) | NOx Emitted, Total Generation (million pounds) |
|---|---|---|---|
| Coal | 0.0076 | 1,788 | 13,668 |
| Natural Gas | 0.0018 | 283.6 | 504 |
| Oil | 0.0021 | 77.8 | 162 |
| U.S. Average Fuel Mix [2] | 0.0049 | 3,494 | 17,112 |
| Wind | --0-- | 3.4 | --0-- |

A single 750-kilowatt wind turbine, operated for one year at a site with Class 4 wind speeds (winds averaging 12.5-13.4 mph at 10 meters height), can be expected to displace a total of 2,697,175 pounds of carbon dioxide, 14,172 pounds of sulfur dioxide, and 8,688 pounds of nitrogen oxides, based on the U.S. average utility generation fuel mix.[3]

AWEA has prepared a spreadsheet which permits calculations based on these and other air emissions statistics and which can be e-mailed to researchers on request.

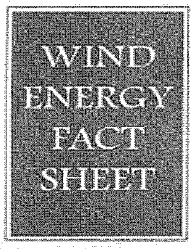
NOTE

1. Emissions data in this fact sheet are based on statistics provided in the EIA's *Annual Energy Review 1998*. (Washington, D.C.: Energy Information Administration, DOE/EIA-0384 ((98)), July 1998.) The Annual Energy Review can be accessed on the Web at <http://www.eia.doe.gov/aer>.

2. The numbers for kilowatt-hours generated and emissions for "Coal," "Natural Gas," and "Oil" are based on U.S. electric utility generation. The numbers for kilowatt-hours generated and emissions for "US Average Fuel Mix" and "Wind" are the totals for all U.S. generation, including nonutility plants."

3. Estimate derived by AWEA using data from *Renewable Energy Technology Characterizations*, published by the U.S. Department of Energy and the Electric Power Research Institute, December 1997.

**American Wind Energy Association**
122 C Street NW, Suite 380, Washington, DC 20001

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# Save the Loon with Wind Energy:

## Comparative Impacts of Wind and Other Energy Sources on Wildlife

One of wind energy's important environmental benefits is its minimal impact on wildlife and natural habitat.

While no electricity generation is entirely benign, the impacts of some energy sources dwarf others in terms of the harm they cause to wildlife. Electricity in the U.S. is mostly produced from coal and other fossil fuels (70%), nuclear energy (20%), and dams, sources which take a heavy toll or impose significant risks on wildlife.[i]

Example: The common loon and other aquatic wildlife are at risk from high concentrations of the toxic heavy metal mercury, emitted largely from coal power plants, according to the National Wildlife Federation. "Rain falling over cities in the Great Lakes region contains as much as 65 times the EPA's "safe level" of mercury, which holds extremely serious health implications for both humans and wildlife," according to the Federation.[ii] Coal power plants are the single largest source of mercury emissions in the U.S., and those emissions are not regulated.[iii] Half of that mercury is airborne, and travels anywhere from 30 to 600 miles downwind of a plant.

Other impacts of U.S. electricity generation on wildlife include:

**--Harm from the sulfur dioxide ($SO_2$) and nitrogen oxide (NOx) released by coal and other fossil fuel power plants.** These pollutants not only cause respiratory ailments in humans—and probably also in wildlife—but also acidify rain, snow, and fog. Because of acid rain, in the Northeast in particular, many lakes and streams once thriving with aquatic creatures are now almost void of life in spite of their pristine appearance. Acidity depletes calcium, so acid rain also results in weaker eggshells for birds. Power plants account for 70% of $SO_2$ and 33% of NOx emitted in the U.S. "Protected" areas such as state and national parks offer no protection to wildlife from this and other forms of airborne pollution.

**--Loss of habitat from mining for coal, uranium, gas and petroleum used to generate electricity**. Birds and other wildlife lose their habitat and can be killed as land is blown up (for mountaintop removal, a coal-mining technique) or strip-mined for coal. An estimated 130,000 acres are disturbed every year for coal used for electricity generation in the U.S. In addition to the land and waste that fills riverbeds, acid mine drainage can occur for years after mines are closed, harming river systems and endangering waterfowl. No total national tally is kept of the impact on wildlife of extraction of fuels for electricity generation in the U.S.

**--Direct and indirect kills from hydroelectric and nuclear power plants**. Dams have caused the extinction or dramatic decline of several species of ocean-going fish, including

wild salmon of the Pacific Northwest and shad of the Eastern Coast. Even if the fish get past the dams to spawn upstream thanks to fish ladders, many of the young perish in the retention ponds above the dam. Local river and coastal ecosystems are also altered by nuclear and other power plants using "once-through" river or coastal water to cool their reactors and equipment. Waters are warmed above their normal temperature, and fish and other aquatic creatures including seals can be killed in the cooling systems.[iv]

**--Global warming.** The earth's temperatures are growing warmer, with build-up of carbon dioxide ($CO_2$) and other greenhouse gases a key factor, according to the U.S. National Oceanic and Atmospheric Administration and other scientific organizations. Some species may thrive with the ecosystem changes brought about by global warming, but many others are likely to perish, as they are unable to adapt. A new report by the World Wide Fund for Nature (WWF) finds that the gradual warming of the Arctic is already endangering the lives of birds in the polar region. Fossil fuel power plants account for about 34% of $CO_2$ emitted by the United States, itself the largest emitter of $CO_2$ worldwide.

--**Risks from radioactivity and radioactive wastes.** The operation of nuclear power plants presents low-probability, but potentially catastrophic risks for wildlife as well for human beings. Transportation and storage of radioactive waste similarly pose risks to wildlife.

By contrast, the impacts of wind energy on wildlife are minimal, **even where wind energy is widely used**.

**--Minimal harmful impacts on birds:** In Denmark, the country with the most intensive use of wind energy, wind turbines generate 10% of electricity and are widespread, but have not been found to cause significant harm to wildlife including birds. Power lines pose a much greater threat to birds, according to Danish and U.S. studies. The National Audubon Society recently issued a statement in support of responsibly sited wind project development [v]

--**Positive impacts on wildlife**: In 1998-99, 925 megawatts (MW)—equivalent to about four medium-size coal or one nuclear power plant—of wind energy generating capacity were added in the U.S., mostly on Iowa and Minnesota farmland. Based on the average U.S. electricity mix, this new wind power is, every year, saving 170 acres of land from mining, and displacing 10,128 tons of $SO_2$, over 2 million tons of $CO_2$, 6,500 tons of NOx, and many other pollutants, thereby helping provide cleaner air and healthier habitat for wildlife.

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[i] *The Environmental Imperative for Renewable Energy An Update*, April 2000, Renewable Energy Policy Project
[ii] *Great Lakes Power Plants Top List of Mercury Polluters*, Nov. 17, 1999, National Wildlife Federation press release.
[iii] *Mercury Falling, An Analysis of Mercury Pollution from Coal-Burning Power Plants*, Nov. 1999, Environmental Working Group, Clean Air Network and Natural Resources Defense Council.
[iv] Over 40 million fish die per year in the intakes of 90 Great Lakes power plants using once-through systems, according to *Environmental Costs of Electricity*, 1991, Richard Ottinger et al., Pace University Center for Environmental Studies.
[v] *National Audubon Applauds Enron Wind Corp. Decision to Pursue Alternate Site for Wind Power Development*, Nov. 3, 1999, Audubon press release. In the U.S. the only site that has caused major bird kills is the Altamont Pass, developed in the 1980s in California. See *A Continued Examination of Avian Mortality in the Altamont Pass Wind Resource Area*. BioSystems, January 1996.

American Wind Energy Association™

# Wind Energy and Wildlife: The Three C's

In terms of impacts on wildlife, wind energy has three primary benefits as an energy generation source: it is **clean**; it is **compatible** with animals and humans; and the industry is **committed** to ensuring minimal impacts on nature and the environment in wind energy development. This fact sheet provides information and statistics on each of these attributes.

- **CLEAN**: Wind energy is one of the cleanest, most environmentally friendly energy sources in the world. Wind energy development protects air quality, reduces the effects and rate of global warming, and displaces mining and drilling for natural gas, coal, and other fuels. While wind energy cannot supply all of the electricity we need, using more of it will reduce the overall environmental impact of our society's energy use.
- **COMPATIBLE**: Wind energy is also one of the healthiest energy options, and the most compatible with animals and humans. The modern wind turbine is far less harmful to birds and other wildlife than are radio towers, tall buildings, airplanes and 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.
- **COMMITTED**: The wind industry is committed to, and has demonstrated, continual innovations leading to greater protection of the environment and wildlife. By offsetting impacts from other energy sources, the use of wind energy improves environmental conditions for birds and other wildlife.

## CLEAN

**Wind energy is one of the cleanest, most environmentally friendly energy sources in the world.**

- Wind energy produces no emissions.
- Wind energy requires no mining, drilling, or transportation of fuel, and no disposal of radioactive or other hazardous or polluting waste. It is a renewable energy resource found in abundant supply in many regions of the United States.

### 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 |
| **Habitat Impacts** | Yes | Limited | Yes | Yes |

Based on AWEA's estimates and data from a 2002 study by the Natural Resources Defense Council (NRDC):

- A single 1-MW turbine displaces nearly 1,800 tons of carbon dioxide each year (equivalent to planting nearly a square mile of forest), based on the current average U.S. utility fuel mix.
- To generate the same amount of electricity as a single 1-MW turbine using the average U.S. utility fuel mix results in the emissions of 9 tons of sulfur dioxide and 4 tons of nitrogen oxide each year.
- To generate the same amount of electricity as a single 1-MW wind turbine for 20 years would require burning 29,000 tons of coal (a line of 10-ton trucks 11 miles long) or 92,000 barrels of oil.
- To generate the same amount of electricity as today's U.S. wind turbine fleet (over 6,000 MW) would require burning more than 9 million tons of coal (a train of coal cars 750 miles long) or 28 million barrels of oil each year.
- 100,000 MW of wind energy will reduce CO2 production by nearly 180 million tons annually (assuming displacement of the fuels used today by U.S. utilities to generate electricity), or about 8% of today's utility carbon dioxide emissions. Carbon dioxide is the most important global warming pollutant.

**CLEAN**

**Wind energy development protects air quality, reduces the effects of global warming, and displaces drilling and mining for natural gas, coal, and other fuels.**

- Electricity generation is the largest industrial source of air pollution in the U.S. In 1999, power plants in the U.S. emitted 13.2 million tons of sulfur dioxide and 7.9 million tons of nitrogen oxide, pollutants which cause acid rain and/or smog, and lung and heart damage. Power plants are also the largest source of mercury pollution in the U.S., releasing an estimated 48 tons of the toxic heavy metal annually into the atmosphere. This toxic heavy metal makes its way into lakes and streams, accumulating in fish and wildlife and humans who consume them (see http://www.ewg.org/reports/mercuryfalling/MercuryFalling.pdf). Wind farms emit no pollution.
- Fossil fuel power plants account for about 34% of the carbon dioxide emitted by the United States, itself the largest emitter of CO2 worldwide; the Energy Information Administration reports that in 1999, U.S. power plants emitted 2.245 billion tons of CO2. Carbon dioxide is the leading global warming pollutant, threatening habitats for wildlife and air quality for humans worldwide. A scientific study published in *Nature* (January 2004) estimated that global warming may lead to the extinction of one million species by 2050 (BBC news report at http://news.bbc.co.uk/1/hi/sci/tech/3375447.stm). Wind farms emit no carbon dioxide.
- Emissions from the manufacture and installation of wind turbines are negligible. The "energy payback time" (a measure of how long a power plant must operate to generate the amount of electricity required for its manufacture and construction) of a wind farm is 3 to 8 months, depending on the wind speed at the site--one of the shortest of any energy technology.
- Wind farm development can support preservation of habitat from suburban sprawl and other development that often has devastating impacts on wildlife. And unlike other forms of development, the footprint of a wind project is generally small, meaning that many forms of wildlife can still use the area.
- The wind farms in place in the U.S. (over 6,700 MW at the end of 2004) save about 0.5 Bcf/day of natural gas annually. Rapid expansion of the nation's wind turbine fleet to 36,000 MW would increase its output to the equivalent of nearly 3 Bcf/day (about as much natural gas as the states of Colorado and Alaska produce today), substantially reducing the need to drill for more natural gas or import liquefied natural gas (LNG). See http://www.awea.org/news/news030618gas.html

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COMPATIBLE

**Wind is also one of the healthiest energy options, and the most compatible with animals and humans.**

- Wind has minor wildlife impacts (breaking up uninterrupted forest or grassland habitat at some locations, avian and bat collisions, noise disturbance during construction), but they are small compared to other electric generation choices.
- 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. 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).
  - Direct mortality from collisions with structures (power plant smokestacks, cooling towers) and from other sources (waste oil pits, oil tanker spills).

  While wind plants and their construction definitely have local impacts, the use of wind energy largely avoids more far-reaching effects of traditional energy generation.
- 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.
- Many extensive studies of bird collisions at wind farms have been carried out, a practice that contrasts greatly with the lack of a 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.
- Energy policy is all about choices. Less wind energy means more of something else—almost certainly something that is more damaging to the environment.

COMPATIBLE

**The modern wind turbine is far less harmful to birds and other wildlife than radio towers, tall buildings, airplanes and 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.**

- All avian studies at wind farm sites show that bird kills per turbine average two to five per year or less, with the exception of a single 3-turbine plant in Tennessee that has recorded eight per turbine per year. These include sites passed by millions of migrating birds each year. At some

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sites, no kills have been found at all. Summaries of available wind studies can be found at www.currykerlinger.com and at www.nationalwind.org

- 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.
- Even if wind were used to generate 100% of U S. electricity needs, at the current rate of bird kills, wind would account for only one of every 250 human-related bird deaths. See Erickson et al, "Avian Collisions With Wind Turbines," http://www.nationalwind.org/pubs/avian_collisions.pdf. This estimate, again, is a conservative one—the actual number could be one in 1,000 or higher.
- Leading human-related causes of bird kills, in the U S. alone, include:
  - cats (1 BILLION per year)
  - buildings (100 million to 1 BILLION per year)
  - hunters (100 million per year);
  - vehicles (60 million to 80 million per year)
  - communications towers (10 million to 40 million per year)
  - pesticides (67 million per year)
  - power lines (10,000 to 174 million per year)

Data on buildings, vehicles, communications towers, power lines contained in Erickson et al, "Avian Collisions With Wind Turbines," http://www.nationalwind.org/pubs/avian_collisions.pdf and elsewhere. Data on cats in Ohio State University Extension Fact Sheet, "Managing for Forest Songbirds," http://ohioline.osu.edu/w-fact/0006.html. Data on pesticides at http://www.currykerlinger.com/birds.htm

Wind energy simply does not constitute a significant threat to birds in general.

**COMMITTED**

**The wind industry is committed to, and has demonstrated, continual innovations leading to greater protection of the environment and wildlife.**

- In 1994, shortly after raptor deaths (of eagles, hawks, and owls) in California's 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 Committee (NWCC), a multi-stakeholder collaborative aimed at addressing the wind/avian issue and other issues affecting the industry's future.
- At the same time, the industry began funding research on bird kills and adopting practices (equipment changes to reduce bird electrocutions, use of tubular towers to discourage perching, testing of anti-perching devices and other measures) aimed at minimizing the impact of Altamont and other wind projects on birds. (It should be noted that while raptor deaths in Altamont Pass, one of the first and oldest wind projects, are an issue, the overall number of bird kills there is very low—approximately one bird for every five turbines in the pass per year. The turbine owners recently agreed to making changes in the project's operations such as shutting down the most risky turbines, stopping operations seasonally, and other measures to reduce mortality by 35%.)
- The wind industry has supported the NWCC's development of a siting handbook and avian site evaluation guidelines used by wind developers to screen sites and provide research-based analysis that can avoid potential problems.
- The wind industry has also supported the NWCC's sponsoring of a series of national research summits examining wind energy's impacts on birds and bats. At these meetings, scientists

present the latest research findings and talk with other stakeholders about research gaps and future needs.

- Pre-construction wildlife surveys are common practice throughout the wind 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. These surveys reduce the threat to birds to minimal levels; as noted above, cats, hunters, glass windows, and communications towers are far more dangerous to birds.
- The industry has been conducting avian studies at wind sites across the country for more than twenty years. Over this period, 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. See http://www.west-inc.com/reports/avian_collisions.pdf.
- 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 has been so small that the technical advisory committee has been discontinued. See http://www.west-inc.com/reports/fcr_final_baseline.pdf.
- Prior to 2003, bat kills at wind farms studied were generally low. However, the frequency of bat deaths at a newly-constructed wind farm in West Virginia in 2003—far higher than those encountered elsewhere--has caused concern. In response, AWEA and several of its member companies have entered into a three-year cooperative effort with Bat Conservation International, the National Renewable Energy Laboratory, and the U.S. Fish and Wildlife Service to research wind/bat interaction and test ways to reduce bat mortality. See http://www.awea.org/news/news040303bat.html.
- The wind industry is currently engaged in discussions with the Federal Aviation Agency (FAA) aimed at reducing the aviation safety lighting required on wind projects. One goal of this effort is to ensure that turbine lights do not attract migrating birds on foggy nights—a phenomenon that is believed to have contributed to mass kills at some very tall communications towers and other structures in the past.

**COMMITTED**

**By offsetting impacts from other energy sources, the use of wind energy improves environmental conditions for birds and other wildlife.**

- Birds, bats, and other wildlife suffer habitat loss from mining and drilling for fossil fuels. An estimated 1 million acres are disturbed every year by mining related to electricity generation in the U.S. For example, the American Bird Conservancy has estimated that approximately one-third of the global population of cerulean warblers will be destroyed by loss of habitat due to mining in Appalachia (See "Determining Biological Significance," Winegrad, Gerald, http://www.nationalwind.org/events/wildlife/20031117/presentations/Winegrad.pdf).
- Power plants account for 70% of the sulfur dioxide (SO2) and 30% of the nitrogen oxide (NOx) emitted in the U.S. SO2 and NOx emissions acidify rain, snow and fog. Acidity depletes

calcium, resulting in weaker eggshells for birds—a problem believed to account for the widespread decline of the wood thrush in the northeastern U.S. Acidity also damages trees and deters the regeneration of forests. (See http://www.epa.gov/airmarkets/acidrain/effects/forests.html and http://www.cleanairtrust.org/acidrain.html ).

- The earth's temperatures are growing warmer, with build-up of carbon dioxide (CO2) and other global warming pollutants a key factor. A report by the World Wide Fund for Nature determined that global warming in the Arctic is already endangering the lives of birds in the polar region. See "Arctic Warming Signals Dire Straits for Birds," Environmental News Network, http://www.enn.com/news/enn-stories/2000/04/04052000/arcticbird_11676.asp .
- A Defenders of Wildlife report states that "The costs of not adopting alternative energy strategies based on renewable energy sources such as wind are potentially enormous. Global warming is predicted to result in countless bird deaths through large-scale alteration of breeding habitats." See http://www.defenders.org/habitat/renew/wind.html.
- As of December 31, 2004, over 6,700 MW of wind power generating capacity—generating the same output as 6 medium-size coal or 3 large nuclear power plants – were online in the U.S. Producing the same amount of electricity with the average U S electricity mix results in the emission of 11 million tons of CO2, 55,000 tons of SO2, 26,000 tons of NOx, and many other pollutants each year. Wind energy development helps provide cleaner air and healthier habitat for wildlife.

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# Carbon Dioxide Emissions from the Generation of Electric Power in the United States

**July 2000**

**Department of Energy**
Washington, DC 20585
**Environmental Protection Agency**
Washington DC 20460

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# Carbon Dioxide Emissions from the Generation of Electric Power in the United States

## Introduction

The President issued a directive on April 15, 1999 requiring an annual report summarizing the carbon dioxide ($CO_2$) emissions produced by the generation of electricity by utilities and nonutilities in the United States. In response, the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency (EPA) jointly submitted the first report on October 15, 1999. This is the second annual report[1] that estimates the $CO_2$ emissions attributable to the generation of electricity in the United States. The data on $CO_2$ emissions and the generation of electricity were collected and prepared by the Energy Information Administration (EIA), and the report was jointly written by DOE and EPA to address the five areas outlined in the Presidential Directive.

- The emissions of $CO_2$ are presented on the basis of total mass (tons) and output rate (pounds per kilowatthour). The information is stratified by the type of fuel used for electricity generation and presented for both regional and national levels. The percentage of electricity generation produced by each fuel type or energy resource is indicated.
- The 1999 data on $CO_2$ emissions and generation by fuel type are compared to the same data for the previous year, 1998. Factors contributing to regional and national level changes in the amount and average output rate of $CO_2$ are identified and discussed.
- The Energy Information Administration's most recent projections of $CO_2$ emissions and generation by fuel type for 1999 are compared to the actual data summarized in this report to identify deviations between projected and actual $CO_2$ emissions and electricity generation.
- Information for 1998 on voluntary carbon-reducing and carbon-sequestration projects reported by the electric power sector and the resulting amount of $CO_2$ reductions are presented. Included are programs undertaken by the utilities themselves as well as programs supported by the Federal government to support voluntary $CO_2$ reductions.
- Appropriate updates to the Department of Energy's estimated environmental effects of the Administration's proposed restructuring legislation are included.

## Electric Power Industry $CO_2$ Emissions and Generation Share by Fuel Type

In 1999,[2] estimated emissions of $CO_2$ in the United States resulting from the generation of electric power were 2,245 million metric tons[3] an increase of 1.4 percent from the 2,215 million metric tons in 1998. The estimated generation of electricity from all sources increased by 2.0 percent, going from 3,617 billion kilowatthours to 3,691 billion kilowatthours. Electricity generation from coal-fired plants, the primary source of $CO_2$ emissions from electricity generation, was nearly the same in 1999 as in 1998. Much of the increase in electricity generation was produced by gas-fired plants and nuclear plants. The 1999 national average output rate,[4] 1,341 pounds of $CO_2$ per kilowatthour generated, also showed a slight change from 1,350 pounds $CO_2$ per kilowatthour in 1998 (Table 1). While the share of total generation provided by fossil

[1] The Presidential directive required the first report by October 15, 1999 and thereafter the report is required by June 30. See Appendix A for the full text of the directive.

[2] Data for 1999 are preliminary. Data for 1998 are final. Last year, 1998 data were preliminary and have been revised to final numbers.

[3] To convert metric tons to short tons, multiply by 1.1023. Carbon dioxide units at full molecular weight can be converted into carbon units by dividing by 44/12.

[4] The average output rate is the ratio of pounds of carbon dioxide emitted per kilowatthour of electricity produced from all energy sources, both fossil and nonfossil, for a region or the Nation.

fuels rose slightly a reduction in the emission rate for coal-fired generation combined with growth in the market share of gas-fired generation contributed to the modest improvement in the output rate.[5]

In the United States, about 40.5 percent[6] of anthropogenic $CO_2$ emissions was attributed to the combustion of fossil fuels for the generation of electricity in 1998 the latest year for which all data are available.[7] The available

**Table 1. Summary of Carbon Dioxide Emissions and Net Generation in the United States, 1998 and 1999**

| | 1998 | 1999 P | Change | Percent Change |
|---|---|---|---|---|
| **Carbon Dioxide** (thousand metric tons)[a] | | | | |
| Coal | 1,799,762 | 1,787,910 | -11,852 | -0.66 |
| Petroleum | 110,244 | 106,294 | -3,950 | -3.58 |
| Gas | 291,236 | 337,004 | 45,768 | 15.72 |
| Other Fuels[b] | 13,596 | 13,596 | - | - |
| **U.S. Total** | **2,214,837** | **2,244,804** | **29,967** | **1.35** |
| **Generation** (million kWh) | | | | |
| Coal | 1,873,908 | 1,881,571 | 7,663 | 0.41 |
| Petroleum | 126,900 | 119,025 | -7,875 | -6.21 |
| Gas | 488,712 | 562,433 | 73,721 | 15.08 |
| Other Fuels[b] | 21,747 | 21,749 | 2 | - |
| **Total Fossil-fueled** | **2,511,267** | **2,584,779** | **73,512** | **2.93** |
| **Nonfossil-fueled**[c] | **1,105,947** | **1,106,294** | **347** | **0.03** |
| **U.S. Total** | **3,617,214** | **3,691,073** | **73,509** | **2.04** |
| **Output Rate**[d] (pounds $CO_2$ per kWh) | | | | |
| Coal | 2.117 | 2.095 | -0.022 | -1.04 |
| Petroleum | 1.915 | 1.969 | 0.054 | 2.82 |
| Gas | 1.314 | 1.321 | 0.007 | 0.53 |
| Other Fuels[b] | 1.378 | 1.378 | - | - |
| **U.S. Average** | **1.350** | **1.341** | **-0.009** | **-0.67** |

[a] One metric ton equals one short ton divided by 1.1023. To convert carbon dioxide to carbon units, divide by 44/12.
[b] Other fuels include municipal solid waste, tires, and other fuels that emit anthropogenic $CO_2$ when burned to generate electricity. Nonutility data for 1999 for these fuels are unavailable; 1998 data are used.
[c] Nonfossil includes nuclear, hydroelectric, solar, wind, geothermal, biomass, and other fuels or energy sources with zero or net zero $CO_2$ emissions. Although geothermal contributes a small amount of $CO_2$ emissions, in this report it is included in nonfossil.
[d] U.S. average output rate is based on generation from all energy sources.
P = Preliminary data.
- = No change.
Note: Data for 1999 are preliminary. Data for 1998 are final.
Sources: •Energy Information Administration, Form EIA-759, "Monthly Power Plant Report"; Form EIA-767, "Steam-Electric Plant Operation and Design Report"; Form EIA-860B, "Annual Electric Generator Report – Nonutility"; and Form 900, "Monthly Nonutility Power Report." •Federal Energy Regulatory Commission, FERC Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants."

[5] Caution should be taken when interpreting year-to-year changes in the estimated emissions and generation due to an undetermined degree of uncertainty in statistical data for the 1999 estimates. Also, differences in the 1998 and 1999 estimation methodologies have an undetermined effect on the change from 1998 to 1999 estimates. See Appendix B, "Data Sources and Methodology," for further information. For more information on uncertainty in estimating carbon dioxide emissions, see Appendix C, "Uncertainty in Emissions Estimates." *Emissions of Greenhouse Gases in the United States*. DOE/EIA-0573(98) (Washington, DC, October 1999). Also, because weather fluctuations and other transitory factors significantly influence short-run patterns of energy use in all activities, emissions growth rates calculated over a single year should not be used to make projections of future emissions growth.
[6] About 37 percent of $CO_2$ emissions are produced by electric utility generators, as reported in the greenhouse gas inventory for 1998. An additional 3.5 percent are attributable to nonutility power producers, which are included in the industrial sector in the GHG inventory.
[7] Energy Information Administration. *Emissions of Greenhouse Gases in the United States 1998*. Chapter 2, "Carbon Dioxide Emissions." DOE/EIA-0573(98) (Washington, DC, October 1999). Data for 1999 will be available in October 2000.

energy sources used for electricity generation result in varying output rates for $CO_2$ emissions from region to region across the United States. Although all regions use some fossil fuels for electricity generation, several States generate almost all electricity at nuclear or hydroelectric plants, resulting in correspondingly low output rates of $CO_2$ per kilowatthour. For example, Vermont produces mostly nuclear power, while Washington, Idaho, and Oregon generate almost all electricity at hydroelectric plants. At the other extreme, Colorado, Indiana, Iowa, Kentucky, New Mexico, North Dakota, Ohio, West Virginia, and Wyoming—a group that includes some of the Nation's largest coal-producing States—generate most of their electricity with coal. Regions where coal-fired generators dominate the industry show the highest rates of $CO_2$ emissions per kilowatthour.

## Coal

Estimated emissions of $CO_2$ produced by coal-fired generation of electricity were 1,788 million metric tons in 1999 (Table 1), 0.7 percent less than in 1998, while electricity generation from coal was 0.4 percent more than the previous year. The divergent direction of generation and emissions changes may reflect a combination of thermal efficiency improvements, changes in average fuel characteristics, and variances associated with both sampling and nonsampling errors. $CO_2$ emissions from coal-fired electricity generation comprise nearly 80 percent of the total $CO_2$ emissions produced by the generation of electricity in the United States, while the share of electricity generation from coal was 51.0 percent in 1999 (Table 3). Coal has the highest carbon intensity among fossil fuels, resulting in coal-fired plants having the highest output rate of $CO_2$ per kilowatthour. The national average output rate for coal-fired electricity generation was 2,095 pounds $CO_2$ per kilowatthour in 1999 (Table 4).

Coal-fired generation contributes over 90 percent of $CO_2$ emissions in the East North Central, West North Central, East South Central, and Mountain Census Divisions and 84 percent in the South Atlantic Census Division (Table 2). Nearly two-thirds of the Nation's $CO_2$ emissions from electricity generation are accounted for by the combustion of coal for electricity generation in these five regions where most of the Nation's coal-producing States are located. Consequently, these regions have relatively high output rates of $CO_2$ per kilowatthour.

**Table 2. Estimated Carbon Dioxide Emissions From Generating Units at U.S. Electric Plants by Census Division, 1998 and 1999**
(Thousand Metric Tons)

| Census Division | 1998 | | | | | 1999 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total | Coal | Petroleum | Gas | Other[a] | Total | Coal | Petroleum | Gas | Other[a] |
| New England | 50,450 | 16,470 | 23,068 | 7,966 | 2,945 | 52,822 | 14,637 | 24,224 | 11,015 | 2,945 |
| Middle Atlantic | 189,023 | 139,821 | 17,315 | 28,441 | 3,447 | 190,214 | 134,528 | 15,232 | 37,007 | 3,447 |
| East North Central | 427,580 | 410,141 | 4,351 | 12,039 | 1,049 | 423,063 | 397,266 | 5,415 | 19,333 | 1,049 |
| West North Central | 217,123 | 209,858 | 1,521 | 4,726 | 1,018 | 219,104 | 208,786 | 1,957 | 7,342 | 1,018 |
| South Atlantic | 445,435 | 373,780 | 43,777 | 24,515 | 3,363 | 452,180 | 378,018 | 41,356 | 29,442 | 3,363 |
| East South Central | 226,749 | 212,350 | 5,018 | 9,299 | 82 | 228,240 | 214,486 | 3,212 | 10,460 | 82 |
| West South Central | 364,056 | 214,544 | 5,461 | 143,945 | 106 | 380,792 | 221,309 | 5,744 | 153,634 | 106 |
| Mountain | 219,147 | 206,256 | 888 | 12,002 | * | 217,543 | 202,421 | 1,278 | 13,843 | * |
| Pacific Contiguous | 64,668 | 14,555 | 2,588 | 46,165 | 1,360 | 70,591 | 14,563 | 2,153 | 52,515 | 1,360 |
| Pacific Noncontiguous | 10,606 | 1,985 | 6,257 | 2,138 | 225 | 10,256 | 1,895 | 5,724 | 2,413 | 225 |
| **U.S. Total** | **2,214,837** | **1,799,762** | **110,244** | **291,236** | **13,596** | **2,244,804** | **1,787,910** | **106,294** | **337,004** | **13,596** |

[a] Other fuels include municipal solid waste, tires, and other fuels that emit anthropogenic $CO_2$ when burned to generate electricity. Nonutility data for 1999 for these fuels are unavailable; 1998 data are used.

* = the absolute value is less than 0.5.

Note: Data for 1999 are preliminary. Data for 1998 are final.

Sources: •Energy Information Administration, Form EIA-759, "Monthly Power Plant Report"; Form EIA-767, "Steam-Electric Plant Operation and Design Report"; Form EIA-860B, "Annual Electric Generator Report – Nonutility"; Form EIA-900, "Monthly Nonutility Power Report." •Federal Energy Regulatory Commission, FERC Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants."

**Table 3. Percent of Electricity Generated at U.S. Electric Plants by Fuel Type and Census Division, 1998 and 1999**
(Percent)

| Census Division | 1998 | | | | | 1999 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coal | Petroleum | Gas | Other[a] | Nonfossil | Coal | Petroleum | Gas | Other[a] | Nonfossil |
| New England | 17 9 | 24 4 | 13 8 | 4 6 | 39.3 | 16 3 | 22.9 | 18 0 | 4 6 | 38 3 |
| Middle Atlantic | 38 4 | 5.2 | 13 6 | 1 3 | 41.5 | 35 8 | 4 5 | 17 5 | 1 3 | 40 9 |
| East North Central | 76 3 | 0.8 | 3 8 | 0 4 | 18 8 | 72 0 | 0 7 | 4 4 | 0 4 | 22 5 |
| West North Central | 75.5 | 0 7 | 2 3 | 0 3 | 21 1 | 73 9 | 0 7 | 3 0 | 0 3 | 22 0 |
| South Atlantic | 55 3 | 7 2 | 6 6 | 0 7 | 30 2 | 55 5 | 6 7 | 7 8 | 0 7 | 29 2 |
| East South Central | 66 2 | 2 1 | 3 2 | * | 28 4 | 68 0 | 1 4 | 3 9 | * | 26 7 |
| West South Central | 39 1 | 0 6 | 42 2 | 0 3 | 17 8 | 40 1 | 0 7 | 44 6 | 0 3 | 14 3 |
| Mountain | 67 9 | 0 2 | 6 8 | 0 1 | 25 0 | 67.5 | 0 3 | 8 1 | 0 1 | 24 1 |
| Pacific Contiguous | 4 3 | 0 7 | 23 1 | 0 4 | 71 4 | 4 2 | 0 5 | 26 2 | 0 4 | 68 7 |
| Pacific Noncontiguous | 12 2 | 52 3 | 21 3 | 1 9 | 12 4 | 11 7 | 52 2 | 24 8 | 1 9 | 9 4 |
| **U.S. Total** | **51.8** | **3.5** | **13.5** | **0.6** | **30.6** | **51.0** | **3.2** | **15.2** | **0.6** | **30.0** |

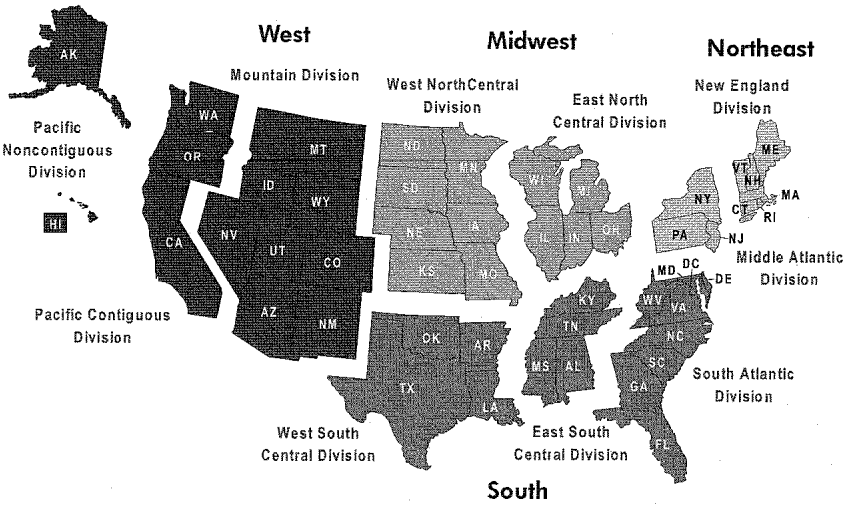
[a] Other fuels include municipal solid waste, tires, and other fuels that emit anthropogenic $CO_2$ when burned to generate electricity Nonutility data for 1999 for these fuels are unavailable; 1998 data are used
* = the absolute value is less than 0.05.
Note: Data for 1999 are preliminary Data for 1998 are final.
Sources: •Energy Information Administration Form EIA-759, "Monthly Power Plant Report"; Form EIA-767, "Steam-Electric Plant Operation and Design Report"; Form EIA-860B, "Annual Electric Generator Report – Nonutility"; Form EIA-900 "Monthly Nonutility Power Report " •Federal Energy Regulatory Commission FERC Form 423 "Monthly Report of Cost and Quality of Fuels for Electric Plants "

**Table 4. Estimated Carbon Dioxide Emissions Rate From Generating Units at U.S. Electric Plants by Census Division, 1998 and 1999**
(Pounds per Kilowatthour)

| Census Division | 1998 | | | | | 1999 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total | Coal | Petroleum | Gas | Other[a] | Total | Coal | Petroleum | Gas | Other[a] |
| New England | 1 059 | 1 934 | 1 984 | 1.213 | 1.339 | 1 077 | 1.827 | 2 156 | 1 250 | 1 328 |
| Middle Atlantic | 1 071 | 2.062 | 1 884 | 1 188 | 1 502 | 1 058 | 2.089 | 1.872 | 1 178 | 1 502 |
| East North Central | 1.680 | 2.113 | 2 244 | 1 239 | 1 124 | 1 579 | 2.061 | 2.759 | 1.630 | 1 131 |
| West North Central | 1.767 | 2.262 | 1 759 | 1.659 | 2.422 | 1 746 | 2 250 | 2 207 | 1 958 | 2.596 |
| South Atlantic | 1.334 | 2 026 | 1.821 | 1 113 | 1 377 | 1 342 | 2 019 | 1 822 | 1.115 | 1.372 |
| East South Central | 1 457 | 2 060 | 1 515 | 1 857 | 3 244 | 1 470 | 2 031 | 1 530 | 1 734 | 3 244 |
| West South Central | 1 469 | 2 214 | 3 955 | 1 376 | 0 151 | 1 529 | 2 215 | 3 170 | 1 382 | 0 151 |
| Mountain | 1 572 | 2 179 | 2 802 | 1 257 | 0 005 | 1 542 | 2 128 | 3 036 | 1 214 | 0 005 |
| Pacific Contiguous | 0 417 | 2 158 | 2 396 | 1 287 | 2 140 | 0 435 | 2 152 | 2 419 | 1 238 | 2 108 |
| Pacific Noncontiguous | 1 453 | 2 229 | 1 641 | 1 375 | 1 661 | 1 393 | 2 209 | 1 488 | 1 319 | 1 661 |
| **U.S. Average** | **1.350** | **2.117** | **1.915** | **1.314** | **1.378** | **1.341** | **2.095** | **1.969** | **1.321** | **1.378** |

[a] Other fuels include municipal solid waste, tires, and other fuels that emit anthropogenic $CO_2$ when burned to generate electricity Nonutility data for 1999 for these fuels are unavailable; 1998 data are used.
Note: Data for 1999 are preliminary Data for 1998 are final.
Sources: •Energy Information Administration, Form EIA-759, "Monthly Power Plant Report"; Form EIA-767 "Steam-Electric Plant Operation and Design Report"; Form EIA-860B, "Annual Electric Generator Report – Nonutility"; Form EIA-900 "Monthly Nonutility Power Report " •Federal Energy Regulatory Commission FERC Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants "

**Figure 1. Census Regions and Divisions**




Note: Map not to scale.
Source: Adapted from U.S. Department of Commerce, Bureau of the Census, *Statistical Abstract of the United States, 1998* (Washington, DC, October 1998), Figure 1.

## Petroleum

$CO_2$ emissions from petroleum-fired electricity generation were 106 million metric tons in 1999. 3 6 percent less than in 1998. Generation of electricity from petroleum-fired plants decreased from 127 billion kilowatthours in 1998 to 119 billion kilowatthours in 1999. $CO_2$ emissions from petroleum-fired electricity generation accounted for 4 7 percent of the national total while generation from petroleum plants was 3.2 percent of the Nation's total electricity generation. The national average output rate for all petroleum-fired generation was 1.969 pounds $CO_2$ per kilowatthour in 1999.

The New England Census Division generates about one-fourth of its electricity at petroleum-fired plants which produce approximately 45 percent of that region's $CO_2$ emissions. The Pacific Noncontiguous Census Division generates about one-half of its electricity at petroleum-fired plants, producing about one-half of the region's $CO_2$ emissions. The South Atlantic and Middle Atlantic Census Divisions also use some petroleum for electricity generation, particularly in Florida. The South Atlantic Census Division contributes the largest share of $CO_2$ emissions from petroleum-fired plants. 1 8 percent of the Nation's total $CO_2$ emissions from all sources.

## Natural Gas

Emissions of $CO_2$ from the generation of electricity at natural gas-fired plants were 337 million metric tons in 1999. Natural gas-fired plants were the only fossil-fueled plants to substantially increase generation from 1998 to 1999. Generation increased an estimated 15 0 percent, with $CO_2$ emissions increasing a corresponding 15 7 percent. Emissions of $CO_2$ from natural gas-fired plants represented 15 0 percent of total $CO_2$ emissions from electricity generation in 1999, while natural gas-fired electricity generation accounted for 15.2 percent of total generation. The output rate for $CO_2$ from natural gas-fired plants in 1999 was 1 321 pounds $CO_2$ per kilowatthour. Natural gas is the least carbon-intensive fossil fuel.

The West South Central Census Division, which includes Texas, Oklahoma, and Louisiana, is where much of the Nation's natural gas-fired capacity is located. The Northeast and Pacific Contiguous Census Divisions also use natural gas to generate a substantial portion of their electricity. About 40.4 percent of the West South Central Division's $CO_2$ emissions from the generation of electricity comes from gas-fired plants, representing approximately 45.6 percent of all $CO_2$ emissions from natural gas combustion for electricity generation in the Nation. About three-fourths of the Pacific Contiguous Census Division s $CO_2$ emissions are from natural gas-fired plants; however, most of that division's electricity generation is produced at nonfossil-fueled plants such as hydroelectric and nuclear plants.

### Nonfossil Fuels

Nonfossil-fueled generation from nuclear, hydroelectric, and other renewable sources (wind, solar, biomass, and geothermal) represented about 30.0 percent of total electricity generation in 1999 and 30.6 percent in 1998. The use of nonfossil fuels and renewable energy sources to generate electricity avoids the emission of $CO_2$ that results from the combustion of fossil fuels. Due to lower marginal costs, nuclear and hydroelectric power generation typically displace fossil-fueled electricity generation.

Nuclear plants increased their output by 8.1 percent in 1999 as several plants in the East North Census Division returned to service, contributing to a record capacity factor of 86 percent for nuclear plants in 1999.[8] Nuclear energy provided 19.7 percent of the Nation's electricity in 1999.[9] Two-thirds of the Nation's nuclear power is generated in the New England, East North Central, South Atlantic, and Middle Atlantic Census Divisions, which generate 27.6 percent, 21.0 percent, 26.0 percent, and 35.6 percent, respectively, of their electricity with nuclear power.

More than one-half of the Nation s hydroelectric capacity is located in the Pacific Contiguous Census Division, which includes California, Oregon, and Washington. In the Mountain Census Division, Idaho generates virtually all of its electricity at hydroelectric plants. The availability of hydroelectric power is affected by both the amount and patterns of precipitation. High snowpack levels in the Northwest increased hydroelectric generation in Washington and Oregon during 1999, despite the fact that on an annual basis both States received less precipitation in 1999 than they did in 1998. However, the remainder of the Nation experienced dry conditions in 1999, decreasing the amount of hydroelectric power available to displace fossil-fueled generation.[10]

## Factors Contributing to Changes In $CO_2$ Emissions and Generation

The primary factors that alter $CO_2$ emissions from electricity generation from year to year are the growth in demand for electricity, the type of fuels or energy sources used for generation, and the thermal efficiencies of the power plants. A number of contributing factors influencing the primary factors can also be identified: economic growth, the price of electricity, the amount of imported electricity, weather, fuel prices, and the amount of available generation from hydroelectric, renewable, and nuclear plants. Other contributing factors include demand-side management programs that encourage energy efficiency, strategies to control other air emissions to comply with the requirements for the Clean Air Act Amendments of 1990, and the installation of new capacity utilizing advanced technologies to increase plant efficiency, such as combined-cycle plants and combined heat and power projects. Annual changes in $CO_2$ emissions are a net result of these complex and variable factors.

As estimated in this report, the amount of anthropogenic $CO_2$ emissions attributable to the generation of electricity in the United States increased 1.4 percent since the previous year. In 1999, fossil-fueled generation increased by about 2.9 percent; however, almost all of the increase was associated with natural gas, the least carbon-intensive fossil fuel. The increase in $CO_2$ emissions from the combustion of natural gas for electricity generation

[8] Capacity factor is the ratio of the amount of electricity produced by a generating plant for a given period of time to the electricity that the plant could have produced at continuous full-power operation during the same period. Based on national level consumption and generation data presented in the *Electric Power Monthly*, and assuming a net summer nuclear capability of 99 000 MW, a 1-percent increase in the annual nuclear plant capacity factor (equivalent to 8 672 400 megawatthours of additional nuclear generation) translates into a reduction in annual consumption of either 4.4 million short tons of coal, 14 million barrels of petroleum, or 92 billion cubic feet of gas, or most likely a combination of each.

[9] Energy Information Administration, *Electric Power Annual 1999 Volume I*, DOE/EIA-0348(99)/1 (Washington, DC, forthcoming).

[10] Energy Information Administration, *Cost and Quality of Fuels for Electric Utility Plants, 1999*, http://www.eia.doe.gov/cneaf/electricity/cq/cq_sum.html

amounted to 46 million metric tons, while the $CO_2$ emissions from the combustion of petroleum and coal decreased 16 million metric tons.

The national average output rate declined from 1 350 pounds of $CO_2$ per kilowatthour in 1998 to 1 341 pounds $CO_2$ per kilowatthour in 1999. The primary driver of this change was the decreased output rate for coal-fired electricity generation, which went from 2.117 pounds of $CO_2$ per kilowatthour to 2.095 pounds of $CO_2$ per kilowatthour. A change in the output rate for coal-fired electricity generation in the absence of significant change in non-emitting generation will have the greatest effect on the national average output rate of $CO_2$ per kilowatthour both because coal-fired generation dominates the industry and is the most carbon-intensive fuel.

## Economic Growth

Economic factors influence the demand for electric power. In 1999, a strong economy was measured by the 4.2-percent increase in the Gross Domestic Product (GDP).[11] Electricity consumption grew by 1.7 percent,[12] while the average national price of electricity decreased 2.1 percent, from 6.74 cents in 1998 to 6.60 cents in 1999.[13] Although the growing demand for electricity is primarily met by a corresponding growth in generation, a small amount is met by imported power, primarily from Canada.

## Weather

Weather is another factor affecting the year-to-year changes in the demand for electricity. Both 1999 and 1998 were record-breaking years in terms of warm weather in the United States. The availability of hydroelectric power to displace fossil-fueled power was limited by dry conditions in much of the Nation, with the exception of the Pacific Northwest States.

During the summer months, the demand for power for air conditioning is a major factor in setting record high peak demands for some utilities. In 1999, electricity generating plants consumed almost as much coal as the record amount consumed in 1998 and increased their natural gas consumption to meet the continuing high demand for electricity in the summer of 1999.

## Demand-Side Management (DSM)

Energy efficiency programs and DSM activities such as improving insulation and replacing lighting and appliances with more energy efficient equipment, can reduce the demand for electricity. The reductions in demand achieved by DSM programs contribute to avoided $CO_2$ emissions. In 1998, 49.2 billion kilowatthours of energy savings were achieved by DSM activities at electric utilities, a decrease from 56.4 billion kilowatthours in 1997. Declining levels of energy savings reflect, in part, lower utility spending on DSM programs. In 1998, utilities' total expenditures on DSM were $1.4 billion, a decrease of 13.1 percent from the previous year, and nearly 50 percent below the 1994 spending level.[14] Data for 1999 are not yet available.

## Fossil and Nonfossil Fuels for Electricity Generation

The fuel or energy source used to generate electricity is the most significant factor affecting the year-to-year changes in $CO_2$ emissions. Because hydroelectric and nuclear generation displace fossil-fueled generation when available, $CO_2$ emissions increase when hydroelectric or nuclear power is unavailable and fossil-fueled generation is used as a replacement. Conversely, $CO_2$ emissions can be reduced through a greater use of nuclear, hydroelectric, and renewable energy for electricity generation. Collectively, nonfossil-fueled electricity generation by nuclear, hydroelectric, and renewable energy sources that do not contribute to anthropogenic $CO_2$ emissions remained almost unchanged in 1999 as compared to 1998, with much of the increase in nuclear generation being offset by an absolute decrease in hydroelectric power generation and other generation from fuels such as municipal solid waste, tires, and other fuels that emit anthropogenic $CO_2$ when burned to generate electricity.

As stated previously, the amount of available hydroelectric power is affected by precipitation patterns. In 1999, hydroelectric power generation was lower in all regions except in the Northwestern States. Oregon, Idaho, and Washington typically generate more than 90 percent of their power at hydroelectric plants and export power to California. Hydroelectric power generation

[11] http://www.bea.doc.gov/bea/dn1.htm, Department of Commerce web site, accessed May 10, 2000.

[12] Retail sales by utilities grew 1.73 percent from 1998 to 1999. Retail sales by marketers in deregulated, competitive retail markets are not included. The addition of an estimated 48 billion kilowatthours in retail marketer sales would result in an increase in electricity consumption of 2.45 percent from 1998 to 1999.

[13] Energy Information Administration, *Electric Power Annual 1999 Volume I*, DOE/EIA-0348(99)/1 (Washington, DC, forthcoming).

[14] DSM data for 1999 will be available in the latter part of 2000.

increased in 1999 in these States, reducing the need for fossil-fueled generation and contributed to keeping $CO_2$ emissions low in the Pacific Contiguous Census Division. Nationally, hydroelectric power generation decreased by 3.6 percent in 1999.

Nuclear power generation increased by 8.1 percent to a record level in 1999, which contributed to keeping $CO_2$ emissions lower by displacing fossil-fueled generation, particularly in the East North Central Census Division. Several nuclear plants came back online in 1999, helping to increase the average nuclear capacity factor to 86 percent. An absolute increase in the amount of nuclear power more than offset the loss of some hydroelectric power in 1999.

## Fuel Quality and Price

The amount of $CO_2$ emissions from the combustion of fossil fuels to generate electricity varies according to the quality of the fuels, defined by their carbon content and the associated heating value (Btu).[15] The Btu content of fuels is a determinant of the number of kilowatthours that can be produced[16] and carbon content is a determinant of the amount of $CO_2$ released when the fuel is burned. Fossil fuels are categorized as either coal, natural gas and other gaseous fuels, or petroleum and petroleum products. Coal-fired electricity generation has the highest output rate of $CO_2$ per kilowatthour produced, averaging 2.095 pounds per kilowatthour in 1999. Petroleum-fired electricity generation averaged 1.969 pounds per kilowatthour, and natural gas-fired electricity generation had the lowest rate of 1.321 pounds per kilowatthour. With coal-fired plants generating the majority of electricity in the Nation and having the highest output rate, they produced the greatest share of $CO_2$ emissions from electricity generation, approximately 80 percent of the total.

Some plants are capable of switching fuels to take advantage of the least expensive or the most available resources. In 1998, the price of crude oil reached its lowest level since 1976, causing the price of petroleum delivered to electric utilities to fall below that of natural gas for the first time since 1993. This factor is important when considering the capability of some electric plants to burn the least expensive of these two fuels. As a result of falling prices in 1998, petroleum-fired generation was higher in 1998 than in 1997. However during 1999, the price of petroleum began to increase, and generation from petroleum plants declined. Petroleum has a higher output rate of $CO_2$ than natural gas; therefore, switching from petroleum to natural gas can have a beneficial effect on both the overall amount and output rate of $CO_2$ emissions.

In 1999, virtually all of the increase in fossil-fueled generation was from natural gas-fired plants. Coal-fired electricity generation was close to unchanged, while petroleum-fired electricity generation fell. Most of the increase in $CO_2$ emissions from gas-fired plants was offset by the decline in $CO_2$ emissions from petroleum- and coal-fired plants.

## Thermal Efficiencies of Power Plants

$CO_2$ emissions from electric power generation are influenced by the efficiency with which fossil fuels are converted into electricity. In a typical power plant, about one-third of the energy contained in the fuel is converted into electricity, while the remainder is emitted as waste heat. Substantial improvements in generation efficiency can be achieved in the future through the replacement of traditional power generators with more efficient technologies, such as combined-cycle generators and combined heat and power (CHP) systems. In these types of systems, waste heat is captured to produce additional kilowatthours of electricity or displace energy used for heating or cooling. Both strategies result in lower $CO_2$ emissions. The national average thermal efficiency of power generation from fossil fuels in 1999 was estimated to be 32.54 percent, slightly higher than the previous year's average of 32.42 percent.[17]

The average thermal efficiency of coal-fired plants went from 33.15 percent to 33.54 percent in 1999. The improvement in efficiency is also reflected in the national average output rate of pounds of $CO_2$ per kilowatthour. The output rate for coal-fired plants decreased from 2.117 pounds of $CO_2$ per kilowatthour in 1998 to

[15] Heating value is measured in British thermal units (Btu), a standard unit for measuring the quantity of heat energy equal to the quantity of heat required to raise the temperature of 1 pound of water 1 degree Fahrenheit.

[16] Boiler type and efficiency, capacity factor, and other factors also affect the number of kilowatthours that can be produced at a particular plant.

[17] The thermal efficiency is a ratio of kilowatthours of electricity produced multiplied by 3,412 Btu to the fuel consumed, measured in Btu. This ratio is dependent on the estimated generation and fuel consumption for 1999. Uncertainty and an undetermined degree of variation in both generation and fuel consumption data for the nonutility sector may contribute to an apparent change in the ratio, which should be regarded as a preliminary value at this time.

2 095 in 1999 Petroleum-fired plants and natural gas-fired plants showed slightly lower thermal efficiencies in 1999, with a corresponding change in the output rate. The rate for petroleum-fired plants increased from 1.915 to 1 969 pounds of $CO_2$ per kilowatthour, and natural gas-fired plants' output rate increased from 1.314 to 1.321 pounds of $CO_2$ per kilowatthour.

## Conclusion

The emission of $CO_2$ by electric power plants is not controlled because no standards or required reductions currently exist. Some technology is available to limit $CO_2$ emissions, but it is extremely expensive. The options to limit the emission of $CO_2$ from electricity generation are to encourage reduction of the overall consumption of electricity through energy efficiency and conservation initiatives, to improve combustion efficiency at existing plants or install new units that employ more efficient technologies, such as combined-cycle units and combined heat and power (CHP) systems, and to replace fossil-fueled generation with nonfossil-fueled alternatives, such as nuclear, hydroelectric, and other renewable energy sources.

## Comparison of Projected with Actual $CO_2$ Emissions and Generation by Fuel Type

Each year the Energy Information Administration prepares the *Annual Energy Outlook* (AEO), which contains projections of selected energy information. Projections for electricity supply and demand data, including $CO_2$ emissions and generation by fuel type, are made for the next 20 years. To evaluate the accuracy and usefulness of the forecast, a comparison was made between the latest forecast for 1999 (from the AEO2000) and the estimated actual data for 1999 (Table 5). The near-term projections in the AEO are based on a combination of the partial-year data available when the forecast was prepared, the latest short-term forecast appearing in the *Short-Term Energy Outlook*, and the regional detail contained in the National Energy Modeling System (NEMS). Consequently, comparisons with the actual data for 1999 are not a definitive indicator of the accuracy of the longer-term projections appearing in the AEO. Nevertheless, they do provide a useful preliminary gauge for tracking and measuring the projections against actual data over time.

Total electricity-related $CO_2$ emissions for fossil fuels in 1999 were 1.4 percent below the projected emissions level, while the actual total generation from fossil fuels was 0.9 percent above the projected generation level. The largest percentage difference between projected and actual generation by fuel (other than for "Other") was for natural gas-fired generation, which was 3.7 percent higher than projected, but with a corresponding difference in $CO_2$ emissions of 7.7 percent. However, the largest absolute difference between projected and actual $CO_2$ emissions by fuel was for coal-fired generation, whose emissions were 75 million metric tons, or 4.0 percent below the projected level, even while generation was 0.2 percent higher. Three primary factors contribute to the divergence in projected and actual $CO_2$ emissions:

- **Efficiency of generating units**. Average generating efficiencies for coal-fired capacity were higher in 1999 than those assumed by NEMS, on the order of about 4 percent. On the other hand, the efficiency of natural gas-fueled capacity was about 4 percent lower than the NEMS assumptions. Because coal-fired units produce more than three times the generation of natural gas-fired generators, the impact of the higher efficiencies of coal-burning capacity outweighs the lower actual efficiencies for natural gas capacity. Efficiencies for petroleum-based generation, a much smaller share of overall supply, were 5.6 percent lower than the NEMS assumptions.
- **Total generation requirements**. Overall electricity generation was 1.6 percent higher in 1999 than projected. This was due to the combined effects of higher sales, lower imports, and higher losses for electricity than expected. The incremental generation requirements were met in part by higher natural gas-fired generation, as well as greater reliance on nonfossil sources of electricity such as nuclear and renewables. To the extent that natural gas-fired generation was above the forecast, higher $CO_2$ emissions resulted.
- **Increased nuclear and hydroelectric generation**. Nuclear generation was 30 billion kilowatthours, or 5.7 percent, above the projected levels in 1999. The difference was due primarily to improving performance of nuclear generating units, beyond that assumed in the projections. Also, hydroelectric generation was 13 billion kilowatthours or 4.3 percent, above projections. Given the same overall level of generation, higher nuclear and hydroelectric projections would have resulted in less projected

**Table 5. U.S. Electric Power Industry Projected and Actual Carbon Dioxide Emissions and Generation, 1999**

| | Projected | Actual | Percentage Difference |
|---|---|---|---|
| $CO_2$ Emissions (million metric tons) | | | |
| Coal | 1,863 | 1,788 | -4.0 |
| Petroleum | 100 | 106 | 6.0 |
| Natural Gas, Refinery and Still Gas | 313 | 337 | 7.7 |
| Other[a] | -- | 14 | N/A |
| **Total $CO_2$ Emissions** | **2,277** | **2,245** | **-1.4** |
| Generation (billion kWh) | | | |
| Coal | 1,878 | 1,882 | 0.2 |
| Petroleum | 121 | 119 | -1.7 |
| Natural Gas, Refinery and Still Gas | 542 | 562 | 3.7 |
| Other[a] | 20 | 22 | 10.0 |
| Non-Fossil Fuels [b] | 1,072 | 1,106 | 3.2 |
| **Total Generation** | **3,632** | **3,691** | **1.6** |
| Net Imports | 47 | 29 | -38.0 |
| **Total Electricity Supply** | **3,679** | **3,720** | **1.1** |
| Retail Electricity Sales by Utilities (billion kWh) | 3,288 | 3,296 | 0.2 |
| Nonutility Generation for Own Use/Sales (billion kWh)[c] | 173 | 165 | -4.6 |
| Losses and Unaccounted For (billion kWh) | 218 | 259 | 18.8 |

[a]Other fuels include municipal solid waste (MSW), tires, and other fuels that emit anthropogenic $CO_2$ when burned to generate electricity. MSW generation represents the largest share of this category. MSW projections in the *Annual Energy Outlook 2000* are assumed to have zero net $CO_2$ emissions. Due to a change in the accounting for MSW by the Environmental Protection Agency, future AEOs will estimate the $CO_2$ emissions attributed to the non-biomass portion of this fuel. If this had been done for the AEO2000, $CO_2$ emissions for MSW would have been 14 million metric tons for 1999.

[b]Includes nuclear and most renewables, which either do not emit $CO_2$ or whose net $CO_2$ emissions are assumed to be zero.

[c]Data for 1999 are estimated.

Note: Actual data for $CO_2$ emissions and electricity generation for 1999 are preliminary. Components may not add to total due to independent rounding.

Sources: **Projections**: Energy Information Administration, *Annual Energy Outlook 2000*, DOE/EIA-0383 (2000) (Washington, DC, December 1999) and supporting runs of the National Energy Modeling System. **Actual**: Carbon dioxide emissions and generation: Table 1; other data: Energy Information Administration, *Monthly Energy Review, April 2000*, DOE/EIA-0035(2000/04) (Washington, DC, April 2000); Energy Information Administration, *Short-Term Energy Outlook*, May 2000 (EIA Web site, www.eia.doe.gov/emeu/steo/pub/contents.html).

generation from fossil fuels, thus bringing electricity-related $CO_2$ emissions more in line with actual data.

## Voluntary Carbon-Reduction and Carbon-Sequestration Programs

Both the DOE and the EPA operate voluntary programs for reducing greenhouse gas emissions and reporting such emission reductions. Voluntary programs that contribute to emission reductions in the electricity sector include DOE/EIA's Voluntary Reporting of Greenhouse Gases Program and EPA's ENERGY STAR program.

EIA's Voluntary Reporting of Greenhouse Gases Program collects information from organizations that have undertaken carbon-reducing or carbon-sequestration projects. Most of the electric utilities that report to the Voluntary Reporting Program also participate in voluntary emission reduction activities through DOE's Climate Challenge Program. In 1998, as part of the Voluntary Reporting Program, 120 organizations in the electric power sector reported on 1,166 projects

undertaken in 1998.[18] By undertaking these projects participants indicated that they reduced $CO_2$ emissions by 165.8 million metric tons[19] (Table 6). The organizations almost universally measured their project-level reductions by comparing emissions with what they would have been in the absence of the project. Reported $CO_2$ reductions from these projects accounted for 7.5 percent of 1998 $CO_2$ emissions attributed to the generation of electric power in the United States. Foreign reductions, largely from carbon-sequestration projects, account for 6.0 percent of total electric utility sector reductions reported for 1998.

DOE's Climate Challenge Program, a voluntary initiative with the electric utility sector established under the President's 1993 Climate Change Action Plan, has become the principal mechanism by which electric utilities participate in voluntary emission reduction activities. Participants that reported the $CO_2$ emission reductions summarized in this report include electric utilities and holding companies, independent power producers, and landfill methane operators. Climate Challenge participants negotiate voluntary commitments with the DOE to achieve a certain level of emission reductions and/or to participate in specific projects. Companies making Climate Challenge commitments as of 1998 accounted for about 71 percent of 1990 U.S. electric utility generation.[20] Climate Challenge participants are required to report their achieved emissions reductions to the Voluntary Reporting of Greenhouse Gases Program.

Results from the Climate Challenge program cannot be compared directly to other figures in this report because

**Table 6. Electric Power Sector Carbon Dioxide Emission Reductions, 1997 and 1998**
(Million Metric Tons Carbon Dioxide)

| Type of Reduction | Carbon Dioxide[a] | |
|---|---|---|
| | 1997 | 1998 |
| **Domestic Reductions** | | |
| Emission Reductions Projects | 135.9 | 155.3 |
| Sequestration Projects | 0.3 | 0.5 |
| **Total Domestic Reductions** | **136.2** | **155.8** |
| **Foreign Reductions** | | |
| Emission Reductions Projects | 0.1 | 0.1 |
| Sequestration Projects | 9.4 | 9.9 |
| **Total Foreign Reductions** | **9.5** | **10.0** |
| **Total $CO_2$ Reductions Reported** | **145.8** | **165.8** |

[a]The Voluntary Reporting of Greenhouse Gases Program is currently in the 1999 data reporting cycle; the most recent year for which complete data are available is 1998. The 1997 and 1998 data in last year's report were preliminary and have been revised in this report due to subsequent completion of internal EIA review of those data. Emission reductions also include those reported by landfill methane operators. The use of landfill methane to generate electricity displaces fossil fuel power generation and produces a reduction in $CO_2$ emissions equivalent to the amount of $CO_2$ that would have resulted from fossil fuel power generation. In calculating $CO_2$ reductions, it is assumed that landfill carbon is biogenic and, thus, the $CO_2$ emissions from landfill gas combustion are zero.

Note: Totals may not equal the sums of the parts due to independent rounding. This data cannot be compared directly to other figures in this report because reporters to EIA's Voluntary Reporting of Greenhouse Gases Program may report emission reductions using baselines and valuation methods different from those applied elsewhere.

Source: Energy Information Administration, Form EIA-1605, "Voluntary Reporting of Greenhouse Gases," (long form) and EIA-1605EZ, "Voluntary Reporting of Greenhouse Gases," (short form), 1997 and 1998 data.

[18] The Voluntary Reporting of Greenhouse Gases Program is currently in the 1999 data reporting cycle; the most recent year for which complete data are available is 1998. The 1997 and 1998 data in last year's report were preliminary and have been revised in this report due to subsequent completion of internal EIA review of those data. Emission reductions also include those reported by landfill methane operators.

[19] The EIA also receives numerous reports on projects and emissions reductions from reporters outside the electric power sector. In addition, many reports submitted to the Voluntary Reporting Program (including electric power sector reports) include reductions of greenhouse gases other than carbon dioxide, such as methane and nitrous oxide and the high Global Warming Potential gases such as HFCs, PFCs and sulfur hexafluoride.

[20] U.S. Department of Energy, Climate Challenge Fact Sheet (1998), and conversation with Larry Mansueti, August 10, 1999. See also http://www.eren.doe.gov/climatechallenge/execsumm/execsumm.htm.

the Climate Challenge program allows participants to report emissions reductions using baselines and calculation methods different from those applied elsewhere. For this reason, EIA keeps an accounting of reports submitted by Climate Challenge participants, but the United States counts only a fraction of these reported reductions in comprehensive assessments of overall reductions in greenhouse gases.[21]

The largest reductions claimed for 1998 are from these major U.S. electric utilities: the Tennessee Valley Authority (26.0 million metric tons of $CO_2$), TXU (19.9 million metric tons of $CO_2$), Duke Energy (12.1 million metric tons of $CO_2$), and FirstEnergy (10.6 million metric tons of $CO_2$).[22] These four companies accounted for about 41.4 percent of the $CO_2$ emissions reductions reported in 1998 by the electric power sector. Each of these companies owns one or more nuclear power plants and the bulk of their reported reductions is calculated by comparing either actual or additional nuclear output from their plants with the emissions that would have occurred if the same quantity of electricity had been generated using fossil fuels.

Electric power industry companies also reported on projects reducing other greenhouse gases.[23] Combining all projects and all greenhouse gases, the electric power sector reporters claimed 176.9 million metric tons of carbon dioxide equivalent reductions in 1998.

Utilities also undertook a number of carbon-sequestration projects. Although these projects do not directly affect $CO_2$ emissions, they do offset utility $CO_2$ emissions. Foreign carbon-sequestration projects from the electric sector were reported to be 9.9 million metric tons of $CO_2$ in 1998, while domestic projects were reported to be 0.5 million metric tons. These activities were dominated by three independent power producer subsidiaries of the AES Corporation which reported 7.6 million metric tons of $CO_2$ sequestration annually from three projects with activities in Belize, Bolivia, Ecuador, Peru, and Guatemala. These projects undertake tropical rain forest management, preservation, or reforestation.

In addition, more than 30 companies reported on their pro-rated share of participation in the Edison Electric Institute's UtiliTree program.[24] The UtiliTree program is a carbon-sequestration mutual fund in which electric utilities purchase shares. UtiliTree uses the funds to participate in forest management and reforestation projects in the United States and abroad.

The United States' voluntary programs are reducing domestic emissions of greenhouse gases in a number of sectors across the economy through a range of partnerships and outreach efforts. For example the ENERGY STAR Program, run by the EPA in partnership with DOE, reduces energy consumption in homes and office buildings across the Nation. EPA and DOE set energy-efficiency specifications for a range of products including office equipment, heating and cooling equipment, residential appliances, televisions and VCRs, and new homes. The ENERGY STAR label for buildings is based on a performance rating system that allows building owners to evaluate the efficiency of their buildings relative to others. On average buildings across the country can improve efficiency by 30 percent through a variety of improvements. Manufacturer and retailer partners in the program may place the nationally recognized ENERGY STAR label on qualifying products.

In the past several years the ENERGY STAR label has expanded to include more than 30 products and nearly 7,000 product models. In 1999, energy consumption was reduced by approximately 28 billion kilowatthours as a result of the program, reducing greenhouse gas emissions by nearly 21 million metric tons $CO_2$ (Table 7). Through EPA's ENERGY STAR Buildings and Green Lights Partnership, more than 15 percent of the square footage in U.S. buildings has undergone efficiency upgrades resulting in electricity savings in excess of 21 billion kilowatthours and emissions reductions of more than 16 million metric tons $CO_2$.

## Environmental Effects of Federal Restructuring Legislation

In April 1999, the Administration submitted to Congress the Comprehensive Electricity Competition Act (CECA), a bill to restructure the U.S. electricity industry and foster retail competition. CECA was designed to ensure

[21] See the *1997 Climate Change Action Report* (the Submission of the United States of America under the United Nations Framework Convention on Climate Change) p. 100 for one such assessment.

[22] TXU was formerly known as Texas Utilities, while FirstEnergy is the result of a merger between Ohio Edison and Centerior Energy (Cleveland Electric).

[23] Other greenhouse gases include methane reductions from landfills and oil and natural gas systems and sulfur hexafluoride ($SF_6$) which has 23,900 times the global warming impact of carbon dioxide when released into the atmosphere.

[24] The more than 40 companies referenced in last year's report are participants in EEI's UtiliTree program. Of these companies, 31 reported their share of participation to the Voluntary Reporting of Greenhouse Gases Program for 1998.

**Table 7. $CO_2$ Emission Reductions and Energy Savings from EPA's Voluntary Programs, 1998 and 1999**

| | 1998 | | 1999 | |
|---|---|---|---|---|
| | Million Metric Tons of $CO_2$ Reduced | Billion kWh Saved | Million Metric Tons of $CO_2$ Reduced | Billion kWh Saved |
| ENERGY STAR Labeled Products | 14.7 | 20 | 20.9 | 28 |
| ENERGY STAR Buildings and Green Lights | 8.8 | 13 | 16.5 | 21 |
| Climate Wise | 9.9 | 3 | 13.9 | 5 |

Source: U.S. Environmental Protection Agency, Climate Protection Division, *1998 Annual Report: Driving Investment in Energy Efficiency, ENERGY STAR and Other Voluntary Programs* (EPA 430-R-99-005), forthcoming.

that the full economic and environmental benefits of electricity restructuring are realized. The expected environmental benefits are the result of both the effects of competition and specific provisions included in the Administration s proposal such as a renewables portfolio standard, a public benefits fund, and tax incentives for investment in combined heat and power facilities Competition itself will also provide incentives to generators to improve their own efficiencies, and create new markets for green power and end-use efficiency services all of which reduce greenhouse gas emissions.

Following an exhaustive interagency review, the DOE issued a *Supporting Analysis*[25] that quantified both the economic and environmental benefits of the Administration's plan in May 1999. The analysis focused on the impacts of full national retail competition relative to continued cost-of-service regulation. The results showed that the Administration's proposal will reduce $CO_2$ emissions by 216 million metric tons in 2010. An EIA study[26] using the same assumptions from the supporting analysis produced similar results Carbon dioxide emissions in the EIA report were estimated to be 194 million metric tons lower in the competitive case than in the cost-of-service reference case in 2010. A number of key uncertainties, however, can affect these projections and some of the reductions could be realized due to actions already taken by individual States. Recognizing uncertainties and the need to avoid double-counting the Administration projected that its proposal would reduce $CO_2$ emissions from energy use by 147 to 220 million metric tons annually by 2010

The DOE and EPA see no recent developments that would change our projection of the expected impact of the Administration proposal. However, we note that restructuring bills that have recently moved forward in the Congress differ significantly from the Administration's comprehensive proposal These bills do not include key provisions that support the effective functioning of competitive electricity markets and energy diversity while at the same time providing reductions in $CO_2$ emissions. In addition to maintaining our capability to reassess the impacts of our own proposal. we are also prepared to provide quantitative analyses of alternative restructuring bills. Additional measures could offer potential for cost-effective emissions reductions in the electric power sector, although they are no substitute for comprehensive restructuring legislation that promotes competitive markets and consumer benefits while providing important reductions in $CO_2$ emissions from electric power generation.

[25] U.S. Department of Energy *Supporting Analysis for the Comprehensive Electricity Act* May 1999.

[26] Energy Information Administration *The Comprehensive Electricity Competition Act: A Comparison of Model Results* Internet site at http://www eia.doe gov/oiaf/servicerpt/ceca html

## Appendix A

## Presidential Directive

April 15, 1999
MEMORANDUM FOR THE
SECRETARY OF ENERGY
ADMINISTRATOR OF THE ENVIRONMENTAL PROTECTION AGENCY

SUBJECT: Report on Carbon Dioxide ($CO_2$) Emissions

My Administration's proposal to promote retail competition in the electric power industry, if enacted, will help to deliver economic savings, cleaner air, and a significant down payment on greenhouse gas emissions reductions. The proposal exemplifies my Administration's commitment to pursue both economic growth and environmental progress simultaneously.

As action to advance retail competition proceeds at both the State and Federal levels, the Administration and the Congress share an interest in tracking environmental indicators in this vital sector We must have accurate and frequently updated data

Under current law, electric power generators report various types of data relating to generation and air emissions to the Department of Energy (DOE) and the Environmental Protection Agency (EPA). To ensure that this data collection is coordinated and provides for timely consideration by both the Administration and the Congress, you are directed to take the following actions:

- On an annual basis, you shall provide me with a report summarizing $CO_2$ emissions data collected during the previous year from all utility and nonutility electricity generators providing power to the grid, beginning with 1998 data. This information shall be provided to me no more than 6 months after the end of the previous year, and for 1998, within 6 months of the date of this directive

- The report which may be submitted jointly, shall present $CO_2$ emissions information on both a national and regional basis stratified by the type of fuel used for electricity generation, and shall indicate the percentage of electricity generated by each type of fuel or energy resource The $CO_2$ emissions shall be reported both on the basis of total mass (tons) and output rate (e g , pounds per megawatt-hour)

- The report shall present the amount of $CO_2$ reduction and other available information from voluntary carbon-reducing and carbon-sequestration projects undertaken both domestically and internationally, by the electric utility sector

- The report shall identify the main factors contributing to any change in $CO_2$ emissions or $CO_2$ emission rates relative to the previous year on a national, and if relevant, regional basis In addition, the report shall identify deviations from the actual $CO_2$ emissions, generation, and fuel mix of their most recent projections developed by the Department of Energy and the Energy Information Administration, pursuant to their existing authorities and missions

- In the event that Federal restructuring legislation has not been enacted prior to your submission of the report, the report shall also include any necessary updates to estimates of the environmental effects of my Administration's restructuring legislation.

- Neither the DOE nor the EPA may collect new information from electricity generators or other parties in order to prepare the report.

WILLIAM J. CLINTON

**Department of Energy and Environmental Protection Agency/ Carbon Dioxide Emissions from the Generation of Electric Power in the United States** 15

Appendix B

# Data Sources and Methodology

This section describes the data sources and methodology employed to calculate estimates of carbon dioxide ($CO_2$) emissions from utility and nonutility electric generating plants. Due to the report being submitted in June of 2000, the annual census data on which 1998 emission estimates are based, are not yet available from the Form EIA-860B and Form EIA-767. The methodology employed for estimating 1999 $CO_2$ emissions in this report are based on two monthly data collections, Form EIA-759 and Form EIA-900. The Form EIA-759 collects monthly generation and fuel consumption from all utility-owned generating plants, and the Form EIA-900 collects generation and fuel consumption from nonutility plants with a nameplate capacity of 50 megawatts (MW) or more. The 1999 estimates of $CO_2$ emissions and net generation are preliminary estimates; final emissions estimates based on annual census data will be published in the *Electric Power Annual Volume II 1999* later this year.

## Electric Utility Data Sources

The electric utility data are derived from several forms. The Form EIA-767, "Steam-Electric Plant Operation and Design Report" collects information annually for all U.S. power plants with a total existing or planned organic- or nuclear-fueled steam-electric generator nameplate rating of 10 MW or larger. Power plants with a total generator nameplate rating of 100 MW or more must complete the entire form, providing among other data, information about fuel consumption and quality. Power plants with a total generator nameplate rating from 10 MW to less than 100 MW complete only part of the form, including information on fuel consumption.

Form EIA-759, "Monthly Power Plant Report," is a cutoff model sample of approximately 360 electric utilities drawn from the frame of all operators of electric utility plants (approximately 700 electric utilities) that generate electric power for public use. The monthly data collection is from all utilities with at least one plant with a nameplate capacity of 50 MW or more. For all utility plants not included in the monthly sample, those with nameplate capacities less than 50 MW, monthly data are collected annually. Form EIA-759 is used to collect data on net generation; consumption of coal, petroleum, and natural gas; and end-of-the-month stocks of coal and petroleum for each plant by fuel-type combination.

The Federal Energy Regulatory Commission (FERC) Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants," is a monthly record of delivered-fuel purchases, submitted by approximately 230 electric utilities for each electric generating plant with a total steam-electric and combined-cycle nameplate capacity of 50 MW or more. FERC Form 423 collects data on fuel contracts, fuel type, coal origin, fuel quality and delivered cost of fuel.

## Nonutility Data Sources

Form EIA-860B, "Annual Electric Generator Report – Nonutility" (prior Form EIA-867, "Annual Nonutility Power Producer Report") collects information annually from all nonutility power producers with a total generator nameplate rating of 1 MW or more including cogenerators, small power producers, and other nonutility electricity generators. All facilities must complete the entire form, providing, among other data, information about fuel consumption and quality; however facilities with a combined nameplate capacity of less than 25 MW are not required to complete Schedule V "Facility Environmental Information" of the Form EIA-860B.

Form EIA-900 "Monthly Nonutility Power Plant Report," is a cutoff model sample of approximately 500 nonutilities drawn from the frame of all nonutility facilities (approximately 2000 nonutilities) that have existing or planned nameplate capacity of 1 MW or more. The monthly data collection comes from all nonutilities with a nameplate rating of 50 MW or more. A cutoff model sampling and estimation are employed using the annual Form EIA-860B.

## $CO_2$ Coefficients

The coefficients for determining carbon released from the combustion of fossil fuels were developed by the

Energy Information Administration. A detailed discussion of the development and sources used is contained in the publication, *Emissions of Greenhouse Gases in the United States* (DOE/EIA-0573), Appendix B. The nonutility coefficients were developed to be consistent with the utility coefficients.

## Methodology for 1998

The methodology for developing the $CO_2$ emission estimates for steam utility plants and nonsteam utility plants (calculations performed on a plant basis by fuel), as well as for nonutility plants (calculations performed on a facility basis by fuel) is as follows:

### *Steam Utility Plants*

Form EIA-767, "Steam-Electric Plant Operation and Design Report"
Form EIA-759, "Monthly Power Plant Report"
FERC Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants"

Step 1. Sum of Monthly Consumption (EIA-767) times Monthly Average Btu Content (EIA-767) divided by Total Annual Consumption (EIA-767) = Weighted Annual Btu Content Factor.

Step 2. Annual Consumption (EIA-767) times Weighted Annual Btu Content Factor (Step 1) = Annual Btu Consumption.

Step 3. Annual Btu Consumption (Step 2) times $CO_2$ factors = Annual $CO_2$ Emissions.

Step 4. Reduce Annual $CO_2$ Emissions (Step 3) by 1 percent to assume 99 percent burn factor.

### *Nonsteam Utility Plants*

Form EIA-759, "Monthly Power Plant Report"
FERC Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants"

Step 1(a). If monthly EIA-759 and monthly FERC Form 423 are available: Sum of Monthly Consumption (EIA-759) times Monthly Average Btu Content (FERC Form 423) divided by Total Annual Consumption = Weighted Annual Btu Content Factor.

Step 1(b). If monthly EIA-759 is available but not monthly FERC Form 423: Sum of Monthly Consumption (EIA-759) times Average Monthly Btu Content (calculated from FERC Form 423) divided by Total Annual Consumption = Weighted Annual Btu Content Factor.

Step 1(c) If only annual EIA-759 is available: Annual Consumption (EIA-759) times Average Annual Btu Content (calculated from FERC Form 423) divided by Total Annual Consumption = Weighted Annual Btu Content Factor.

Step 2. Annual Consumption (EIA-759) times Weighted Annual Btu Content Factor (Step 1) = Annual Btu Consumption.

Step 3. Annual Btu Consumption (Step 2) times $CO_2$ Factors = Annual $CO_2$ Emissions.

Step 4. Reduce Annual $CO_2$ Emissions (Step 3) by 1 percent to assume 99 percent burn factor.

### *Nonutility Plants*

Form EIA-860B, "Annual Electric Generator Report – Nonutility"
FERC Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants"

Step 1 Annual Consumption (EIA-860B) times Average Annual Btu Content (EIA-860B) divided by Total Annual Consumption = Weighted Annual Btu Content Factor.

Step 2. Annual Consumption (EIA-860B) times Weighted Annual Btu Content Factor (Step 1) = Annual Btu Consumption.

Step 3. Annual Btu Consumption (Step 2) x $CO_2$ Factors = Annual $CO_2$ Emissions.

Step 4. Reduce Annual $CO_2$ Emissions (Step 3) by 1 percent to assume 99 percent burn factor.

## Methodology for 1999

*Utility Plants*

Form EIA-767, "Steam-Electric Plant Operation and Design Report"
Form EIA-759, "Monthly Power Plant Report"
FERC Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants"

Step 1(a) If monthly EIA-759 and prior year annual EIA-767 are available: Sum of Monthly Consumption (EIA-759) times Monthly Average Btu Content (EIA-767) divided by Total Annual Consumption (EIA-759) = Weighted Annual Btu Content Factor.

Step 1(b) If prior year annual EIA-767 is not available, but monthly EIA-759 and monthly FERC Form 423 are available: Sum the Monthly Consumption (EIA-759) times the Monthly Average Btu Content (FERC Form 423) divided by the Total Annual Consumption (EIA-759) = Weighted Annual Btu Content Factor.

Step 1(c) If prior year annual EIA-767 and monthly FERC Form 423 are not available, but monthly EIA-759 is available: Sum the Monthly Consumption (EIA-759) times the Average Monthly Btu Content (calculated at State level from FERC Form 423) divided by the Total Annual Consumption (EIA-759) = Weighted Annual Btu Content Factor.

Step 1(d) If prior year annual EIA-767, monthly EIA-759 and monthly FERC Form 423 are not available, but only annual EIA-759 is available: Annual Consumption (EIA-759) times the Average Annual Btu Content (calculated at State level from FERC Form 423) divided by the Total Annual Consumption (EIA-759) = Weighted Annual Btu Content Factor.

Step 2 Annual Consumption (EIA-759) times the Weighted Annual Btu Content Factor (Step 1) = Annual Btu Consumption.

Step 3. Annual Btu Consumption (Step 2) times $CO_2$ Coefficients (*Emissions of Greenhouse Gases in the United States*) = Annual Gross $CO_2$ Emissions

Step 4. Reduce Annual Gross $CO_2$ Emissions (Step 3) by 1 percent to assume 99 percent burn factor.

*Nonutility Plants*

Form EIA-900, "Monthly Nonutility Power Report"
Form EIA-860B, "Annual Electric Generator Report - Nonutility"
FERC Form 423 "Monthly Report of Cost and Quality of Fuels for Electric Plants"

Step 1(a) If monthly EIA-900 and prior year annual EIA-860B are available: Sum the Monthly Generation by Census Division and Fuel Type (EIA-900), and apply annual growth factor model to estimate 1999 Annual Generation. Divide 1999 Annual Generation by 1998 Annual Generation (EIA-860B) subtract 1, and multiply by 1998 Total Annual Consumption[27] (EIA-860B) = 1999 Total Annual Consumption 1999 Total Annual Consumption times Average Btu Content (EIA-860B for prior year) = 1999 Annual Btu Consumption

Step 1(b) If monthly EIA-900 and FERC Form 423 for 1998 are available: (sold utility plant to nonutility in 1999): Annual Consumption (EIA-900) times the Average Btu Content (FERC Form 423) = 1999 Annual Btu Consumption.

Step 1(c). If only monthly EIA-900 is available (new nonutility plants): Annual Consumption (EIA-900) times the Average Btu Content (calculated at State level from FERC Form 423) = 1999 Annual Btu Consumption

Step 2. 1999 Annual Btu Consumption (Step 1) times $CO_2$ Coefficients (*Emissions of Greenhouse Gases in the United States*) = Annual Gross $CO_2$ Emissions

Step 3 Reduce Annual Gross $CO_2$ Emissions (Step 2) by 1 percent to assume 99 percent burn factor

[27] 1998 Annual Consumption for cogenerators is adjusted to exclude fuel not used for generation of electricity

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January 28, 2008

Bill Walker
Shasta County
Department of Resources Management
1855 Placer Street, Suite 103
Redding, CA 96001-1759

RE: RES's comments on the alternatives analysis in the Hatchet Ridge Draft EIR

Dear Mr. Walker,

RES would like to provide comments on the alternatives analysis provided in the Draft EIR. The Hatchet Ridge Project has unique geographic features which impose siting constraints on turbines and associated facilities. Additionally, constraints on the minimum size of commercial wind energy projects to ensure an economically viable project play an important role in how a project is developed and financed. As the Draft EIR explained, some of these constraints were taken into consideration when determining the range of potentially feasible alternatives for the project. Below I have provided additional evidence supporting the Draft EIR's conclusions regarding the infeasibility of three of the initially considered alternatives that were rejected for further analysis: the Smaller Capacity Project Alternative, the Butte County morning glory Avoidance Alternative, and the Alternative Technology Alternative.

**Smaller Capacity Project Alternative**

RES would like to provide further explanation as to why we do not consider the Smaller Capacity Project Alternative feasible; the primary reason relates to economies of scale. The costs of development and construction of certain facilities associated with a wind project (i.e., transmission, substations, transformers, roads, etc.) needs to be spread out over an optimum MW output. As an example, regardless of the number of turbines installed a transformer will be needed. MW output associated with five turbines will not support a multi-million dollar transformer. When the energy output is minimized by reducing the total number of turbines, and the cost of the remaining facilities required to support the turbines exceeds the output, the project becomes infeasible. Very few commercial scale, stand-alone (not considering a second phase of an existing project) wind energy projects in the west are developed below 102 MW due to economies of scale relating to associated facilities. It is for this reason that RES chose the development of a minimum 102 MW-sized project as one of its key project objectives. (DEIR, p. 2-4.)

Additionally, the smaller capacity project would not reduce the environmental impacts identified in the EIR to a less than significant level. As mentioned in the previous paragraph, the same associated facilities would be needed for a wind power project, whether it has 50 turbines or 100 turbines. To obtain optimal energy output for a reduced capacity project, turbines would still have to be sited along the ridge,

which would require construction of roads, a substation, an operations and maintenance buildings, etc. Therefore, any reduction of environmental impacts is likely to be minimal with a reduced capacity project because the related facilities, which contribute to the project's significant impacts identified in the Draft EIR, would still be required to be built.

For these reasons, RES considers the Smaller Capacity Project Alternative both infeasible and unlikely to substantially reduce or avoid significant environmental impacts and therefore unworthy of further consideration or substantive analysis in an EIR.

**Butte County Morning Glory Avoidance Alternative**

In this alternative the Draft EIR suggested eliminating or relocating six of the turbines identified in an area where the Butte County morning glory was found. As described above, a reduction in the number of turbines proposed by RES would render the project infeasible due to the financial constraints of wind energy plant development and construction.

It is also infeasible to relocate the six turbines given the current topography of the proposed project area. The ridge upon which the project is proposed is at its widest 450 meters. There is no room along the existing ridge to relocate the turbines and it is not possible to place turbines upwind of one another along the ridge. Turbines that are placed too close together run the risk of causing a wake effect, which in turn affects the performance of the turbine and could have some safety implications as well. A trade-off exists between optimizing the turbine location for energy production and maintaining reasonable turbine interconnection costs, which increase with wider spacing. Experience, mathematical analysis, and cost considerations are employed to determine the optimum configuration given all of the existing site conditions. The layout currently proposed for Hatchet Ridge in the Draft EIR takes all these factors into consideration and has been optimized to produce the greatest amount of energy using the minimum number of turbines and appropriate spacing. Also, there is not another ridge or geographic feature adjacent to Hatchet Ridge upon which the six relocated turbines could be placed without requiring a significant amount of additional transmission or underground cabling, which would result in additional environmental impacts not addressed in this EIR.

Finally, as pointed out in comments provided by WEST (RES' environmental consultant) the project is unlikely to have a negative impact on the local Butte County morning glory population, and may, in fact, result in an increased population over time, due to the species' affinity for disturbed environments. WEST also notes that the Butte County morning glory cannot be shown to meet CEQA definitions of endangered or rare, and the number of occurrences and number of individuals exceeds the state criteria for listing. Therefore, a project alternative that considers changes to the layout to accommodate the Butte County morning glory is not warranted under CEQA and is unlikely to protect or benefit the species of concern.

**Alternative Technologies Alternative**

The Draft EIR states "The use of vertical axis wind turbine (VAWT) could theoretically minimize the visual impact because of the reduced height; however, the availability – and hence the feasibility – of these devices is unknown." (DEIR, p. 4-13.) Additionally, Wintu Audubon Society in its comments provided to the County on January 22, 2008, suggests using VAWT turbines would reduce environmental impacts. RES has researched VAWT technology and has found that not only is it infeasible to use this

technology at the Hatchet Ridge project, but it is unlikely to reduce environmental impacts. In fact, it could substantially increase the footprint-related impacts associated with turbine installation. (See footnote 1 below.) Moreover, Terra Moya Aqua, the company recommended by Wintu Audubon Society, currently has VAWT turbines in the range of only 1kw to 750 kw. The following excerpt is taken directly from the Terra Moya Aqua Web Site (www.tmawind.com):

> Our expected catalogue of turbines is as follows:
>
> A 1-5 kw units, approximately 8' tall with a footprint equal to a 8'x8'x8' equilateral triangle
> B 25-100 kw units, approximately 34' tall with a footprint equal to a 34'x34'x34' equilateral triangle
> C 100-350 kw units, approximately 116' tall with a footprint equal to 96'x96'x96' equilateral triangle.
> D 350-500/750 kw units approximately 150' tall with a footprint equal to 150'x150'150' equilateral triangle.
> E Larger models will be considered if new generator technologies prove out

It is not possible in today's energy market to develop a commercial scale energy project that is economically viable with the turbines currently available at Terra Moya Aqua. RES does not know of any other VAWT manufacturer supplying VAWT turbines viable for use on a commercial wind energy project. In fact, out of over 16,800 MW of currently operating commercial wind projects in the United States, zero MWs are produced from VAWT. The Wyoming facility that Wintu referenced in their comments is a test facility, not a commercial wind project, and we were not able from the information provided by Terra Moya Aqua to determine the size of the project.

Since VAWT turbines are currently manufactured with a top capacity of only 750 kw, almost three times the number of VAWT turbines would be needed at Hatchet Ridge to produce 102 MW, the minimum capacity that is financially feasible to construct and operate. Increasing the number of turbines on the project site would undoubtedly result in a greater impact on the environment than the currently proposed project.

The Wintu Audubon Society also commented on its concern for the Butte County morning glory in recommending the use of VAWT turbines; however, RES believes that VAWT turbines would have a far greater impact on this species than would a standard rotating blade turbine. The footprint of VAWT turbines is significantly larger than the turbines RES proposes to use[1], thereby substantially increasing the scope of the impact on Butte County morning glory that the Draft EIR considered. Additionally, the claim that this turbine technology will not cause any wildlife fatalities is not backed by any peer reviewed literature. Since there are no VAWT turbines in use at commercial scale wind energy projects, we were not able to find any avian impact or mortality studies for which to compare potential impacts at the Hatchet Ridge Project.

---

[1] / A typical foundation for the standard rotating blade turbine RES proposes to use ranges from 420-1600 square feet in size, depending on the type of foundation the ground conditions would require (16-foot diameter pier-type or 40-foot by 40-foot spread-footing type). (See DEIR, p. 2-10.) The footprint of just one foundation for the largest VAWT turbines manufactured by Terra Moya Aqua (750 kw) is 9,743 square feet (the area of one 150-foot equilateral triangle). As noted above, RES would have to install three times as many (approx. 138) of the largest VAWT turbines as standard rotating blade 2.4 MW turbines (43) in order to achieve the minimum financially feasible 102 MW output. Doing so would result in a total VAWT turbine foundation footprint on Hatchet Ridge of approximately 1,344,534 square feet (or 30.8 acres) (138 VAWT turbines x 9,743 sq.ft.). Compare this hypothetical VAWT footprint to the total maximum of just 68,800 square feet (1.58 acres) (43 turbines x 1600 sq.ft.) if the largest possible foundations were used for all of the standard rotating blade 2.4 MW turbines RES proposes to use.

Furthermore, the height of VAWTs is only 29 meters, which may function well in the treeless plains of Wyoming, but which will not function in the timberland setting of the Hatchet Ridge project site, where trees would significantly interfere with the wind at that lower height. Overall, RES finds this technology is incomparable to the technology required to build a viable commercial scale wind energy project, and therefore, the County was correct in considering it an infeasible alternative for the Hatchet Ridge Project.

Even if the VAWT turbine as referenced in the Wintu Audubon Society's comment letter was technically feasible (which it is not as indicated herein), there are no VAWT turbines manufactured anywhere in the world today that are financeable by any institutional investors or lenders active in the wind or power industry. The fact is, the proposed Hatchet Ridge Project is a $200 million project and suggesting that a commercially unproven and largely unknown manufacturer of turbines could be a financially viable alternative is a baseless assertion.

RES appreciates your consideration of this information regarding the feasibility of the project alternatives discussed in the Draft EIR. If the County needs further information about economic or construction constraints associated with the proposed project, please feel free to contact me.

Sincerely,

Nicole S. Hughes, M.A. RPA
RES America Developments, Inc.

4

Hatchet Ridge Wind, LLC
An affiliate of
RES
RES America Developments, Inc.

700 SW Taylor Street
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Portland, OR
97205 USA

Tel: +1 503 219 9000
Fax: +1 503 219 9009

January 28, 2008

Bill Walker
Shasta County
Department of Resources Management
1855 Placer Street, Suite 103
Redding, CA 96001-1759

RE: RES's comments on cultural resources section of EIR

Dear Mr. Walker,

RES has reviewed the Draft EIR for the Hatchet Ridge Wind Project and has some comments on the impact analysis and recommended mitigation measures listed in section 3.5, Cultural Resources. As a Registered Professional Archaeologist with several years of experience conducting cultural resources investigations and evaluating traditional cultural properties throughout the Northwest, I am very familiar with the complexities of evaluating cultural resources under state and federal environmental regulations. While I believe the Hatchet Ridge Draft EIR is thorough in its evaluation of the potential impacts regarding cultural resources, I have some concerns regarding the recommended mitigation measures and feel that some are outside the purview of CEQA. I urge you to consider my comments not only as the project applicant, but also as a professional archaeologist with unique experience in cultural resources investigations for large energy development and construction projects.

In addition to providing you with comments specific to the Draft EIR, I would like to share with you evidence of our commitment to put forth a good faith effort at consultation with the Pit River Tribe. Our goal from the beginning of this project has been to work cooperatively with the tribe to attempt to minimize and mitigate impacts to culturally sensitive areas and resources. Working towards this goal, we have attempted several communications with the tribe over the last 7 months. Our communications to the Pit River Tribe include letters, e-mail messages and phone messages requesting a meeting with the tribe to discuss their concerns (copies of these communications are included). Unfortunately, with the exception of one short phone conference between myself and tribal members in September 2007, we have not been very successful at engaging the tribe in meaningful discussions regarding potential impacts to cultural resources and tribal values.

RES will continue to attempt communications with the Pit River Tribe and understands from the findings of the EIR that coordination with the tribe will be an essential item for moving forward with project approval. We continue to be interested in initiating substantive discussions with the tribe and in preparing an agreement outlining an understanding of the tribe's future involvement in the project in a timely manner. We are concerned, however, that based on the lack of responses we have received to date from the tribe, further communications attempts may not be successful. We would appreciate the County's

assistance in facilitating further coordination with the tribe, especially now that such coordination is proposed as part of the mitigation approach in the Draft EIR.

Comments specific to the Draft EIR:

Pg 3.5-2:

The Draft EIR suggests that Bunchgrass Mountain is a well known locality used by Achumawi spiritual practitioners for vision quests and as a power place and may be affected by the proposed project. According to our records, Bunchgrass Mountain is approximately 1 mile outside the proposed project area. RES would like the Final EIR to explain further how Bunchgrass Mountain will be directly affected by the proposed project.

Under the section entitled *Identified Cultural Resources* the Draft EIR names "Hatchet Ridge-Bunchgrass Mountain" as an identified cultural resource. The EIR consultant provides descriptions of Hatchet Ridge and Bunchgrass Mountain and how these localities are significant to the Pit River Tribe and a statement that Hatchet Ridge is used as a route to access Bunchgrass Mountain. However, by the mere fact that one locality is used as a travel route to get to the other does not seem to justify the two localities being considered as one in the impact analysis. RES believes that an independent analysis of the two localities is a more appropriate way to analyze project impacts.

Pg. 3.5-8:

The Draft EIR lists the criteria for eligibility for listing in the California Register of Historical Resources, however, it fails to explain how under California law the integrity of a property is also taken into consideration. The following is a statement from the California Historic Resources Information System publication entitled *California Register Eligibility*:

> Integrity is the authenticity of an historical resource's physical identity evidenced by the survival of characteristics that existed during the resource's period of significance. Historical resources eligible for listing in the California Register must meet one of the criteria of significance described above and retain enough of their historic character or appearance to be recognizable as historical resources and to convey the reasons for their significance. Historical resources that have been rehabilitated or restored may be evaluated for listing.
>
> Integrity is evaluated with regard to the retention of location, design, setting, materials, workmanship, feeling, and association. It must also be judged with reference to the particular criteria under which a resource is proposed for eligibility. Alterations over time to a resource or historic changes in its use may themselves have historical, cultural, or architectural significance.
>
> It is possible that historical resources may not retain sufficient integrity to meet the criteria for listing in the National Register, but they may still be eligible for listing in the California Register. A resource that has lost its historic character or appearance may still have sufficient integrity for the California Register if it

2

maintains the potential to yield significant scientific or historical information or specific data.

Pg. 3 5-11; Mitigation Measure CUL-1:

RES does not agree that Mitigation Measure CUL-1 is an appropriate measure for mitigation of visual and auditory disruption of Pit River Tribe religious practices. The mitigation measure suggests the project area be recorded as a Traditional Cultural Property. "Traditional Cultural Property" is a term used in federal historic preservation law to define a property that is eligible for inclusion in the National Register on the basis of its importance to a living community for maintaining cultural identity. If the consultant suggests that the site is a significant Archaeological or Historic Resource as defined in California Code of Regulations, Title 14, Chapter 3 15064.5, any further recordation of the site should be in support of a determination of eligibility to the California Register of Historical Resources, not as a Traditional Cultural Property under the federal regulatory scheme.

Furthermore, there currently is no legal precedent set for use of the proposed project area as a Traditional Cultural Property. The property is owned by Sierra Pacific Industries and Fruit Growers Association and is managed primarily as timberland. The timberland within the proposed project area has been managed for timber production and harvested for over 100 years. During that time there have been multiple entries and active uses, including logging, road construction and maintenance, forest management, and tree planting, as well as the construction of several telecommunication sites.

Sierra Pacific has been the owner of lands within the proposed project area since 1978. During the last 20 of these 40 years, they have prepared 4 different Timber Harvest Plans (THP) within or adjacent to the project area, in which the Pit River Tribe has been given the opportunity to comment on each THP. In addition, the entire area was completely harvested and mechanically site-prepped following the Fountain Fire in 1992. During this time, the tribe never provided input and never suggested that the property should be considered a Traditional Cultural Property. Furthermore, in the course of owning and conducting activities on this property, the landowner has had no knowledge or evidence of such use or of the presence of any historic or prehistoric archaeological sites. The lack of comment from the tribe regarding the significance of the site over the last 20 years of timber management indicates that the area has only recently been determined a potential Traditional Cultural Property.

Right to pass on this property is by permission and subject to control of the owner as per Section 1008 of the California Civil Code and is posted accordingly. Access to properties subject to this provision is sometimes available, but the landowners reserve the right to control such access. Some activities would require a permit that would include insurance coverage and liability releases. Examples would include group use, woodcutting, Christmas trees, mushroom picking, and bough or greenery collection. The Pit River Tribe does not have a permit for resources extraction or any other use on the property.

3

Since granting approval of the project would result in no changes to land ownership or existing access rights, and because RES does not have the right to change the designation of the property through its leases with Sierra Pacific Industries and Fruit Growers Association, RES does not intend to facilitate the recording of the property as a Traditional Cultural Property.

While RES feels it is important to protect significant cultural properties and wishes to implement a monitoring program which will include tribal input and involvement, we do not feel that it is necessary nor warranted to officially designate the property as a Traditional Cultural Property.

Impact CUL-3:

The Draft EIR suggests that access restrictions adversely affect the use of a historical resource, and even though the proposed project would not change the access rights of the Pit River tribe, it is still considered in the CEQA analysis as an impact. The Pit River Tribe does not have a permit with the landowner for resource extraction; therefore, any collection of basketry material conducted in the area is considered an illegal activity. RES does not consider access restrictions an impact which should be evaluated in the EIR because it is an existing condition of the property which will be unchanged by the proposed project.

Thank you for taking the time to consider my comments on the Draft EIR and suggestions for revisions of the proposed mitigation measures and impact analyses.

Sincerely,

Nicole S. Hughes, M A , RPA
RES America Developments, Inc.

Enclosures
Pit River Communications

4

Call Log Hatchet Mt.

| Contact | Date | Subject | Left Message |
|---|---|---|---|
| Sharon Elmore | 6/19/07 | | phone |
| Sharon Elmore | 7/10/07 | | phone |
| Sharon Elmore | 9/14/07 | | phone |
| Sharon Elmore w/ several Tribal members | 9/[illegible]/07 | Discussed Tribe's concerns about Project + requested meeting w/ Tribe the week of the Sept. 24 | |
| Sharon Elmore | 9/21/07 | message re setting up mtg on 27th | phone |

RES
RES America Developments, Inc.

1 SW Columbia
Suite 460
Portland, OR 97258

Tel: (503) 219 9000
Fax: (503) 219 9009

May 30, 2007

Jessica Jim, Tribal Chair
Pit River Tribal Council
37014 Main Street
P.O. Drawer 1570
Burney, CA 96013

Dear Ms. Jim,

Renewable Energy Systems (RES) would like to meet with the Pit River Tribal Council and all other concerned tribal members regarding the proposed Hatchet Mountain Wind Energy Project. As you know Shasta County is preparing a SEQA document outlining environmental concerns for the project. We understand from public scoping comments obtained during the SEQA process that there are concerns about how the proposed project will impact cultural sites and natural resources. RES would like the opportunity to answer questions and identify concerns so that appropriate measures can be taken to avoid unnecessary adverse impacts. If you would like, RES can propose a date and arrange a meeting place in Burney for such an event, otherwise we would be happy to attend one of your regularly scheduled tribal council meetings. Thank you considering our request, we look forward to meeting with you.

Feel free to call me directly at 503-789-5741

Sincerely,

Nicole S. Hughes
NW Regional Permitting Specialist
Renewable Energy Systems

Hatchet Ridge Wind, LLC
an affiliate of
RES
RES America Developments, Inc.

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97258 USA

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July 5, 2007

Jessica Jim, Tribal Chair
Pit River Tribal Council
37014 Main Street
P.O. Drawer 1570
Burney, CA 96013

Dear Ms. Jim,

Hatchet Ridge Wind, LLC (an affiliate of Renewable Energy Systems (RES)) would like to meet with the Pit River Tribal Council and all other concerned tribal members regarding the proposed Hatchet Mountain Wind Energy Project. As you know Shasta County is preparing a SEQA document outlining environmental concerns for the project. We understand from public scoping comments obtained during the SEQA process that there are concerns about how the proposed project will impact cultural sites and natural resources. RES would like the opportunity to answer questions and identify concerns so that appropriate measures can be taken to avoid unnecessary adverse impacts. If you would like, we can propose a date and arrange a meeting place in Burney for such an event, otherwise we would be happy to attend one of your regularly scheduled tribal council meetings. Thank you for considering our request; we look forward to meeting with you.

Feel free to call me directly at 503-341-0185.

Sincerely,

Nicole S. Hughes
NW Regional Permitting Specialist
RES America Developments

Cc:
Sharon Elmore, Culture Information Officer
Bill Walker, Shasta County Dept. of Resource Management (electronic copy)

**Nicole Hughes**

**From:** Nicole Hughes
**Sent:** Monday, September 10, 2007 11:00 AM
**To:** 'ajumawi@frontiernet net'
**Subject:** Hatchet Ridge Wind contacts

Sharon, here is the contact information I have for the county and Jones and Stokes

Shasta County
Bill Walker
Shasta County Dept of Resource Mgmt
bwalker@co.shasta.ca.us
1855 Placer Street, Suite 103
Redding, CA 96001-1759
(530) 225-5532

Jones and Stokes
John Forsythe
Senior Project Manager
jforsythe@jsanet com
2600 V Street
Sacramento, CA 95818
(916) 737-3000

Nicole S Hughes
Renewable Energy Systems
One SW Columbia
Portland, OR 97258

(503) 219-9000 (direct dial)
(503) 341-0185(cell) ***NEW CELL NUMBER***
(503) 219-9009 (fax)
nicole hughes@res-americas com (email)

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11/13/2007

**Nicole Hughes**

**From:** Nicole Hughes
**Sent:** Monday, September 17, 2007 4:11 PM
**To:** 'ajumawi@frontiernet.net'
**Subject:** Visit next week

Sharon, I am planning a visit to Burney next week and would like to come speak with tribal members as we discussed I can also arrange for a site visit if you are interested. I will be in Burney on Thursday the 27th

Nicole S. Hughes
Renewable Energy Systems
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Portland, OR 97258

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(503) 341-0185 (cell)
(503) 219-9009 (fax)
nicole.hughes@res-americas.com (email)



11/13/2007

**Nicole Hughes**

**From:** Nicole Hughes
**Sent:** Tuesday, November 13, 2007 1:14 PM
**To:** ajumawi@frontiernet.net
**Subject:** Hatchet Ridge Project

Sharon, we have heard from Shasta County recently, they are expecting a draft of the Environmental Impact Report soon. I plan on making several copies of the report available at the Burney Chamber of Commerce. I will let you know when they are available. RES would still like to schedule a meeting with the tribe to discuss the concerns that were shared during the conference call in September. Please let me know the availability of the tribe and I can either set up a meeting place or come to your offices.

*Please note new address*

Nicole S. Hughes
Renewable Energy Systems
700 SW Taylor St. Suite 210
Portland, OR 97205

(503) 219-9000 ext. 2106 (direct)
(503) 341-0185 (cell)
(503) 219-9009 (fax)
nicole.hughes@res-americas.com (email)



11/13/2007

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January 8, 2008

Jessica Jim, Tribal Chair
Pit River Tribal Council
37014 Main Street
P.O Drawer 1570
Burney, CA 96013

Dear Ms Jim,

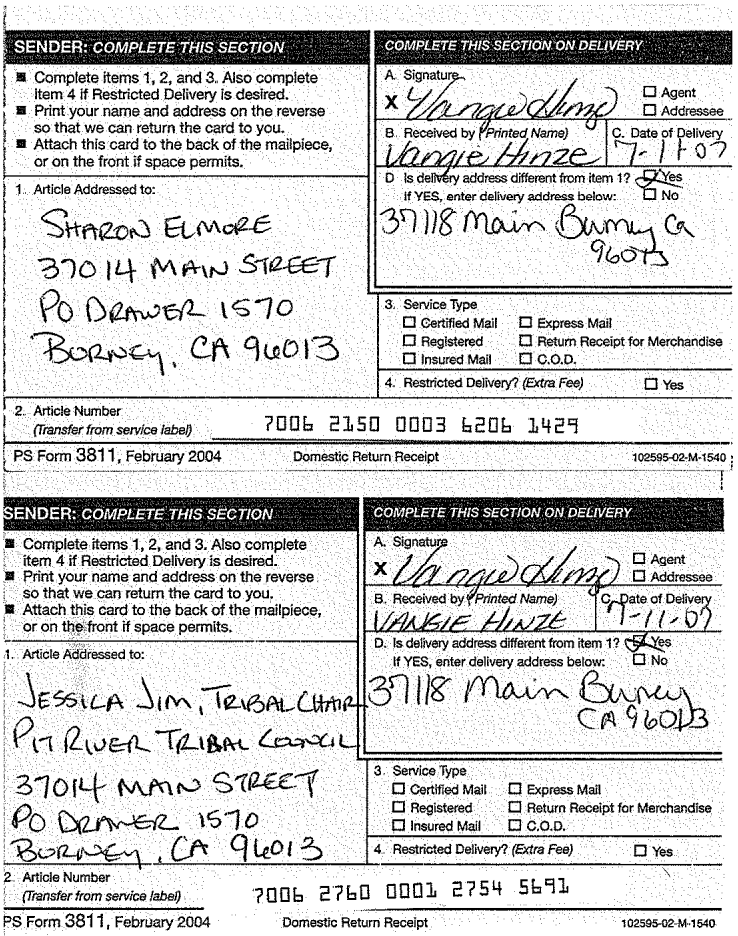
Hatchet Ridge Wind, LLC (an affiliate of RES America Developments, Inc. (RES)) would like to meet with the Pit River Tribal Council and all other concerned tribal members regarding the proposed Hatchet Mountain Wind Energy Project. As I am sure you are aware Shasta County has released a draft CEQA document which identifies a potential significant and unavoidable impact related to tribal resources. We would like to work with the Pit River Tribe to minimize impacts and are interested in entering into an agreement with the tribe which outlines future tribal involvement. If you would like, we can propose a date and arrange a meeting place in Burney for such an event, otherwise we would be happy to attend one of your regularly scheduled tribal council meetings. Thank you for considering our request; we look forward to working with you.

Feel free to call me directly at 503-341-0185

Sincerely,

Nicole S. Hughes
NW Regional Permitting Specialist
RES America Developments, Inc.

Cc:
Sharon Elmore, Culture Information Officer
Bill Walker, Shasta County Dept of Resource Mgmt, 1855 Placer Street, Suite 103
Redding, CA 96001-1759



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1. Article Addressed to:

SHARON ELMORE
37014 MAIN STREET
PO DRAWER 1570
BURNEY, CA 96013

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X Vangie Hinze ☐ Agent ☐ Addressee

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1. Article Addressed to:

JESSICA JIM, TRIBAL CHAIR
PIT RIVER TRIBAL COUNCIL
37014 MAIN STREET
PO DRAWER 1570
BURNEY, CA 96013

**COMPLETE THIS SECTION ON DELIVERY**

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X Vangie Hinze ☐ Agent ☐ Addressee

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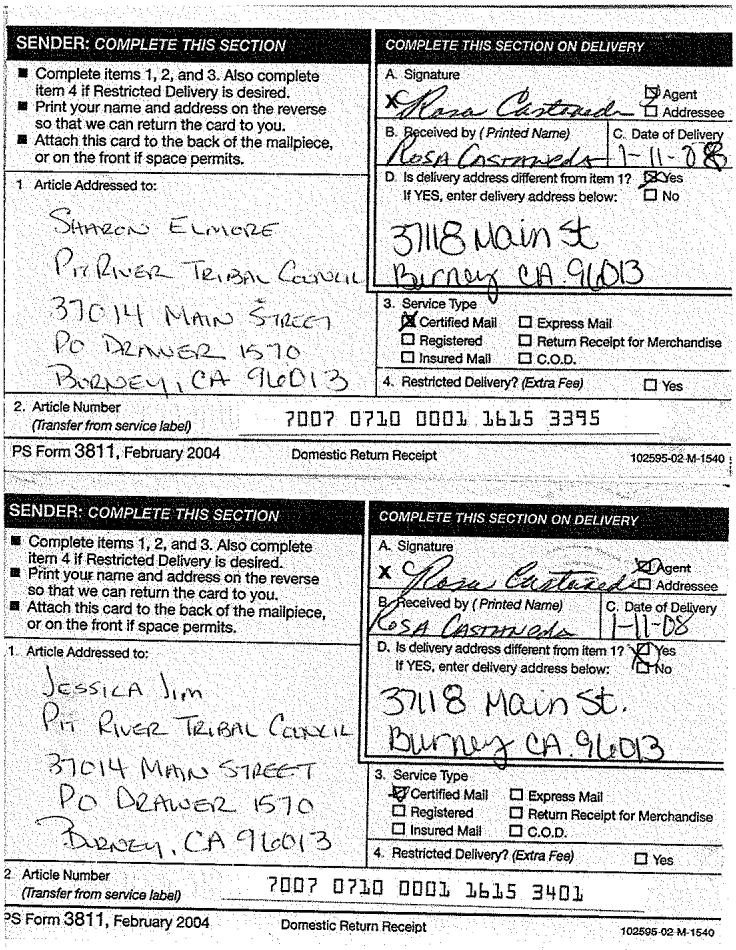

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SHARON ELMORE
PIT RIVER TRIBAL COUNCIL
37014 MAIN STREET
PO DRAWER 1570
BURNEY, CA 96013

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Rosa Castaneda ☒ Agent ☐ Addressee

B. Received by (Printed Name) ROSA CASTANEDA C. Date of Delivery 1-11-08

D. Is delivery address different from item 1? ☒ Yes
If YES, enter delivery address below: ☐ No

37118 Main St
Burney CA 96013

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4. Restricted Delivery? (Extra Fee) ☐ Yes

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- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

JESSICA JIM
PIT RIVER TRIBAL COUNCIL
37014 MAIN STREET
PO DRAWER 1570
BURNEY, CA 96013

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Rosa Castaneda ☒ Agent ☐ Addressee

B. Received by (Printed Name) ROSA CASTANEDA C. Date of Delivery 1-11-08

D. Is delivery address different from item 1? ☒ Yes
If YES, enter delivery address below: ☐ No

37118 Main St.
Burney CA 96013

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7007 0710 0001 1615 3401

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

# Letter OG3 Remy, Thomas, Moose and Manley, LLP

## Response to Comment OG3-1

This comment introduces the applicant's attorney's comments on the Draft EIR. The comment states that the applicant is in agreement with most of the conclusions of the Draft EIR, with a few exceptions as noted in subsequent comments.

## Response to Comment OG3-2

Based on currently available information on the number of known Butte County morning-glory occurrences and the element occurrence rank of each occurrence as provided in the California Natural Diversity Database (2008), the Draft EIR does not overstate the significance of impacts on Butte County morning-glory. Please see the response to Comment OG6-7, OG6-8, and OG6-9 for further explanation.

## Response to Comment OG3-3

The evidence and comments submitted by Dave P. Young of WEST have been carefully reviewed and considered, and proposed changes to Section 3.4 of the Draft EIR have been made where appropriate. Please refer to the responses to Letter OG6 below.

## Response to Comment OG3-4

The term *traditional cultural property* has been removed from Mitigation Measure CUL-1 to eliminate any implication that the project is required to comply with federal cultural resource regulations.

## Response to Comment OG3-5

It is acknowledged that any private property access must be granted by the property owner.

## Response to Comment OG3-6

Comment noted. The Draft EIR screened a reasonable range of project alternatives that could reduce or eliminate one or more of the significant environmental impacts associated with the project. Section 4.5, *Alternatives Analysis*, beginning on page 4-11 of the Draft EIR, discusses this process in detail.

## Response to Comment OG3-7

Comment noted. The commenter offers additional information on the constraints associated with the use of vertical axis wind turbines for the proposed project. The Draft EIR addresses this technology in Section 4.5.1, *Alternatives Considered but Rejected.* The information provided supports and does not change the conclusions in that section of the Draft EIR.

## Response to Comment OG3-8

In this comment, the applicant's CEQA counsel describes the research and justification for RES's selection of a particular turbine for the proposed project. This information is presented in Appendix A of Final EIR as information supporting the project description, presented in Chapter 2 of the Draft EIR.

## Response to Comment OG3-9

The commenter provides supporting information quantifying the reductions in greenhouse gas emissions generated by wind turbines in contrast to those generated by fossil fuels.

## Response to Comment OG3-10

The AWEA citation is noted and included in the administrative record. Additional information is provided by the applicant's CEQA counsel. The information is noted and will be included in the administrative record for the project.

## Response to Comment OG3-11

Comment noted. The relevant FAA requirements, as set forth in the technical note *Development of Obstruction Lighting Standards for Wind Turbine Farms*, are excerpted below.

> Nighttime wind turbine obstruction lighting should consist of the preferred Federal Aviation Administration (FAA) L-864 aviation red-colored flashing lights. Minimum intensities of 2000 candelas for nighttime red flashing or strobe lights are required. The standard FAA L-810 steady-burning obstruction light, with an intensity of approximately 32 candelas, is of very little use. (Patterson 2005.)

The wording of Mitigation Measure AES-1 has been revised to clarify compliance with FAA regulations.

## Response to Comment OG3-12

Comment noted. The wording of Mitigation Measure AIR-1 has been revised to remove the requirement that operations be discontinued when wind speeds exceed 20 mph and that other minimization measures be implemented instead.

## Response to Comment OG3-13

This comment expresses the applicant's interest in reconsideration of certain issues in the Draft EIR, as identified above.

**Letter OG4**

Hatchet Ridge Wind, LLC
An affiliate of
RES
RES America Developments, Inc.

700 SW Taylor Street
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97205 USA

Tel: +1 503 219 9000
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January 28, 2008

Bill Walker
Shasta County
Department of Resources Management
1855 Placer Street, Suite 103
Redding, CA 96001-1759

RE: RES's comments on the alternatives analysis in the Hatchet Ridge Draft EIR

Dear Mr. Walker,

RES would like to provide comments on the alternatives analysis provided in the Draft EIR. The Hatchet Ridge Project has unique geographic features which impose siting constraints on turbines and associated facilities. Additionally, constraints on the minimum size of commercial wind energy projects to ensure an economically viable project play an important role in how a project is developed and financed. As the Draft EIR explained, some of these constraints were taken into consideration when determining the range of potentially feasible alternatives for the project. Below I have provided additional evidence supporting the Draft EIR's conclusions regarding the infeasibility of three of the initially considered alternatives that were rejected for further analysis: the Smaller Capacity Project Alternative, the Butte County morning glory Avoidance Alternative, and the Alternative Technology Alternative.

OG4-1

**Smaller Capacity Project Alternative**

RES would like to provide further explanation as to why we do not consider the Smaller Capacity Project Alternative feasible; the primary reason relates to economies of scale. The costs of development and construction of certain facilities associated with a wind project (i.e., transmission, substations, transformers, roads, etc.) needs to be spread out over an optimum MW output. As an example, regardless of the number of turbines installed a transformer will be needed. MW output associated with five turbines will not support a multi-million dollar transformer. When the energy output is minimized by reducing the total number of turbines, and the cost of the remaining facilities required to support the turbines exceeds the output, the project becomes infeasible. Very few commercial scale, stand-alone (not considering a second phase of an existing project) wind energy projects in the west are developed below 102 MW due to economies of scale relating to associated facilities. It is for this reason that RES chose the development of a minimum 102 MW-sized project as one of its key project objectives. (DEIR, p. 2-4.)

OG4-2

Additionally, the smaller capacity project would not reduce the environmental impacts identified in the EIR to a less than significant level. As mentioned in the previous paragraph, the same associated facilities would be needed for a wind power project, whether it has 50 turbines or 100 turbines. To obtain optimal energy output for a reduced capacity project, turbines would still have to be sited along the ridge,

which would require construction of roads, a substation, an operations and maintenance buildings, etc. Therefore, any reduction of environmental impacts is likely to be minimal with a reduced capacity project because the related facilities, which contribute to the project's significant impacts identified in the Draft EIR, would still be required to be built.

OG4-2 cont.

For these reasons, RES considers the Smaller Capacity Project Alternative both infeasible and unlikely to substantially reduce or avoid significant environmental impacts and therefore unworthy of further consideration or substantive analysis in an EIR.

**Butte County Morning Glory Avoidance Alternative**

In this alternative the Draft EIR suggested eliminating or relocating six of the turbines identified in an area where the Butte County morning glory was found. As described above, a reduction in the number of turbines proposed by RES would render the project infeasible due to the financial constraints of wind energy plant development and construction.

It is also infeasible to relocate the six turbines given the current topography of the proposed project area. The ridge upon which the project is proposed is at its widest 450 meters. There is no room along the existing ridge to relocate the turbines and it is not possible to place turbines upwind of one another along the ridge. Turbines that are placed too close together run the risk of causing a wake effect, which in turn affects the performance of the turbine and could have some safety implications as well. A trade-off exists between optimizing the turbine location for energy production and maintaining reasonable turbine interconnection costs, which increase with wider spacing. Experience, mathematical analysis, and cost considerations are employed to determine the optimum configuration given all of the existing site conditions. The layout currently proposed for Hatchet Ridge in the Draft EIR takes all these factors into consideration and has been optimized to produce the greatest amount of energy using the minimum number of turbines and appropriate spacing. Also, there is not another ridge or geographic feature adjacent to Hatchet Ridge upon which the six relocated turbines could be placed without requiring a significant amount of additional transmission or underground cabling, which would result in additional environmental impacts not addressed in this EIR.

OG4-3

Finally, as pointed out in comments provided by WEST (RES' environmental consultant) the project is unlikely to have a negative impact on the local Butte County morning glory population, and may, in fact, result in an increased population over time, due to the species' affinity for disturbed environments. WEST also notes that the Butte County morning glory cannot be shown to meet CEQA definitions of endangered or rare, and the number of occurrences and number of individuals exceeds the state criteria for listing. Therefore, a project alternative that considers changes to the layout to accommodate the Butte County morning glory is not warranted under CEQA and is unlikely to protect or benefit the species of concern.

OG4-4

**Alternative Technologies Alternative**

The Draft EIR states "The use of vertical axis wind turbine (VAWT) could theoretically minimize the visual impact because of the reduced height; however, the availability – and hence the feasibility – of these devices is unknown." (DEIR, p. 4-13.) Additionally, Wintu Audubon Society in its comments provided to the County on January 22, 2008, suggests using VAWT turbines would reduce environmental impacts. RES has researched VAWT technology and has found that not only is it infeasible to use this

OG4-5

technology at the Hatchet Ridge project, but it is unlikely to reduce environmental impacts. In fact, it could substantially increase the footprint-related impacts associated with turbine installation. (See footnote 1 below.) Moreover, Terra Moya Aqua, the company recommended by Wintu Audubon Society, currently has VAWT turbines in the range of only 1kw to 750 kw. The following excerpt is taken directly from the Terra Moya Aqua Web Site (www.tmawind.com):

> Our expected catalogue of turbines is as follows:
>
> A 1-5 kw units, approximately 8' tall with a footprint equal to a 8'x8'x8' equilateral triangle
> B 25-100 kw units, approximately 34' tall with a footprint equal to a 34'x34'x34' equilateral triangle
> C 100-350 kw units, approximately 116' tall with a footprint equal to 96'x96'x96' equilateral triangle.
> D 350-500/750 kw units approximately 150' tall with a footprint equal to 150'x150'150' equilateral triangle.
> E Larger models will be considered if new generator technologies prove out

OG4-5 cont.

It is not possible in today's energy market to develop a commercial scale energy project that is economically viable with the turbines currently available at Terra Moya Aqua. RES does not know of any other VAWT manufacturer supplying VAWT turbines viable for use on a commercial wind energy project. In fact, out of over 16,800 MW of currently operating commercial wind projects in the United States, zero MWs are produced from VAWT. The Wyoming facility that Wintu referenced in their comments is a test facility, not a commercial wind project, and we were not able from the information provided by Terra Moya Aqua to determine the size of the project.

Since VAWT turbines are currently manufactured with a top capacity of only 750 kw, almost three times the number of VAWT turbines would be needed at Hatchet Ridge to produce 102 MW, the minimum capacity that is financially feasible to construct and operate. Increasing the number of turbines on the project site would undoubtedly result in a greater impact on the environment than the currently proposed project.

OG4-6

The Wintu Audubon Society also commented on its concern for the Butte County morning glory in recommending the use of VAWT turbines; however, RES believes that VAWT turbines would have a far greater impact on this species than would a standard rotating blade turbine. The footprint of VAWT turbines is significantly larger than the turbines RES proposes to use[1], thereby substantially increasing the scope of the impact on Butte County morning glory that the Draft EIR considered. Additionally, the claim that this turbine technology will not cause any wildlife fatalities is not backed by any peer reviewed literature. Since there are no VAWT turbines in use at commercial scale wind energy projects, we were not able to find any avian impact or mortality studies for which to compare potential impacts at the Hatchet Ridge Project.

OG4-7

[1] / A typical foundation for the standard rotating blade turbine RES proposes to use ranges from 420-1600 square feet in size, depending on the type of foundation the ground conditions would require (16-foot diameter pier-type or 40-foot by 40-foot spread-footing type). (See DEIR, p. 2-10.) The footprint of just one foundation for the largest VAWT turbines manufactured by Terra Moya Aqua (750 kw) is 9,743 square feet (the area of one 150-foot equilateral triangle). As noted above, RES would have to install three times as many (approx. 138) of the largest VAWT turbines as standard rotating blade 2.4 MW turbines (43) in order to achieve the minimum financially feasible 102 MW output. Doing so would result in a total VAWT turbine foundation footprint on Hatchet Ridge of approximately 1,344,534 square feet (or 30.8 acres) (138 VAWT turbines x 9,743 sq.ft.). Compare this hypothetical VAWT footprint to the total maximum of just 68,800 square feet (1.58 acres) (43 turbines x 1600 sq.ft.) if the largest possible foundations were used for all of the standard rotating blade 2.4 MW turbines RES proposes to use.

3

Furthermore, the height of VAWTs is only 29 meters, which may function well in the treeless plains of Wyoming, but which will not function in the timberland setting of the Hatchet Ridge project site, where trees would significantly interfere with the wind at that lower height. Overall, RES finds this technology is incomparable to the technology required to build a viable commercial scale wind energy project, and therefore, the County was correct in considering it an infeasible alternative for the Hatchet Ridge Project. OG4-8

Even if the VAWT turbine as referenced in the Wintu Audubon Society's comment letter was technically feasible (which it is not as indicated herein), there are no VAWT turbines manufactured anywhere in the world today that are financeable by any institutional investors or lenders active in the wind or power industry. The fact is, the proposed Hatchet Ridge Project is a $200 million project and suggesting that a commercially unproven and largely unknown manufacturer of turbines could be a financially viable alternative is a baseless assertion. OG4-9

RES appreciates your consideration of this information regarding the feasibility of the project alternatives discussed in the Draft EIR. If the County needs further information about economic or construction constraints associated with the proposed project, please feel free to contact me. OG4-10

Sincerely,

Nicole S. Hughes, M.A. RPA
RES America Developments, Inc.

4

# Letter OG4 RES America Developments, Inc.

## Response to Comment OG4-1

The project applicant notes the particular considerations that factor into an alternatives analysis under CEQA, particularly at this site. The applicant notes that additional information about the alternatives is provided in this comment letter.

## Response to Comment OG4-2

This comment states that the smaller project alternative is not economically feasible at this site, and provides a rationale for this assertion.

## Response to Comment OG4-3

The comment provides additional explanation and justification for the elimination of the Smaller Capacity Project Alternative in the Draft EIR. The Draft EIR's discussion of the Smaller Capacity Project Alternative begins on page 4-15. This discussion states that the alternative "may" be feasible but that it would not reduce the significance of identified impacts to a less-than-significant level. The applicant states that a smaller capacity alternative (less than 100 MW) is not economically feasible and does not meet the project objective (Draft EIR Page 2-4) due to the cost of supporting infrastructure (a constant) regardless of the number of turbines installed. Therefore, based on the analysis presented in the Draft EIR and the supporting information provided by the applicant in this comment, this alternative was considered infeasible and was not considered further in the Draft EIR.

## Response to Comment OG4-4

The commenter provides additional information concerning the Butte County Morning Glory Avoidance Alternative and its infeasibility. As discussed in Section 4.5.1 of the Draft EIR, this alternative was considered but rejected from further analysis. The information does not change the Draft EIR conclusions regarding this alternative.

## Response to Comment OG4-5

Comment noted. This comment provides additional information regarding the feasibility of the vertical axis wind turbine (VAWT) technology at this project site.

## Response to Comment OG4-6

The project applicant addresses the availability and commercial viability of vertical axis wind turbines, also previously addressed in both the Draft EIR and Wintu Audubon comment letter (and response thereto). The applicant makes clear its view that VAWTs are not feasible for the proposed project. See also the response to Comment OG3-6.

## Response to Comment OG4-7

Comment noted. The applicant provides information indicating that the areal extent of habitat loss associated with the installation of vertical axis wind turbines would far exceed the habitat loss associated with the wind turbines planned for the proposed project.

## Response to Comment OG4-8

The comment supports the elimination of VAWTs as an alternative technology as discussed on page 4-13 of the Draft EIR. The applicant supports the finding that this alternative technology is infeasible for the proposed project and does not meet the project objectives. The information does not change the conclusion regarding this alternative presented in Chapter 4 of the Draft EIR.

## Response to Comment OG4-9

In addition to the applicant's contention that the application of VAWT technology is not feasible for the proposed project (see the response to Comment OG4-7), this comment provides additional information indicating that such equipment "cannot be financed by institutional investors or lenders in the wind or power industry." The commenter suggests that because the project would cost approximately $200 million, the claim that an "unproven" technology from a largely "unknown" manufacturer of turbines could be financially viable is a "baseless" assertion. As stated in the Draft EIR, based on these factors, the use of VAWTs is not feasible, does not meet the project objectives, and was eliminated from consideration in the Draft EIR. The information does not change the conclusion regarding this alternative presented in Chapter 4 of the Draft EIR.

## Response to Comment OG4-10

Comment noted. No further information on the economic or construction constraints is needed at this time.

**Letter OG5**

Hatchet Ridge Wind, LLC
An affiliate of
RES
RES America Developments, Inc.

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97205 USA

Tel: +1 503 219 9000
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January 28, 2008

Bill Walker
Shasta County
Department of Resources Management
1855 Placer Street, Suite 103
Redding, CA 96001-1759

RE: RES's comments on cultural resources section of EIR

Dear Mr. Walker,

RES has reviewed the Draft EIR for the Hatchet Ridge Wind Project and has some comments on the impact analysis and recommended mitigation measures listed in section 3.5, Cultural Resources. As a Registered Professional Archaeologist with several years of experience conducting cultural resources investigations and evaluating traditional cultural properties throughout the Northwest, I am very familiar with the complexities of evaluating cultural resources under state and federal environmental regulations. While I believe the Hatchet Ridge Draft EIR is thorough in its evaluation of the potential impacts regarding cultural resources, I have some concerns regarding the recommended mitigation measures and feel that some are outside the purview of CEQA. I urge you to consider my comments not only as the project applicant, but also as a professional archaeologist with unique experience in cultural resources investigations for large energy development and construction projects. **OG5-1**

In addition to providing you with comments specific to the Draft EIR, I would like to share with you evidence of our commitment to put forth a good faith effort at consultation with the Pit River Tribe. Our goal from the beginning of this project has been to work cooperatively with the tribe to attempt to minimize and mitigate impacts to culturally sensitive areas and resources. Working towards this goal, we have attempted several communications with the tribe over the last 7 months. Our communications to the Pit River Tribe include letters, e-mail messages and phone messages requesting a meeting with the tribe to discuss their concerns (copies of these communications are included). Unfortunately, with the exception of one short phone conference between myself and tribal members in September 2007, we have not been very successful at engaging the tribe in meaningful discussions regarding potential impacts to cultural resources and tribal values. **OG5-2**

RES will continue to attempt communications with the Pit River Tribe and understands from the findings of the EIR that coordination with the tribe will be an essential item for moving forward with project approval. We continue to be interested in initiating substantive discussions with the tribe and in preparing an agreement outlining an understanding of the tribe's future involvement in the project in a timely manner. We are concerned, however, that based on the lack of responses we have received to date from the tribe, further communications attempts may not be successful. We would appreciate the County's

assistance in facilitating further coordination with the tribe, especially now that such coordination is proposed as part of the mitigation approach in the Draft EIR. **OG5-2 cont.**

Comments specific to the Draft EIR:

Pg 3.5-2:

The Draft EIR suggests that Bunchgrass Mountain is a well known locality used by Achumawi spiritual practitioners for vision quests and as a power place and may be affected by the proposed project. According to our records, Bunchgrass Mountain is approximately 1 mile outside the proposed project area. RES would like the Final EIR to explain further how Bunchgrass Mountain will be directly affected by the proposed project. **OG5-3**

Under the section entitled *Identified Cultural Resources* the Draft EIR names "Hatchet Ridge-Bunchgrass Mountain" as an identified cultural resource. The EIR consultant provides descriptions of Hatchet Ridge and Bunchgrass Mountain and how these localities are significant to the Pit River Tribe and a statement that Hatchet Ridge is used as a route to access Bunchgrass Mountain. However, by the mere fact that one locality is used as a travel route to get to the other does not seem to justify the two localities being considered as one in the impact analysis. RES believes that an independent analysis of the two localities is a more appropriate way to analyze project impacts. **OG5-4**

Pg. 3.5-8:

The Draft EIR lists the criteria for eligibility for listing in the California Register of Historical Resources, however, it fails to explain how under California law the integrity of a property is also taken into consideration. The following is a statement from the California Historic Resources Information System publication entitled *California Register Eligibility*: **OG5-5**

> Integrity is the authenticity of an historical resource's physical identity evidenced by the survival of characteristics that existed during the resource's period of significance. Historical resources eligible for listing in the California Register must meet one of the criteria of significance described above and retain enough of their historic character or appearance to be recognizable as historical resources and to convey the reasons for their significance. Historical resources that have been rehabilitated or restored may be evaluated for listing.
>
> Integrity is evaluated with regard to the retention of location, design, setting, materials, workmanship, feeling, and association. It must also be judged with reference to the particular criteria under which a resource is proposed for eligibility. Alterations over time to a resource or historic changes in its use may themselves have historical, cultural, or architectural significance.
>
> It is possible that historical resources may not retain sufficient integrity to meet the criteria for listing in the National Register, but they may still be eligible for listing in the California Register. A resource that has lost its historic character or appearance may still have sufficient integrity for the California Register if it

2

maintains the potential to yield significant scientific or historical information or specific data.

OG5-5 cont.

Pg. 3 5-11; Mitigation Measure CUL-1:

RES does not agree that Mitigation Measure CUL-1 is an appropriate measure for mitigation of visual and auditory disruption of Pit River Tribe religious practices. The mitigation measure suggests the project area be recorded as a Traditional Cultural Property. "Traditional Cultural Property" is a term used in federal historic preservation law to define a property that is eligible for inclusion in the National Register on the basis of its importance to a living community for maintaining cultural identity. If the consultant suggests that the site is a significant Archaeological or Historic Resource as defined in California Code of Regulations, Title 14, Chapter 3 15064.5, any further recordation of the site should be in support of a determination of eligibility to the California Register of Historical Resources, not as a Traditional Cultural Property under the federal regulatory scheme.

OG5-6

Furthermore, there currently is no legal precedent set for use of the proposed project area as a Traditional Cultural Property. The property is owned by Sierra Pacific Industries and Fruit Growers Association and is managed primarily as timberland. The timberland within the proposed project area has been managed for timber production and harvested for over 100 years. During that time there have been multiple entries and active uses, including logging, road construction and maintenance, forest management, and tree planting, as well as the construction of several telecommunication sites.

Sierra Pacific has been the owner of lands within the proposed project area since 1978. During the last 20 of these 40 years, they have prepared 4 different Timber Harvest Plans (THP) within or adjacent to the project area, in which the Pit River Tribe has been given the opportunity to comment on each THP. In addition, the entire area was completely harvested and mechanically site-prepped following the Fountain Fire in 1992. During this time, the tribe never provided input and never suggested that the property should be considered a Traditional Cultural Property. Furthermore, in the course of owning and conducting activities on this property, the landowner has had no knowledge or evidence of such use or of the presence of any historic or prehistoric archaeological sites. The lack of comment from the tribe regarding the significance of the site over the last 20 years of timber management indicates that the area has only recently been determined a potential Traditional Cultural Property.

OG5-7

Right to pass on this property is by permission and subject to control of the owner as per Section 1008 of the California Civil Code and is posted accordingly. Access to properties subject to this provision is sometimes available, but the landowners reserve the right to control such access. Some activities would require a permit that would include insurance coverage and liability releases. Examples would include group use, woodcutting, Christmas trees, mushroom picking, and bough or greenery collection. The Pit River Tribe does not have a permit for resources extraction or any other use on the property.

OG5-8

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Since granting approval of the project would result in no changes to land ownership or existing access rights, and because RES does not have the right to change the designation of the property through its leases with Sierra Pacific Industries and Fruit Growers Association, RES does not intend to facilitate the recording of the property as a Traditional Cultural Property.

OG5-8 cont.

While RES feels it is important to protect significant cultural properties and wishes to implement a monitoring program which will include tribal input and involvement, we do not feel that it is necessary nor warranted to officially designate the property as a Traditional Cultural Property.

OG5-9

Impact CUL-3:

The Draft EIR suggests that access restrictions adversely affect the use of a historical resource, and even though the proposed project would not change the access rights of the Pit River tribe, it is still considered in the CEQA analysis as an impact. The Pit River Tribe does not have a permit with the landowner for resource extraction; therefore, any collection of basketry material conducted in the area is considered an illegal activity. RES does not consider access restrictions an impact which should be evaluated in the EIR because it is an existing condition of the property which will be unchanged by the proposed project.

OG5-10

Thank you for taking the time to consider my comments on the Draft EIR and suggestions for revisions of the proposed mitigation measures and impact analyses.

Sincerely,

Nicole S. Hughes, M A , RPA
RES America Developments, Inc.

Enclosures
Pit River Communications

4

# Letter OG5 RES America Developments, Inc.

## Response to Comment OG5-1

These comments provide information from the applicant regarding cultural resources at the site.

## Response to Comment OG5-2

The project applicant expresses a willingness to coordinate with the Pit River Tribe regarding the Tribe's concerns about Hatchet Ridge, while acknowledging the difficulty of arranging meaningful discussions with the Tribe. The applicant is requesting that the County assist in facilitating such consultation, especially since consultation is one component of Mitigation Measure CUL-1 as set forth in the EIR. The County is committed to assisting the applicant in arranging the coordination activities specified in Mitigation Measure CUL-1 to ensure that the interests of both the applicant and the Pit River Tribe are addressed.

## Response to Comment OG5-3

The EIR does not treat Bunchgrass Mountain as an entity separate from Hatchet Ridge (see response to Comment OG5-4 below). Accordingly, this comment is not relevant to the impact analysis presented in the cultural resources section of the Draft EIR.

## Response to Comment OG5-4

As indicated on page 3.5-6 of the Draft EIR, the Pit River Tribe identified Hatchet Ridge–Bunchgrass Mountain as a single cultural resource. Page 3.5-6 also discloses that power places are distributed along the ridge on Hatchet Ridge and Bunchgrass Mountain. Because the cultural resource was identified by the Pit River Tribe (who treats the two localities as one) on the basis of their historic and recent use of Hatchet Ridge–Bunchgrass Mountain, and because power places are distributed within both localities, treatment of Hatchet Ridge–Bunchgrass Mountain as a single entity is consistent with the information on record. The fact that persons outside the Pit River Tribe prefer to regard Hatchet Ridge and Bunchgrass Mountain as separate geographic features does not reflect the Pit River Tribe's conception of the area as a cultural resource, but instead reflects modern geographic conventions made independently of cultural resource concerns.

## Response to Comment OG5-5

Comment noted. Although the Draft EIR does not cite the integrity discussion contained in the California Historical Resources Information System publication *California Register Eligibility*, such a discussion of integrity is presented on page 3.5-7 of the Draft EIR. Specifically,

> A number of recent disturbances are evident on Hatchet Ridge–Bunchgrass Mountain: radio and microwave towers on Hatchet Ridge and Bunchgrass Mountain, a system of dirt roads, Sierra Pacific Industries timber operations, and the partial vegetative denuding of the area caused by the Fountain Fire. *Despite these recent disturbances, for the purposes of traditional cultural practices, the Pit River Tribe considers Hatchet Ridge–Bunchgrass Mountain "visually pristine"* (Tiley 2007:Appendix C). Although Bunchgrass Lookout Road and other elements of the road system are doubtless larger travel corridors than historic-era Achumawi foot trails, *the presence of unpaved roads along the ridge is not inconsistent with traditional use of the ridge as a travel corridor. The damage inflicted on the ridge's vegetative communities, while severe, is at worst a temporary impact on the character-defining features of Hatchet Ridge–Bunchgrass Mountain.* Forest fires are not exclusively modern phenomena; they doubtless occurred on the ridge in former times.

> Additionally, though not documented specifically in the project area, the deliberate burning of vegetation was a common California Indian forest management practice (Woods and Raven 1985:6–7). *Finally, the radio and microwave towers, while clearly visible on most of the ridge, do not impede views from the ridge of important natural features such as Mt. Lassen and Mt. Shasta. The towers are sufficiently dispersed relative to the length of the ridge that they do not dominate the viewshed on or fully compromise the character-defining features of Hatchet Ridge–Bunchgrass Mountain for traditional cultural practices*. [Emphasis added.]

Whereas the specific term *integrity* is not used in the previous paragraph, a clear case is made that Hatchet Ridge–Bunchgrass Mountain, in the words of *California Register Eligibility*, retains "enough…historic character or appearance to be recognized as [a historical resource] and to convey the reasons for [its] significance."

## Response to Comment OG5-6

The first sentence under Impact CUL-1 identifies Hatchet Ridge–Bunchgrass Mountain as a historical resource for the purposes of CEQA (page 3.5-10 of the Draft EIR): "Hatchet Ridge–Bunchgrass Mountain appears to be a historical resource for the purposes of CEQA."

As Ms. Hughes points out in her letter, further evaluative and subsequent mitigation efforts will be made within the framework of the California Register of Historical Resources' significance criteria. For a more in-depth discussion of the identification of Hatchet Ridge–Bunchgrass Mountain as a traditional cultural property, refer to the responses to Comments OG3-4 and OG5-7.

## Response to Comment OG5-7

Although Ms. Hughes' statement that the Pit River Tribe has provided no input concerning the status of Hatchet Ridge–Bunchgrass Mountain as a traditional cultural property *may* be valid[1], a careful reading of page 3.5-6 of the Draft EIR reveals that the status of Hatchet Ridge–Bunchgrass Mountain as a sacred or religious site has long been a matter of record. As recently as 2003, Registered Professional Forester M. E. Wyhlidko (2003:1) documented that Hatchet Ridge–Bunchgrass Mountain is a sacred site. Bureau of Land Management archaeologist Eric Ritter (1986:1) documented that the Pit River Tribe used Hatchet Ridge–Bunchgrass Mountain for seeking visions, consistent with Olmsted and Stewart's (1978:Figure 1) designation of Hatchet Ridge–Bunchgrass Mountain as a power place. Furthermore, professional cultural anthropologist Shelley (Raven) Tiley—who prepared the consultation report (Tiley 2007) on which the Draft EIR's analysis of Hatchet Ridge–Bunchgrass Mountain is based—documents the Pit River Tribe's use of Hatchet Ridge–Bunchgrass Mountain as a traditional cultural property from the historic period through 1985 (Woods and Raven 1985:40) to the present day (Tiley 2007: 8–9). Whatever the history of consultation between the present landowner and the Pit River Tribe, the sources cited in this paragraph reveal that the Pit River Tribe's use of Hatchet Ridge–Bunchgrass Mountain as a sacred site and traditional cultural property has been a matter of record among anthropologists and cultural resource managers for a minimum of 30 years (dating from Olmsted and Stewart 1978). Depending on what point in time previous timber harvest plans were conducted on Hatchet Ridge–Bunchgrass Mountain, some or all of this literature was accessible to archaeologists, cultural resource managers, and registered professional foresters qualified to review confidential cultural resource documents. These sources of information should have been reviewed during the timber harvest plan impact

[1] The information in Ms. Hughes' comment letter is not sufficient to substantiate the claim, because she does not cite actual timber harvest plans or supporting documents.

analyses referred to by Ms. Hughes. Whether these sources refer to Hatchet Ridge–Bunchgrass Mountain as a traditional cultural property, sacred site, or religious site, all such designations conform to state and federal definitions of a cultural resource "site" (not archaeological site), and the responsibility to consider impacts on this resource under past, present, and future environmental reviews is not obviated by the degree of input by the Pit River Tribe or the categorization of the resource. Its status as a cultural resource is a matter of record.

The fact that the landowner has no specific "knowledge or evidence of such use or of the presence of any historic or prehistoric archaeological sites" has little bearing on whether Hatchet Ridge–Bunchgrass Mountain constitutes a traditional cultural property that qualifies as a historical resource for the purposes of CEQA. Furthermore, the Draft EIR (page 3.5-7) documents two projectile points (HR-ISO-1 and HR-ISO-3) and a historic can (HR-ISO-2) in the project area. These three isolated finds do not constitute historic or prehistoric archaeological sites, but do indicate that, in the absence of a pedestrian survey by a qualified archaeologist, statements as to the absence of such sites are anecdotal and not indicative of the absence of any type of cultural resource.

## Response to Comment OG5-8

It is noted that private property access requires permission by the landowner.

## Response to Comment OG5-9

It is noted that the applicant does not recognize the cultural resources as a traditional cultural property.

## Response to Comment OG5-10

Impact CUL-3 was identified on the assumption that construction-related activities would present an impediment to continued traditional cultural use of Hatchet Ridge–Bunchgrass Mountain. Ms. Hughes makes a fair argument that a lack of net change in accessibility to the property constitutes no effective change in baseline access conditions. This point is consistent with the information disclosed in Impact CUL-3 of the Draft EIR.

**Letter OG6**

WEST, Inc.
Western EcoSystems Technology, Inc. 2003 Central Ave., Cheyenne, WY 82001
Phone: 307.634.1756 Fax: 307.637.6981 Web site: www.west-inc.com

January 28, 2008

Shasta County
Department of Resources Management
1855 Placer Street, Suite 103
Redding, CA 96001-1759

Re. Comments on the Draft Environmental Impact Report for the Hatchet Ridge Wind Project

Attn: Mr. Bill Walker

Western EcoSystems Technology, Inc. (WEST) was retained by Renewable Energy Systems North America (RES) to develop and implement pre-project studies of avian and bat resources in the proposed Hatchet Ridge Wind Project area. The overall objectives of the studies were to provide information that would be useful in developing an impact assessment for the project and information that may be useful in siting project facilities to minimize potential impacts to avian and bat resources. **OG6-1**

WEST has been a leader in the U.S. in the study of wind projects and wildlife interactions and impacts. WEST is active in both the American Wind Energy Association and the National Wind Coordination Committee wildlife initiatives. WEST has worked and conducted studies in nearly all states in the U.S. where active wind development is taking place. Many of the protocols that are in place for studying wind power projects were developed by WEST biologists and statisticians and WEST has participated in wind power study guidelines at the state and national level. WEST is considered an expert in the field of wind power and wildlife impacts assessment and documentation. Additional WEST credentials and experience can be found on the corporation web page (www.west-inc.com) as well as curriculum vitas for WEST principals. These further document the experience and expertise of the company and personnel in the study of wind power projects and impacts on natural resources. **OG6-2**

I have reviewed the EIR for the proposed Hatchet Ridge Wind Power project to provide comments for the County to consider in it's preparation of the Final EIR. The following review is provided on the behalf of RES to clarify certain discussions and proposed mitigation in the Draft EIR based on the results of the site specific studies as well as general knowledge of the field of study of wildlife and wind turbine interaction. **OG6-3**

In addition, I have summarized below the preliminary results of the nocturnal radar studies conducted by ABR, Inc., a subcontractor to WEST, Inc. I expect the study report will be available very soon, and we will provide it to the County to include in the Final EIR as soon as possible. **OG6-4**

Thank you for your consideration of this additional information regarding the Hatchet Ridge Draft Environmental Impact Report. If there are any questions regarding the information I can be contacted at the address or phone number in the letterhead. **OG6-5**

Sincerely,

David P. Young, Jr.
Senior Manager/Senior Biologist
Western EcoSystems Technology, Inc.

dy/

Enclosure

Shasta County
Comments on Draft EIR for the Hatchet Ridge Wind Project
Page 1

Draft EIR Comments

Table 3.4-3 Special-Status Wildlife Potentially Occurring in the Hatchet Ridge Project Area.

Page 8 of 8 of this table presents definitions for the Potential Occurrence in the Study Area column of the table. These definitions are somewhat misleading because they do not accurately reflect the relative abundance of species listed in the table in the project area and they are not used consistently in the table with the definition provided. This tends to generate confusion and ambiguity in the subsequent impact assessment. Indicating that a species has high potential to occur in the project area implies high risk, when in reality most of the species in this table have low risk of being impacted by the project. For example, the table defines "high" potential as "known occurrences of the species within the study area or … records of the species within a 10-mile radius of the study area". The table then lists cascade frog, peregrine falcon, and spotted owl as moderate or low but also indicates that there are known records for these species within 10 miles. While even the moderate potential ranking for spotted owls to occur in the project area is probably too high, and they should be listed as low potential, by the definition used in the table they should be listed as high. This conclusion would be erroneous given the results of surveys conducted by the landowner and the habitat and management of the site, which is unsuitable for spotted owl occurrence (see WEST, Inc. 2007b). Based on the results of the surveys and the characteristics of the project area habitat, spotted owls are not expected to occur and should therefore be described as having low potential for occurrence in the project area.

The table also lists ferruginous hawk as having high potential occurrence in the project area based on a *single* record of the species seen during migration during the baseline studies (WEST, Inc. 2007a). The table then goes on to say that there is no suitable habitat and the species does not nest in the project area. This tends to contradict the high potential occurrence ranking, leading to confusing conclusion about the level of risk to the species. The site studies recorded only one individual ferruginous hawk in the study area during the spring migration season. While this indicates that, yes, ferruginous hawks may occasionally migrate over the project area, it does not correlate to a high probability of occurrence in the project. Moreover, the lack of suitable habitat in the project area would indicate that there is little to attract them to the site, a further indication that a low ranking is more appropriate.

OG6-6

I suggest that this table be revised to indicate (1) whether a species has been documented in the study area and, (2) an estimate of the potential for the project to impact a species based on a more comprehensive assessment of the occurrence data, habitat, and other information. This will improve the ability of the reader to infer a reasoned judgment about whether the project may impact any particular species and put the occurrence data in the proper context. For example, while spotted owl has been documented within 10 miles of the study area, it has not been documented in the project area and its occurrence in the project area is unlikely due to lack of suitable habitat. Also, for ferruginous hawk, the occurrence information should explain that the species has been documented at least once but the estimate of potential impact is low because the information regarding the single record indicates that the frequency of occurrence and relative abundance are very low (see WEST, Inc. 2007a). Improving the table to include better

information supporting an estimate of risk would also change the ranking of several other species, including peregrine falcon, horned lark, golden eagle, sandhill crane, northern goshawk, osprey, prairie falcon, Vaux's swift, willow flycatcher, California wolverine, spotted bat, western mastiff bat, and cascades frog, all of which in reality, likely have low potential to be affected by the project.

**OG6-6 cont.**

Page 2.4-15, Impact BIO-1

This section refers to the presence of special-status plants in the project area, and in particular, Butte County morning glory in areas where it will be disturbed by construction. The analysis does not take into account information related to the abundance, distribution, and status of the species, and so presents conclusions and mitigation that are not warranted for protection of the species. I have the following suggestions to correct the impact assessment and to provide the appropriate level of mitigation for this species.

The text erroneously equates the loss of 11 acres of habitat to 8% of the population of Butte County morning glory (fifth sentence, third paragraph, p. 3.4-15). This statement should be clarified to state that this loss equates to 8% *of the habitat.* The percentage of the population in the 11 acres that will be impacted is unknown. While the site surveys documented the species over an approximately 144-acre area, the relative percentage of the population within any subset of this area is unknown. The EIR also states (first sentence, last paragraph p. 3.4-15) that the "morning glory appears to have a patchy distribution within the population in the project area". It appears that the author's intent with this statement is to say that the plants are located in patches within the area where it is found (144 acres). Under this scenario (patchy distribution), the 11 acres could have greater than or less than 8% of the local population. Thus, it is more accurate to clarify that the 11 acres correlates to habitat, not population.

**OG6-7**

According to available information regarding the ecology of Butte County morning glory, it is an early-successional perennial herb that responds favorably to stand regeneration events (e.g., fire, logging) within mixed conifer forests (State of California, Department of Forestry and Fire Protection 2007). It grows in general forest soils on timber sites from approximately 1975 to 4000 feet in elevation. It appears to do best in more open, disturbed areas rather than under the canopy of mixed-conifer forests (State of California, Department of Forestry and Fire Protection 2007). In general, the species is invasive and occupies disturbed areas and areas with low canopy cover. While the Draft EIR discusses loss of habitat generally, it does not consider the fact that because of the plant's ecology, new habitat will be made available for the species as a result of the ground disturbance that will occur for construction of the project. The new project roads and areas cleared for turbines will create areas where the species will likely colonize, given the existing nearby population. It is likely that Butte County morning glory will occupy a much larger area than it currently does following completion of the project.

**OG6-8**

An analysis of the records for Butte County morning glory in the Natural Diversity Database (NDDB) provides additional information about the abundance of the species, location occurrences, and its response to disturbance. The Sierra Pacific Industries, Bovine Timber

**OG6-9**

Harvest Plan (2007) provides an annotated summary of NDDB records. In general, the species responds quite readily to disturbance, including bulldozing, timber harvest, fire, and herbicide applications; it is often located along roadsides, transmission lines, and canals where vegetation cover is actively managed for open, no-canopy vegetation communities. At least one record in the NDDB lists millions of the plant in harvested national forest lands. Collectively, the observations in the NDDB suggest that Butte County morning glory is not vulnerable to, and in fact, responds positively to, the types and intensities of disturbances associated directly with activities such as timber harvest, transmission lines, and road corridors – all components of the proposed Hatchet Ridge project.

In a letter from Botanist Dr. Dean Wm. Taylor dated August 2001 to Sierra Pacific Industries in support of preparation of the Bunchgrass Canyon Timber Harvest Plan (State of California, Department of Forestry and Fire Protection 2001), a description of the Butte County morning glory is provided. Dr. Taylor states "*Calystegia artiplicifolia* ssp. *buttensis* was until recently unknown from timberlands in Shasta County. I first located regional populations of this taxon in 1996. This perennial, summer flowering herb is found in mid elevation Cascade Range forested habitats southward to Butte County. In my surveys throughout the range of this plant, it consistently is most abundant in recently logged sites or on roadbanks. In Tehama County, near Cohasset, it occurs in abundance in young pine plantations that are under treatment with herbicides for brush control. In 1987-1988, this plant was absent from mixed conifer forests in nearby Flat Woods on the Pit River Canyon rim. When these areas were cleared of forest for a major electrical-transmission line, it became abundant and often the dominant herb under the powerline where regular vegetation management (including herbicide use) is now practiced."

**OG6-9 cont.**

Another important point to note is that Butte County morning glory no longer meets the definition of "rare or endangered" under CEQA Guidelines section 15380, subdivision (d). The California NDDB has not yet processed all submitted records for the species, including the population found in the project area, as well as populations found through timber harvest plan evaluations. Presently, NDDB lists 69 occurrences. Sierra Pacific Industries, the largest landowner in the project area, is aware of an additional 38 occurrences, for a total of at least 107. The California Department of Fish and Game's "Special Plants List" (DFG 2006) provides the criteria for State Ranking. Butte County morning glory exceeds the state ranking limits for S3 rank: number of occurrences exceeding 21-80, and number of individuals, 3,000-10,000 for S3 rank. During the California Native Plant Society Inventory revision, one CNPS biologist suggests that a S4 ranking is warranted (State of California, Department of Forestry and Fire Protection 2007), noting that the species is common in clear cuts, apparently benefiting from timber harvest.

The mitigation measures identified for impacts to the species in the 11 acres that will be disturbed do not appear warranted based on the ecology of the species and the expected expansion of the species population and distribution due to the project. As explained above, due to the species' positive response to ground disturbance, the project will result in a net increase in habitat for the species. The primary focus of mitigation for the species should be to insure continued compliance with the existing land management measures and mitigation requirements

and to prevent encroachment by non-native invasive species. No plant protection measures for the species are needed when the normal construction activities for the wind project will create habitat for the species and are likely to result in the expansion of the species distribution along the whole Hatchet Mountain ridgeline. Since it already occurs in the area, it will likely invade new areas suitable for its occurrence following construction. Dense or otherwise shaded conifer forest stands will be removed, creating bare mineral soil sites and conditions where full sun is present. Site preparation and maintenance treatments may also include ripping or discing, piling and burning, or noxious weed control, which would further create areas of suitable habitat for the species establishment. Butte County morning glory is known to be tolerant of typical vegetation control methods (State of California, Department of Forestry and Fire Protection 2007). The proposed Hatchet Ridge wind project will not result in a substantial reduction of suitable habitat for Butte County morning glory; to the contrary, it will increase the amount of suitable habitat. The effect of the proposed project on this species is beneficial and therefore not a significant adverse impact requiring mitigation.

**OG6-9 cont.**

Since Butte County morning glory cannot be shown to meet CEQA definitions of endangered or rare, the number of occurrences and number of individuals exceeds the state criteria for listing, and construction and operation of the Hatchet Ridge wind project will benefit the species, no additional protections need to be afforded this species. If, however, the County disagrees with this assessment, then effective mitigation would include minimizing areas of construction related impacts where the plant occurs, minimizing peripheral construction impacts through Best Management Practices (BMPs) on site (e.g., silt fences for erosion control), noxious weed control to prevent encroachment by other invasive competitors, and maintaining the existing land management measures which are apparently conducive to the plant's existence on site.

Page 3.4-20, Mitigation Measure BIO-6

This mitigation measure is proposed in reference to a post-construction monitoring study of the wind project and adaptive management strategies for mitigating impacts. The Draft EIR recommends that the monitoring study of the wind project be conducted in accordance with the CEC guidelines; however, the mitigation measures and monitoring recommendations do not actually appear to be consistent with the CEC Guidelines. According to the CEC Guidelines, the project is likely to be a "Category 2 - Project Sites with Little Existing Information and No Indicators of High Wildlife Impacts" or a "Category 3 - Project Sites with High or Uncertain Potential for Wildlife Impacts" project. The following is a description of the inconsistencies between mitigation measures currently recommended in the Draft EIR and the guidance available in the CEC Guidelines:

**OG6-10**

- Under the heading *Duration of Operations Monitoring,* the CEC Guidelines set recommended durations for monitoring that include the following: "Category 2 and 3 projects will need two years of carcass count data to assess whether pre-permitting impact estimates were accurate, evaluate the effectiveness of mitigation measures, and capture variability between years. Category 2 projects may be able to reduce the level of

study effort for year two if the results of year one monitoring indicate fatality rates equal to or lower than those estimated during pre-permitting studies and if CDFG, USFWS, and experts agree such a reduction is warranted. Category 3 projects may need additional study effort in year two and possibly beyond if the first year of data shows fatalities higher than expected and/or to different species than anticipated. For both Category 2 and 3 projects, the results of the first year of data should be critically assessed to determine which modifications, if any, are needed for the second year of study."

The Draft EIR does not follow the CEC's recommended duration of monitoring, instead suggesting that five years of monitoring are needed, but does not give any justification for why any more than two years is necessary. Additionally, the EIR does not suggest a review of the data after one year to determine if modifications or additional years of monitoring are necessary (consistent with the CEC Guidelines). The CEC Guidelines suggest using the monitoring data to determine if long term monitoring beyond the recommended schedule is necessary. The Draft EIR's approach of a blanket requirement for five years of monitoring is not justified by the impact analysis for the project nor is it consistent with the CEC Guidelines for this type of project. As an alternative, I recommend following the CEC Guidelines and requiring that two years of monitoring be conducted and a determination of modifications and timing for the second year be made based on the results of the first year of monitoring. In addition, it could be added that the need for monitoring beyond two years will be determined following the second year of monitoring, and continued project monitoring will be evaluated on an annual basis.

**OG6-10 cont.**

- The CEC Guidelines also recommend against using open-ended mitigation. They state explicitly: "To avoid open ended conditions that are difficult for developers to include when planning for project costs and timing, establish minimization measures and compensatory mitigation that could be needed for unexpected impacts as well as the thresholds that will trigger these actions." The statement on page 3.4-20 of the Draft EIR – "If mortality rates exceed levels at which population-level effects could occur, one or more of the following adaptive management measures will be implemented at the discretion of the USFWS and the CDFG…" – is an open-ended mitigation measure that results in extreme difficulty in planning for project costs and specific mitigation measures. The adaptive management suggested by the Draft EIR includes measures related to operating the wind project which would further complicate project planning efforts.

**OG6-11**

- The CEC Guidelines further state, "Mitigation measures should establish clear, objective, and verifiable biological goals, a requirement to adjust management and/or mitigation measures if those goals are not met, and a timeline for periodic reviews and adjustments." It is my recommendation that any mitigation measures that require adjustment to the wind project management be clearly stated with defensible thresholds and objectives for when and what is expected that the project management adjustments would achieve.

**OG6-12**

Shasta County
Comments on Draft EIR for the Hatchet Ridge Wind Project
Page 6

The following are recommended changes to the mitigation measure to make them consistent with the CEC Guidelines (as the Draft EIR states they will be) as well as the intent of Shasta County in minimizing and mitigating potential impacts.

- The applicant shall be responsible for the formation of a Technical Advisory Committee (TAC). Invitations for participation will be sent to representatives from the California Department of Fish and Game, the U.S. Fish and Wildlife Service, Shasta County Resources Management Division, the landowners, the applicant's project operations and construction managers, conservation organizations, and a representative of the local community. The applicant will make reasonable efforts to insure participation by the above parties, but notwithstanding a failure of any of these representatives to respond to the applicant's invitations or to agree to participate, the TAC would be formed within six months of the initiation of project operations. The TAC will review results from fatality monitoring to determine if fatality thresholds have been exceeded and make recommendations on what appropriate additional mitigation measures should be applied (see Recommended Mitigation Measures table below).

- Hatchet Ridge Wind shall implement a two-year monitoring study consistent with the CEC Guidelines. Consultation with agencies shall occur on an annual basis during the monitoring studies to determine the need for continued monitoring or additional studies specific to refining mitigation measures as appropriate. One objective of the monitoring study would be to determine if specific mitigation for impacts is warranted and what the mitigation would entail. Mitigation may be appropriate if fatality rates exceed a threshold of concern for particular species or groups of species (see Fatality Thresholds table below). To determine if a threshold has been exceeded, the average annual fatality rate for species and species groups will be determined after two years of monitoring. Fatality Thresholds listed in the table below were determined based on the pre-project surveys, current knowledge of species that are likely to use the habitat in the project area, and the Draft EIR impact analysis

  If data shows that a threshold of concern has been exceeded, the project owner shall implement additional mitigation measures if the TAC determines the mitigation is appropriate based on the analysis of the data and best available information for the species impacted. The project TAC could propose mitigation measures designed to benefit the affected species or species group (e.g., raptors). Example of appropriate mitigation include, but are not limited to, protection of nesting habitat for the affected species through purchase or conservation easement, enhancement of habitat or protected areas, creating artificial nesting habitat (e.g., nest structures), improving wildfire response and prevention, changes in land management (e.g., logging, grazing, weed control), wetland enhancement or creation, species related research to improve our knowledge of a species and conservation needs (e.g., bat population research), contributing to established conservation programs for specific species or issues (e.g., Bat Wind Energy Cooperative), and establishing a compensatory mitigation fund for species-specific conservation programs. Focusing mitigation on species and resources impacted is

**OG6-12 cont.**

consistent with national policies for environmental protection such as the National Environmental Protection Act, Endangered Species Act, and Clean Water Act.

Mitigation that includes operations strategies for the wind project would be considered only if the additional mitigation measures recommended by the TAC fail to address the fatality threshold exceedance. Also the operations strategy must benefit the appropriate species or species group (e.g., raptors) where a threshold for significant impacts has been exceeded and there are no other appropriate mitigation measures to offset the impact. Any operations management strategies would be determined through the TAC and approved by the applicant's operations management team and Shasta County's Resources Management Division so that expertise and feasibility related to turbine management is considered in the process.

Fatality Thresholds

**OG6-12 cont.**

| Species | Fatality Threshold Per Year of Operations |
|---|---|
| Bald Eagle | 0.07 fatalities per turbine; 0.03 fatalities per MW |
| Sandhill Crane | 0.11 fatalities per turbine; 0.05 fatalities per MW |
| Other Raptor Species | 0.35 fatalities per turbine; 0.15 fatalities per MW |
| Yellow Warbler | 0.07 fatalities per turbine; 0.03 fatalities per MW |
| Owls | 0.11 fatalities per turbine; 0.05 fatalities per MW |

The operational monitoring study would be designed to determine the level of mortality from the project and take into account biases such as the searcher efficiency, carcass removal, and effective search area to estimate total mortality from the project. The exceedence of fatality thresholds would be based on the results of the monitoring so are therefore expressed as a rate per turbine or per MW. This method effectively utilizes the adjusted or calculated fatalities impacts as opposed to the observed impacts. For example, the number of fatalities for any given species that are found may not be the total number of that species actually impacted because of the biases associated with searcher efficiency (carcasses that are not found) or carcass removal (carcasses scavenged before they could be found).

Recommended Mitigation Measures

The following measures are a suggested starting point for further discussion of refining the Draft EIR's mitigation measures to address potential impacts to birds and bats. Further revisions may be necessary to ensure that the final proposed mitigation measures fully comply with the requirements of CEQA, California State Law, and Shasta County Law.

**OG6-13**

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| Mitigation Measure | Description | Duration | Threshold for Additional Mitigation |
|---|---|---|---|
| Fatality Monitoring | Fatality monitoring will be conducted by a qualified biologist and will be used to compare pre-operations predictions of fatality with actual fatalities associated with project operations and determine if impacts threshold have been exceeded. | 2 years, beginning within 1 year of first day of operations. After first year of monitoring the TAC will meet to assess the methods and determine if changes to methods are necessary | Referral to the TAC for potential changes to monitoring methods and additional monitoring or research will occur if the above fatality thresholds are exceeded. |
| Technical Advisory Committee | Formation of a Technical Advisory Committee (invited parties should include representatives from the CDFG, USFWS, conservation organization, biologists conducting monitoring studies, project operations and construction managers, landowners, representative of the community at large, and the permitting agency representative) | Meets bi-annually to review the results of avian fatality monitoring for two years, beginning 6 months after first year of monitoring has begun. | If fatality thresholds are exceeded, the TAC will confer to determine recommendations for additional mitigation as necessary |
| Compensatory Mitigation Fund | The applicant will set aside a mitigation fund to be used for Habitat Protection and Enhancement, Additional Research, and/or additional monitoring beyond the recommended 2 years. The TAC will decide on the best uses of the compensatory mitigation fund | Mitigation fund will be set up as a one time payment for individual mitigation activities. | The Compensatory Mitigation Fund will be used when fatality thresholds are exceeded |
| Habitat Protection and Enhancement | Habitat protection and enhancement measures will be implemented if thresholds for additional mitigation are reached. Examples of possible mitigation measures include, protection of nesting habitat, off-site habitat enhancement, alterations to habitat within study area to inhibit or enhance certain species success. The TAC will determine the appropriate habitat protection measures for the particular species in question. | Habitat Protection and Enhancement measures will be implemented according to recommendations of the TAC. | If fatality thresholds are exceeded, habitat protection and enhancement measures may be needed. |

**OG6-13 cont.**

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| | | | |
|---|---|---|---|
| Additional Research | Additional Research may be needed if unexpected fatalities occur as a result of operations. Unexpected fatalities include exceedance of fatality thresholds or fatalities of special status species not expected in pre-operations studies. Studies will be limited to addressing specific unexpected fatalities and the results will be used to determine appropriate mitigation measures. | Additional research to address unexpected fatalities may be needed after the first year of fatality monitoring. | If fatality thresholds are exceeded, additional research may be necessary. |
| Operations Measures | Changes to operations will be considered if all other mitigation measures are not effective in addressing the impact. Changes to operations will need to be approved by the operations management team and the permitting agency representative. Operations changes that may be implemented include shutdown of individual turbines during times of sensitivity of species of concern. Operations shutdowns will be limited to individual turbines where fatality thresholds are consistently exceeded and will be limited to the month where the highest number of threshold exceedances occur. | Limited to month within which the highest number of fatality exceedances occur. | Only implemented if fatality threshold exceedance cannot be mitigated by Habitat Protection and Enhancement, Compensatory Mitigation, and Additional Research. Must be approved by permitting agency representative and operations management team. |

**OG6-13 cont.**

Page 3.4-24, Impact BIO-13

Additional supporting information has been collected through a nocturnal migration study in the project area with the use of marine radar that confirms the less-than-significant impact assessment presented. Final results of the study are not yet available and will be provided upon completion of the study report. However, preliminary information from the study supports the conclusion in the Draft EIR that potential avian and bat migration corridor impacts are less than significant. Preliminary results from the nocturnal study, which ran for 39 nights from 7 September to 15 October 2007, were consistent with other nocturnal migration studies showing temporal variation in passage rates of targets both within a single night and across several nights. The mean nightly passage rate, which is typically expressed as the number of targets that pass overhead within one kilometer of migratory front per hour period, ranged from approximately 50 to 1200 targets with an average across the whole study period of approximately 300 targets. The mean nightly flight altitude of targets ranged from approximately 275 to 700 meters above

**OG6-14**

ground level with an average across all nights studied of approximately 450 meters above ground level, well above the typical height of turbines (128 meters). These results are typical of nocturnal migration studies using marine radar, which generally show that while some nocturnal migrants will pass over the site in the zone of risk posed by turbine rotors, the vast majority of nocturnal migrants passing over the site will not be at risk of turbine collisions. The final report for the migration study is expected to be completed very soon, at which time it will be submitted to the County for consideration in the Final EIR.

**OG6-14 cont.**

References:

State of California, Department of Forestry and Fire Protection. 2001. Bungrass Canyon Timber Harvesting Plan. Sierra Pacific Industries. Date Filed August 27, 2001.

State of California, Department of Forestry and Fire Protection. 2007. Bovine Timber Harvesting Plan. Sierra Pacific Industries. Date Filed September, 2007

WEST 2007a Ecological Baseline Studies for the Hatchet Ridge Wind Energy Project, Shata County California

WEST 2007b Biological Assessment of Endangered, Threatened, Proposed and Candidate Species for the Hatchet Ridge Wind Project.

**DAVID P. YOUNG, JR.**, Senior Biologist/Senior Manager
**W**estern **E**co**S**ystems **T**echnology, Inc. 2003 Central Ave., Cheyenne, Wyoming 82001; dyoung@west-inc.com

EDUCATION
M.S. University of Georgia, Athens, Georgia 1988 *Zoology*
B.A. Earlham College, Richmond, Indiana 1986 *Biology*

PREVIOUS POSITIONS
1991-1992 *Field Supervisor*, Wildlife International Ltd., Easton, Maryland
1990-1991 *Environmental Health Specialist*, Liberty County, Georgia
1989-1990 *Research Technician II*, Savannah River Ecology Laboratory, Aiken, South Carolina
1983-1986 *Assistant Curator*, Joseph Moore Museum of Natural History, Earlham College, Richmond, Indiana

ADDITIONAL TRAINING & EDUCATION
Supervisory Development Workshop, Wildlife International, Ltd., Easton, Maryland
Studies for Resource Selection, Western EcoSystems Technology, Inc., Lakewood, Colorado
Basic Wetland Delineation, Wetland Training Institute, Inc., San Diego, California
Practical Project Development and Documentation, NEPA/Section 4(f) Applied to Transportation Projects, Robert Jacobsen Environmental Planning, Lakewood, Colorado
Interagency Consultation for Endangered Species, U.S. Fish and Wildlife Service, National Conservation Training Center, Shepherdstown, West Virginia
Habitat Conservation Planning, U.S. Fish and Wildlife Service, National Conservation Training Center, Shepherdstown, West Virginia
Wind-Wildlife Interaction Seminar, Northern Arizona University - presenter

SPECIALTY AREAS
**Wind Power Studies:** Twelve years experience conducting avian and bat research in wind resource areas and wind projects throughout the U.S. and Canada. Extensive experience supervising wildlife and natural resource studies through all phases of wind project development from early site assessment studies to post-construction monitoring and mitigation. Studies include Site Characterization Studies, Environmental Issues Analyses Site screening and ranking, Phase 1 Fatal Flaw analyses, Environmental Impact Assessments, Threatened and Endangered Species Biological Assessments and Habitat Conservation Plans, literature reviews, pre-construction baselines avian and bat studies, post-construction impact monitoring, mitigation planning, cumulative impact analyses, and Technical Advisory Committees. Clients include AES Alternative Energy, PacifiCorp, enXco, Horizon Wind Energy, Renewable Energy Systems, Bonneville Power Administration, BP Alternative Energy, Eurus Energy America Corp, NedPower, Acciona. Presentations and invited speaker at annual meetings of the National Wind Coordination Collaborative, American Wind Energy Association, Wildlife Society, American Ornithologist Union,.

**Threatened and Endangered Species:** Experience includes: formal training in Endangered Species Act, Section 7 consultation and Habitat Conservation Plans; T&E species surveys, clearances, and monitoring; Biological Assessments for highway construction projects, water development projects, and wind power proejcts; paid and volunteer field technician studying threatened and endangered species.

Species include: *Indiana bat*, Indiana, New York; *grey bat*, Indiana; *green sea turtles*, Florida; *wood stork*, Georgia; *black-footed ferrets*, *Wyoming toads*, *Preble's meadow jumping mouse, mountain plover*, *Ute ladies' tresses orchid*, and *Colorado butterfly plant,* Wyoming; *Mexican spotted owl*, Arizona; *copperbelly water snake* and *Kirtland's snake*, Indiana; *bull trout* and *westslope cutthroat trout*, Montana; *Allen's Cay Rock Iguana* and *Riley's Rock Iguana,* Bahamas.

**Environmental Impact Assessment**: Experience in environmental regulation compliance including work under the *National Environmental Policy Act, Endangered Species Act, Clean water Act,* and *Federal Insecticide, Fungicide, and Rodenticide Act*; biological assessments for impacts to threatened and endangered species; Environmental Impact Statements for water development, highway construction, and wind power projects; Categorical Exclusions, and Environmental Assessments for highway projects; Environmental Assessments for Indian reservation casinos; Environmental Impact Assessments and reports under California, Oregon, Washington, and New York State Environmental Quality Acts.

SCIENTIFIC ORGANIZATION MEMBERSHIPS
*American Ornithologists Union* *Society for the Study of Amphibians & Reptiles* *Raptor Research Foundation*

# Letter OG6 WEST, Inc.

## Response to Comment OG6-1

The author identifies WEST's role on the project and the studies it conducted.

## Response to Comment OG6-2

This comment references WEST's credentials in the field.

## Response to Comment OG6-3

This comment presents the purpose of this letter: to clarify issues identified in the Draft EIR.

## Response to Comment OG6-4

This comment references the nocturnal migration radar study recently conducted for the project.

## Response to Comment OG6-5

The author provides contact information.

## Response to Comment OG6-6

Table 3.4-3 contained several errors and has been revised to correct those errors. This comment addresses specific issues associated with the special-status species table referenced above; no substantive CEQA issues are raised.

## Response to Comment OG6-7

The commenter correctly notes that the percentage of the area occupied by Butte County morning-glory within the 11 acres that will be affected is unknown. Because the amount of this impact is unknown, it must be assumed that all 11 acres could be occupied by Butte County morning-glory. Accordingly, the impact estimate of approximately 8% as provided in the Draft EIR is correct.

## Response to Comment OG6-8

The commenter is correct in stating that Butte County morning-glory has been observed to respond to certain types of ground disturbance. The disturbance created by the project may result in temporarily higher densities (numbers of individuals) within that habitat on the project site that is not converted to roads or turbine foundations. However, the commenter erroneously equates the proliferation of more individuals with an increase in habitat. The Draft EIR correctly states that there will be a net loss of habitat as a result of the proposed project.

## Response to Comment OG6-9

The commenter notes that Butte County morning-glory is known to respond to disturbance such as bulldozing, timber harvest, and fire. Please see the response to Comment OG6-8 above, which acknowledges that Butte County morning-glory is known to respond to disturbance.

The commenter also notes that the project will cause types of disturbance that will increase habitat for the species. Please see the response to Comment OG6-3 regarding this issue. The commenter erroneously equates the proliferation of more individuals with an increase in habitat. The project will convert lands currently occupied by Butte County morning-glory to other uses

such as turbine foundations and access roads, resulting in a net decrease in habitat. The Draft EIR correctly states that there will be a net loss of habitat as a result of the proposed project.

The commenter also notes that Butte County morning-glory should no longer meet the definition of "rare or endangered" under CEQA because approximately 38 additional occurrences have not been recorded in the California Natural Diversity Database (CNDDB) and the species no longer meets the definition of "rare or endangered" under CEQA. Based on a review of the most current version of the CNDDB (February 2008), there are now 101 known extant occurrences of Butte County morning-glory. The commenter is correct in noting that the California Department of Fish and Game's *Special Plants List* (California Department of Fish and Game 2008) provides the criteria for state ranking and that 21–80 occurrences or 3,000–10,000 individuals or 10,000–50,000 acres defines the S3 rank. There is good evidence from recent timber harvest plans prepared for harvests in the region that there may be additional occurrences not yet recorded in the CNDDB. Regardless of the 101 occurrences currently known in the CNDDB, apparent additional occurrences, and the apparent affinity for disturbance displayed by the species, the california Department of Fish and Game published its most recent update of the *Special Plants List* in January 2008 in which they retained the S3 rank for Butte County morning-glory. The California Department of Fish and Game states in the *Special Plants List* that there "is more to ranking than just counting EO's and individuals". The *Special Plants List* also indicates that there are other factors that contribute to the ultimate ranking of a particular species, such as aspects of ecology and biology, known trends, and types of threats. The species must be considered "rare or endangered" for the purposes of CEQA based on the recent status listing.

The proposed project would result in a net loss of habitat for Butte County morning-glory. Although construction of the project would result in a net loss of habitat for the species, the Draft EIR acknowledges that the amount of direct loss does not appear to be substantial. However, potential indirect impacts as described in the Draft EIR, such as competition with nonnative species, could result in a substantial reduction of the population over time; accordingly, the measures described in the Draft EIR—avoidance and/or control of invasive species—are warranted and appropriate to mitigate this impact. The commenter notes that if impacts on Butte County morning-glory are found to be potentially significant, effective mitigation would include minimizing areas of construction-related impacts where the plant occurs and noxious weed control to prevent encroachment by invasive competitors. The County concurs with the commenter's recommendations. The mitigation proposed in the Draft EIR is consistent with those recommendations.

## Response to Comment OG6-10

Comment noted. Mitigation Measure BIO-6 has been extensively revised, and the duration of monitoring has been set at 3 years, unless mortality thresholds are exceeded. However, the mitigation measure was not and is not inconsistent with CEC guidelines as the commenter suggests. A longer period of monitoring than the standard 2-year recommendation is warranted by the fact that two of the species most likely to be affected are state- and federally listed species that are relatively large and long-lived, and thus more likely to exhibit greater temporal variation in their behavior patterns than other species might be.

## Response to Comment OG6-11

Thresholds that would trigger actions to minimize avian mortality have been further refined in the final version of Mitigation Measure BIO-6.

Measures "related to operating the wind farm" are the only measures that are available to minimize impacts. See response to comment PA1-8 for a discussion of the appropriateness of compensatory mitigation and why such mitigation is inconsistent with CEQA in this case.

## Response to Comment OG6-12

Mitigation Measure BIO-6 has been revised to include thresholds of mortality below which no further mitigation is required. It has also been revised to include development and implementation of a monitoring and adaptive management program, which includes formation of a Technical Advisory Committee and a 2-year monitoring study. Clear timelines are established for when mortality monitoring will no longer be required. The goal of the adaptive management program is clearly stated to be the reduction and maintenance of avian mortality rates that are below the established thresholds. Please see the complete revised text of Mitigation Measure BIO-6 in Chapter 3 of the Final EIR.

## Response to Comment OG6-13

Many of the recommendations presented in the comment have been incorporated into revised Mitigation Measure BIO-6.

## Response to Comment OG6-14

The final results of the nocturnal migration study using marine radar are included as Appendix B of the Final EIR. However, the data and results of the study provide no new information that would alter any of the conclusions in the Draft EIR.

**Letter OG7**

January 22, 2008

Bill Walker, Senior Planner
Shasta County Department of Resources Management
1855 Placer Street, Suite 103
Redding. California 96001-1759

Dear Mr. Walker,

The Wintu Audubon Society of Redding review comments for the Hatchet Ridge Wind Project Draft EIR are attached as enclosure (1.).

A committee of our directors reviewed the DEIR with the intent to ensure compliance with CEQA regulations and that every consideration has been given to the protection and preservation of avian species. Unfortunately, we find that is not the case and strongly recommend some portions of the DEIR be revisited and investigated at greater length. Specifically, we are concerned about compliance with the law as regards threatened and endangered species, limited studies done on migrating avian species, especially nocturnal, studies on alternate wind generation technologies, lack of a positive mitigation plan, and cumulative impacts of this and other proposed wind farm projects on avian species and bats. **OG7-1**

We feel the project should not go forward as written and feel the time spent in investigative studies now can and should provide the basis for compliance with the laws, and provide appropriate safeguards, from the beginning, for avian species and bats. An added benefit would be the avoidance of lengthy and expensive hearings and revisions later. We also feel that the best science currently available is represented by the California Energy Commission's recent report, *Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development.* These guidelines should be consulted when assessing appropriate methods/protocols and proposed mitigations. **OG7-2**

We hope we have provided some assistance by our review as well as a critical analysis. We strongly endorse wind energy development as a green source of available and relatively inexpensive energy, but feel proper siting, appropriate safeguards, and realistic mitigation are imperative.

**OG7-2 cont.**

Sincerely,

***/s/ William W. Oliver***

William W. Oliver, President

Enclosure: (1.) Response to the Proposed Hatchet Ridge Windmill Project Draft Environmental Impact Report (DEIR) (26 pages)

Copy to: Glenn Olson, Executive Director
Audubon California

Mike Daulton, Director of Conservation Policy
National Audubon Society

# RESPONSE TO THE PROPOSED HATCHET RIDGE WINDMILL PROJECT DRAFT ENVIRONMENTAL IMPACT REPORT

**The Wintu Audubon Society of Redding, California is submitting this response to the Draft Environmental Impact Report (DEIR) for the Hatchet Ridge Windmill Project, Shasta County, California.**

## Executive Summary:

We support the responsible implementation of 'clean' sources of alternative energy, including wind power. However, we cannot support this project as proposed because of the unacceptably high level of avian and bat mortality it predicts, with no proposed mitigations in place that would substantially reduce this 'significant' impact to avian and bat species. Contradictions in the Baseline Biological study and subsequent analyses are present in the DEIR. The Alternatives required by CEQA were not explored and were dismissed without reasoned cause. Cumulative impacts were not adequately assessed and no mitigations were proposed. The CEQA guidelines are not being followed in many instances and this is unacceptable. However, since we believe in the responsible implementation of alternative energy sources, we have devoted considerable time and resources to develop recommendations with regard to this project which will serve to aid Shasta County and the applicant in reducing the unacceptable levels of bird and bat mortality projected for this project. Thus, we are optimistic that a wind farm can be a responsible form of alternative energy. If wind development is to be undertaken responsibly, it must be planned with real measures in place to minimize impacts to avian and bat populations, both resident and migratory. We hope to be able to work with the county and responsible agencies to aid in the successful implementation of responsible alternative energy sources in our area.

OG7-3

CEQA requires that the DEIR be governed in large part by the following:
CEQA Guidelines, Section 15003.Policies, state that:

- *The EIR serves not only to protect the environment but also to demonstrate to the public that it is being protected.(County of Inyo v. Yorty, 32 Cal. App. 3d 795)*
- *CEQA was intended to be interpreted in such manner as to afford the fullest possible protection to the environment within the reasonable scope of the statutory language. (Friends of Mammoth v. Board of Supervisors, 8 Cal. 3d 247"*
- *The lead agency must consider the whole of an action, not simply its constituent parts, when determining whether it will have a significant environmental effect. (Citizens Assoc. For Sensible Development of Bishop Area v. County of Inyo (1985) 172 Cal.App.3d 151)*

CEQA Guidelines, Section 15002.General Concepts p2-3, state that:

> *(h) Methods for Protecting the Environment. CEQA requires more than merely preparing environmental documents. The EIR by itself does not control the way in which a project can be built or carried out. Rather, when an EIR shows that a project would cause substantial adverse changes in the environment, the governmental agency must respond to the information by one or more of the following methods:"*

These methods include the ones quoted below, which we feel are the most appropriate options for this project, among the methods listed in the Guidelines: **OG7-3 cont.**

> *(1) Changing a proposed project*
> *(2) Imposing conditions on the approval of the project*
> *(4) Choosing an alternative way of meeting the same need*
> *(5) Disapproving the project*

The DEIR is not in keeping with CEQA Guidelines and we support this contention by the presentation of points, and an analysis of the DEIR that follow in the body of this comment letter. We will also offer Recommendations for the EIR and the project based on our analysis of the EIR and the effects of the project on the natural environment.

**POINTS:**

**1-A. THE PROJECT IS IN CLEAR VIOLATION OF STATE AND FEDERAL LAW** **OG7-4**

**1-B. THE DEIR CONTAINS NO DISCUSSION OF THE LAW AS IT SPECIFICALLY PERTAINS TO THE AFFECTED AVIAN SPECIES.** **OG7-5**

**1-C. AN INCIDENTAL TAKE PERMIT IS REQUIRED FOR THE NORTHERN SPOTTED OWL.** **OG7-6**

**2. THE BIOLOGICAL RESOURCES SECTION OF THE DEIR IS INADEQUATE, including the lack of a nocturnal study of avian migrants.** **OG7-7**

**3. THE PROJECT'S OWN STATED GOALS WITH REGARD TO THE IMPACT ON THE ENVIRONMENT ARE NOT BEING MET.** **OG7-8**

**4. ALTERNATIVES WERE NOT ADEQUATELY CONSIDERED; this includes inadequate consideration of an alternative vertical axis wind turbine (VAWT) design.** **OG7-9**

**5. NO FUNCTIONAL MITIGATIONS ARE BEING REQUIRED.**

**6. NO CONTINGENCY MITIGATION PLAN IS INCLUDED.** **OG7-10**

**7. THE EIR IS LACKING ANY FORM OF COMPENSATORY MITIGATION.** **OG7-11**

**8. SIGNIFICANT CUMULATIVE IMPACTS WILL OCCUR BUT ARE NOT EVALUATED.** **OG7-12**

## RECOMMENDATIONS:

It is our position that PRIOR to the final EIR being issued that:

**1. A study for monitoring nocturnal avian migrants must be implemented** and completed as recommended in the *California Energy Commission's 'Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development'. The analysis provided in the current DEIR lacks any data on nocturnal migrants and as such is meaningless and cannot provide an adequate foundation for any credible scientific conclusions or mitigation planning. **OG7-13**

**2. Classification of the impact of Butte County morning glory as: 'Significant and Unavoidable' that cannot be mitigated to a less-than-significant level.** Based on the classification of this species by the California Native Plant Society as 'Rare and Endangered', any permanent loss of population is significant, and this project will result in habitat loss. Mitigation BIO measures 1 and 2 will not reduce this impact to a less-than-significant level. Measures discussed under the Butte County Morning Glory Avoidance Alternative require a use permit, and should not be classified as a separate alternative. Location of turbines must be coordinated with both Shasta County and CDFG prior to issuance of a use permit to minimize, to the extent possible, disturbance and habitat loss of the Butte County morning glory. **OG7-14**

**3. Alternatives need to be adequately analyzed and considered , including:**

- **Alternative Technologies** such as solar power need to be adequately explored, and if windpower is still the preferred type of power recommended for this project, then use of the VAWT design, patented and manufactured by Terra Moya Aqua, Inc. should be considered. Use of this design would largely eliminate the bird and bat kills of this project.

  If the use of this type of windmill design is not possible due to the current project construction timeline, the project should be delayed to accommodate installation of this type of windmill, and if this is not possible, the project should be implemented in phases that allow for the inclusion of this design of windmill in the later phases. The project has a projected lifetime of 20 years, which means 20 years worth of avian and bat mortality. A potential delay of a few months to a year when viewed in this larger context is insignificant, and worth the tradeoff. **OG7-15**

- **Alternative Sites**
- **Alternative Siting**
- **Smaller Project**
- **Phased Project**

**OG7-15 cont.**

**4. Establish a concrete and meaningful MITIGATION PLAN in accordance with CEC Guidelines that includes:**

- Appropriate compensatory mitigation
- Detailed monitoring methodologies and requirements
- Detailed adaptive operations and mitigation mechanisms

**OG7-16**

**5. Adopt additional requirements that would lessen the impact to birds and bats:**

- Paint turbine blades in Hodos Scheme
- Locate any man-made rock piles away from turbine area
- Use non-guyed meteorological towers; if this is not possible, use bird deterrents on guy cables.

**OG7-17**

- **Safety Lighting:**
  - Turbine towers: If allowed by FAA regulations, white strobe lighting should be considered as recent studies indicate that birds are less attracted to white strobe lights under poor visibility conditions than they are to conventional red flashing lights.
  - General facilities lighting: Keep lighting at both operation and maintenance facilities and substations to the minimum required to meet safety and security needs. Use white lights with sensors and switches that keep the lights off when they are not required. These lights should be hooded and directed to minimize backscatter, reflection, skyward illumination, and illumination of areas outside of the facility or substation.

**OG7-18**

**6. Establish a contingency mitigation plan** that includes detailed adaptive operations and mitigation mechanisms per California Energy Commission (CEC) Guidelines to mitigate high levels of unanticipated fatalities, which *.becomes even more important when choices for operational impact avoidance or minimization are so limited." (CEC Guidelines p. 69),* as is the case for this project as currently proposed.

**OG7-19**

**7. We urge the lead agency, Shasta County to contract the California Energy Commission to manage the mitigation measures**, as they have extensive expertise and experience in this area, and are an independent third party.

**OG7-20**

**8. Provide discussion and analysis of the biological impacts of the project pertaining to species that are protected by law.** This includes California 'fully protected status' species, as well as, species protected under various other state and federal laws. The DEIR mentions the state and federal laws that govern the protection of these species. However, it does not analyze and discuss the possible biological impacts of this project on these species.

**OG7-21**

**9. The natural life histories of species impacted must be analyzed and considered in assessing the magnitude of the specific and overall impact(s) of the project.** OG7-22

**10. Other Species Protected by Law**

Golden Eagle, Red-tailed Hawk, Turkey Vulture, Osprey, American Robin and Common Raven are afforded considerable protection under law, and as such, the impacts on them by the project MUST be analyzed and discussed in the DEIR. These impacts must be considered and added to the weight of impacts already discussed in the DEIR when estimating the magnitude of the impact of this project. OG7-23

**11. Incidental Take Permit and Habitat Conservation Plan**

It is required by federal law and otherwise appropriate for consultation with the US Fish and Wildlife Service (USFWS) to determine if a take permit and subsequent development and submission of a habitat conservation plan is necessary for the Northern Spotted Owl, a federal 'protected status' species. If required, these permits and a clear plan are necessary for the conditional use permit for this project. OG7-24

**12. Cumulative Impacts**

The wind farm projects planned in the immediate vicinity need to be analyzed and considered more thoroughly because of their significant cumulative impact. The migratory nature of avian species populations needs to be considered in determining the geographical area to be considered in assessing the cumulative impacts of this project. OG7-25

All significant cumulative impacts need to be fully mitigated to the extent possible, using means such as off-site compensatory mitigation, or other functional mitigations.

**Signed,**
**/s/ William W. Oliver**
**/s/Claudia Lyons Yerion**
**/s/Victor Modeen**
**/s/Rob santy**
**/s/W. R. Yutzy**

**Board of Directors**
**The Wintu Audubon Society**
**Shasta County, California**

**DISCUSSION OF POINTS:**

**1. THE LAW**

Several of the species that would be severely impacted, including Bald Eagle, Golden Eagle and Greater Sandhill Crane, are protected by state and federal law and have **'**Fully Protected Species' status under California law. This means that California Department of Fish and Game cannot issue a 'take permit' for these species, and any instance of death to an individual of one of these species constitutes an 'illegal take', and is a felony under California law, punishable by fines and prison for each instance of violation. Thus, this project as proposed would result in the violation of State and Federal law. Consequently, Shasta County, as the lead agency should fully consider the ramifications of this before deciding to issue a use permit for this project as currently proposed. **OG7-26**

Because of this violation of the law and the DEIR's own assessment of the impacts to these species as 'significant and unavoidable there exists no reasonable foundation to support a decision by the County to issue a 'statement of overriding consideration' to justify granting of a use permit for this project, unless the recommendations outlined subsequently in this letter are implemented to reduce and fully mitigate the impacts.

**1-A**. There are a number of state and federal laws that govern protection of various species of birds, bats and animals that must be considered by the lead agency when determining whether to grant a conditional use permit and what conditions to impose as conditions of that permit, including any appropriate mitigation. This project as currently proposed will result in violation of most of the laws listed below. Also, Shasta County, California Department of Fish and Game, and the U.S. Fish and Wildlife Service share liability as Lead and permitting agencies, respectively.
These laws are:

**CALIFORNIA STATE LAW**

**California Endangered Species Act (CESA)**

**CA Fish and Game Code:** **OG7-27**
**Fully Protected Species**, Fish and Game Code section 3511, 4700, 5050, and 5515
**Migratory Birds**, CA Fish and Game Code section 3513
**Birds of Prey and Their Eggs**, CA Fish and Game Code section 3503.5
**Nongame Birds**, CA Fish and Game Code section 3800

**FEDERAL LAW**

**Federal Endangered Species Act (FESA)**
**Migratory Bird Treaty Act (MBTA)**
**Bald and Golden Eagle Protection Act**

**1-B. The DEIR does not provide discussion and analysis of the biological impacts of the project to species protected by law.** This includes California 'fully protected status' species as well as species protected under various other state and federal laws. The DEIR mentions the state and federal laws that govern the protection of these species. However, it does not analyze and discuss the biological impacts of this project. OG7-28

**The California Energy Commission's 'Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development (CEC Guidelines)** This document is a valuable tool for local lead agencies, government agencies such as CDFG and USFWS, as well as developers for use during the project planning, CEQA and permitting process. It provides guidance in assessing a project's impacts to birds and bats, understanding the law, and aids in the creation of effective mitigation plans. The County has selectively utilized these guidelines in some aspects of the EIR, and we encourage an even more extensive adherence to them in the final EIR. The Guidelines state that:

*Other state and federal protective wildlife laws, some of which mandate avoidance of 'take' without options for permitting, can also influence project siting and operations. Project developers, permit decision makers, and the resource agencies involved should consider these strict liability laws during the permitting process to ensure that impacts to bird and bat species are minimized and mitigated to offset impacts. Implementing the methods recommended in the Guidelines during the permitting process will demonstrate a good faith effort to develop and operate projects in a fashion that is consistent with the intent of these state and federal wildlife protection laws. Such good faith efforts will be considered by CDFG before taking enforcement actions for violation of a California wildlife protection law.* OG7-29

**1-C. Incidental Take Permit and Habitat Conservation Plan.** A permit is required for incidental take of species protected under the Federal Endangered Species Act. The Northern Spotted Owl is a federal threatened status species. In its brief description of the FESA under "Endangered Species Act Authorization Process"p.3.4-10-11 the DEIR states that:

*To receive an ITP, the nonfederal entity is required to prepare a Habitat Conservation Plan (HCP). The HCP must include conservation measures that avoid, minimize, and mitigate the project's impact on listed species and their habitat.* OG7-30

The Northern Spotted Owl, a federal 'threatened status species, has designated 'Critical Habitat' adjacent to the project site. As such, we do not agree with the DEIR's assessment that exposure of this species to lethal contact with the turbines will be minimal. We think it is required by federal law and otherwise appropriate for consultation with US Fish and Wildlife Service to determine if a take permit and subsequent development and submission of a habitat conservation plan will be necessary.

**2. BIOLOGICAL RESOURCES**

The Biological Resources Section of the DEIR is incomplete**,** and as such any resulting conclusions presented are not credible. It does not examine the impacts to several key OG7-31

avian species mentioned in its own baseline study that are protected by law. In addition, nocturnal monitoring, essential for the acquisition of data on night migrants, was not undertaken at all. (see CEC Guidelines*)

OG7-31 cont.

**2-A. No Nocturnal Monitoring study was performed.** The analysis provided in the current DEIR lacks any data on nocturnal migrants and as such is meaningless and cannot provide an adequate foundation for any credible scientific conclusions or mitigation planning.

California is part of the Pacific Flyway, a major migration corridor between the waterfowl nesting grounds of Alaska and Canada and the wintering grounds of California. Every fall and spring, millions of ducks and geese fly through our Northern California region. Even during migration season, however, the volume of migration varies by orders of magnitude from day to day. This variation is to a large extent a function of weather. Much of this migration occurs at night and, especially in autumn, Large migrations are often associated with the passage of cold fronts. This is well documented in the California Guidelines for Reducing Impacts to Birds and Bats From Wind Energy Development, October 2007, document number CEC-700-2007-008-CMF (p. 51):

OG7-32

*Most songbirds, waterfowl, shorebirds, herons, and egrets migrate at night (Kerlinger and Moore, 1989), and radar studies yield some insight into general patterns of night flying behavior. Nocturnal migrants generally take off after sunset, ascend to their cruising altitude between 300 and 2,000 feet (90 to 610 meters), and return to land before sunrise (Kerlinger, 1995). For most of their flight, songbirds and other nocturnal migrants are above the reach of wind turbines, but they pass through the altitudinal range of wind turbines during ascents and descents and may also fly closer to the ground during inclement weather or when negotiating mountain passes (Able, 1970; Richardson, 2000).*

This agrees with the personal experiences of many members of the Wintu Audubon Society. Most of us hear geese and swans migrating at night, especially in the fall. Casual field observers have seen many thousands of Greater White-fronted Geese and Snow Geese flying at just above treetop height over Hatchet Ridge right before an early fall snowstorm. Even these anecdotal observations show that at least occasionally large numbers of actively migrating birds pass over Hatchet Ridge at low altitudes during unfavorable weather conditions. So, we know the ridge is used as a migration corridor during bad weather. But, there is not a lot of information about bird migration in the Hatchet Ridge area.

OG7-33

This deficiency is also supported by the 'analysis' presented in the Ecological Baseline Study (EBS) p.10:

*Even though waterfowl were the second most abundant group on terms of numbers of individuals observed (Table1), they were observed only during 4.4% of the surveys.*

This is due in part because they *migrate at night.* The EBS even states that:

*This analysis is based on observations of birds during the daylight period and does not take into consideration flight behavior or abundance of nocturnal migrants* (EBS p.17).

They directly contradict this statement in the EBS, saying:

*The data collected during this study suggest that the Hatchet Ridge project is not within a major migratory pathway, either for diurnal or nocturnal migrants.*

How can data collected during the day point to ANY conclusion about night migrants?

They continue on to state that:

*…based on all survey data, song bird mortality at Hatchet Ridge would likely be lower than the national average of 2.3birds/turbine/year or 3.1/MW/year.*

That's an unfounded conclusion. Presenting baseless conclusion(s) is a clear is a violation of CEQA.

**OG7-33 cont.**

In our estimation, it is collisions with turbines by actively migrating birds, particularly species that migrate in large flocks,that provide the greatest potential for large bird kills at this site. The most likely conditions for high mortality will be during periods of low cloud, fog or other reduced visibility conditions coincident with large migratory movements, a condition most likely to occur in the fall. Such conditions will likely be infrequent and migration itself is pulsatile and highly weather-dependent. Problems could occur either during the day or at night. The DEIR expresses concern about Greater Sandhill Cranes, which are largely diurnal migrants, but geese, swans and other waterfowl migrate both day and night. The co-occurrence of "kill conditions" and a large migration might only happen once or twice per season, if that, but when it does, very large numbers of birds could be killed.

**OG7-34**

Because of the energetic advantages, birds tend to initiate migration on days or nights with a tail wind. Because the blades of these wind turbines will rotate automatically such that they are always oriented into the prevailing wind, migrating birds will generally be flying in directions perpendicular to the rotational axis of the blades. Thus whether birds are moving parallel to the ridge or crossing it will make little difference with respect to their vulnerability to collision with the rotors.

Little or nothing is apparently known about active migration by passerine nocturnal migrants over these mountains. Neither the magnitude, direction nor altitude of such movements has been studied, so it is impossible to predict the impact of the wind farm, if any, on these birds. It is worth noting, however, that there are ridge-top sites in both North America and Europe where songbirds migrating at night pass over ridges at altitudes at which they can be captured in standard mist nets set up along the top of the ridge.

*McCrary et al. (1983) noted that wind turbines on ridges might present a risk of collision because the altitude of birds in relation to ground level decreases when the birds fly over ridges. Williams et al. (2001) conducted studies in the northern Appalachian Mountains and noted that avian migrants react to local terrain, resulting in concentrations of migrants over ridge summits or other topographic features. Richardson (2000) also noted that migration altitudes can be lower than cruising altitude when birds cross a ridge or pass.(CEC Guidelines, Chapter 4, p. 64-65)*

**OG7-34 cont.**

*Williams et al. (2001) conducted studies in the northern Appalachian Mountains and noted that avian migrants react to local terrain, resulting in concentrations of migrants over ridge summits or other topographic features.*

*Richardson (2000) also noted that migration altitudes can be lower than cruising altitude when birds cross a ridge or pass."(CEC Guidelines, Chapter 4, p. 64-65)*

*The DEIR also admits that:*

*This analysis …does not take into consideration flight behavior..."(EBS p.17)*

The EBS cites several wind farms that do not have geographical characteristics present at Hatchet Ridge as part of their basis for the conclusion that:

**OG7-35**

*In any event, waterfowl mortality at the Hatchet Ridge is expected to be minor.*

This conclusion is unfounded. The Baseline Study arrives at this conclusion based on :

- incomplete data that does not include a nocturnal monitoring study
- the comparison of data from wind farms that do not share the same topography characteristics
- not taking into account low cloud ceiling conditions that regularly occur at the site or at sites with similar topographical features.

No specific migration component to the bird census was done by WEST. They state that they found no evidence of migration during the year they did their bird counts. This is to be expected because 30-minute, fixed-point counts performed once a week on days not selected on the basis of the likelihood of occurrence of a large migration are very poorly suited to sample active migration. All of the surveys were performed during daylight hours and it is likely that there was a distinct bias toward calm days with good visibility. Ground-based censuses could well indicate no migration when large numbers could be passing over unnoticed. Most bird migration occurs at night and the conditions most likely to lead to mortality among actively migrating birds, day or night, are those involving low cloud cover, fog or other reduced visibility conditions.

**OG7-36**

There is ample evidence from the observations of amateur birders that at some times and under some conditions, large migrations of Greater Sandhill Cranes, several species of geese and Tundra Swans pass at low altitudes over the Hatchet Mountain

ridge where the wind turbines are proposed to be sited. Because the potential for significant avian mortality exists, even by the estimate presented in the DEIS, there is a need for additional study at the site specifically designed to address the timing, spatial pattern, altitude and magnitude of bird migration in the vicinity of the ridge. We propose that such studies be required before approval of this project is considered.

**OG7-36 cont.**

An appropriate study of migration in this situation should encompass both spring and fall migration seasons (note that in this region, southward migration of waterfowl often extends into December and beyond, with late-season movements stimulated by weather changes and freeze-up of open water farther north). Monitoring should take place both day and night and must be able to detect movements during periods of inclement weather when the ridge top may be enshrouded in clouds. Marine radar coupled with night vision technology should be employed and these techniques should be accompanied with direct visual and acoustic observations by competent ornithologists to provide data on the identity of the bird targets observed (see e.g., Harmata, et al., 1999, Nohara, et al., 2005, Gauthreaux and Livingston, 2006). Because migration is highly pulsatile and strongly influenced by local weather, observations should be made every day. It might require observations over several seasons to develop an accurate picture of the risk to migrating birds because the local conditions under which large kills of birds are likely to occur are relatively infrequent. It is important to emphasize again that when these conditions coincide with a large migratory passage of flocked birds, there is the potential for very significant mortality. On most days and nights, under favorable weather conditions, migrants passing near or over the ridge would probably be above, or even well above, the airspace swept by the rotors.

**OG7-37**

**2-B. Other Species Protected by Law:** Golden Eagle, Red-tailed Hawk, Turkey Vulture, Osprey. American Robin and Common Raven are afforded considerable protections under law, and as such the impacts on them by the project MUST be analyzed and discussed in the DEIR. These impacts also must be considered and added to the weight of impacts already discussed in the DEIR when estimating the magnitude of the impact of this project in general terms as well. These species were described in the Baseline Study as diurnal species most likely to have the highest rates of direct mortality for windmill collision. Yet, no mention was made of this in the main DEIR, and subsequently nor was this impact considered as a component of the overall impact of the project

**OG7-38**

The DEIR, by not considering these species in discussion and analysis in the main body of the report, is misleading and incomplete. It presents analysis and conclusions that, as severe as they may seem, give a grossly underestimated picture of the project's impact to birds.

**2-C. Natural History of Raptors as it relates to the impacts of numbers killed:** While a discussion of the natural history of (only) Bald Eagle and Northern Spotted Owl is included in Appendix C of the DEIR in the Hatchet Ridge Wind Project Biological Assessment, Sec. 3.0, no real correlation or discussion is made in the DEIR of how

**OG7-39**

these life histories relate to a loss in population. Providing applied analysis of the Baseline data in the main body of the DEIR is essential to an understanding of the real impacts of this project. For raptors and owls, the impact would be greater than the numbers reflect because of the: (In the case of the Bald Eagle, for instance)

- Because only an average of 2 young are produced each year, and because both may not survive to sexual maturity, the number of birds produced each year is quite low, especially when you take into consideration the low number of breeding pairs distributed over any given geographic area as compared to other more prolific orders of birds, such as Passerines. Also, if the mother is killed before the young have fledged, all young in the nest die. Thus the death of one eagle could result in the death of up to 4 birds.

- This species takes 4-5 yrs to reach sexual maturity. This fact, coupled with the low number of young produced per year means that a bird lost is not quickly replaced in the population (as is more likely the case of bird species that quickly reach maturity in a year or so)

- The lifespan can be 20 to 30 years. Obviously the ability of a species with such a long expected life span to recover quickly from numerous deaths is not favorable. The population simply can't support numerous unnatural losses.

- The number of individuals of the species for a given home range is small when compared to other bird orders that have higher relative numbers. Since there are fewer individuals of eagle than more numerous species of birds, a given number of bird deaths for this species will have much greater impact than the same number of deaths of a species of bird that has a greater density of individuals for any given geographic area.

Given all of the above, a loss of one bird is significant, and the impact of deaths on the populations would be greater than the numbers reflect. This discussion needs to be part of the DEIR as part of the assessment for the severity of the impacts on these species populations.

**OG7-39 cont.**

**2-D. Golden Eagle:** The Golden Eagle should have been discussed in the BIO section of the DEIR. It is listed as a 'fully protected' status species in California. This means the California Department of Fish and Game cannot issue a 'take permit' fully protected species, and any instance of death to an individual of one of these species constitutes an 'illegal take', and is a felony under California law, punishable by fines and prison for each instance of violation. The DEIR states that the potential for Golden Eagles to occur in the project area is high. Audubon Christmas Bird counts and observations by local bird watchers and scientists that live in the area reflect that a year-round resident population exists in the area, as well as a wintering population. . This all needs to be stated in the DEIR. Incidental take is not allowed for migratory birds of this species under the FESA and MBTA.

**OG7-40**

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**2-E. Other Species Protected by Law:** Under 'Birds of Prey and Their Eggs, the California Fish and Game Code Section 3503.5', It is unlawful to take, possess, or destroy any birds in the orders *Falconiformes* or *Strigiformes*. The order Falconiformes includes Red-tailed Hawk, Turkey Vulture, and Osprey. The DEIR does not discuss these species specifically, as it did the Bald Eagle and the Greater Sandhill Crane. It should have, because they are protected under State law as described above. In fact, the Red-tailed Hawk and Turkey Vulture are species that were singled out in the Baseline Biological Study as the top two species most often observed at rotor-swept heights. OG7-41

The DEIR, by not considering these species in discussion and analysis in the main body of the report, when this information was in their own baseline study, is misleading and incomplete. It presents analysis and conclusions that, as severe as they may seem, give a grossly underestimated picture of the project's impact to birds.

**2-F. 'Mitigation Measure BIO-6':** The DEIR states that:

*If mortality rates of special-status species are determined to be below the level at which populations may be negatively affected (as defined above), no further mitigation will be required.*

However, the California Fish and Game Code Sec. 3505.5 states:

*It is unlawful to take, possess, or destroy any birds in the orders Falconiformes or Strigiformes (birds-of-prey)...* OG7-42

And the Migratory Birds, Fish and Game Code Sec. 3513 and Federal Migratory Bird Treaty Act state that:

*It is unlawful to take, possess, or destroy migratory non-game bird as designated by the federal Migratory Bird Treaty Act,..*

The impacts to birds and proposed mitigations discussed under the Operational Impacts portion of the Biological Resources section of the DEIR only include special status species, and specific discussions of impacts to three: Bald Eagle, Spotted Owl and Greater Sandhill Crane. This is unacceptable, as the law is very clear that non-listed species are protected.

- CEQA requirements pertain to all aspects of the natural environment, not just to special status species. Therefore, impacts, especially the resulting mortality of all avian species and bats must be considered, both in data collection, analysis and mitigation in the DEIR. OG7-43
- Also the law says nothing about population levels in regard to the fully protected status species likely to be killed. Any instance of 'take' is illegal, and thus any death should be considered significant, both as it pertains to the environment and the law. So the mitigations trigger referenced in Mitigation Measure Bio 6 should

not be based on mortality rates that negatively affect the population, but any significant avian mortality, to any bird species. OG7-43 cont.

**2-G. Mitigation Measure BIO-8: Potential direct mortality of greater sandhill cranes:** The DEIR states that:

*Implementation of Mitigation Measure BIO-6 would reduce this impact to the maximum extent practicable.* OG7-44

The impact to the Sandhill Crane and other avian species can be much more effectively reduced through other means, such as installation of a VAWT (Vertical Axis Wind Turbine) windmill design that does not result in large numbers of birds and bats killed. (This is discussed in greater detail later)

**2-H. Impact BIO-9: Potential direct mortality of bald eagles:** The DEIR does not mention in this section that this species is a State 'fully protected' status species in California. This means that California Department of Fish and Game cannot issue a 'take permit' for these species, and any instance of death to an individual of one of these species constitutes an 'illegal take', and is a felony under California law, punishable by fines and prison for each instance of violation. They also do not mention that this bird is protected under the Bald and Golden Eagle Protection Act**.** As such,

*This law provides for the protection of the bald eagle and the golden eagle by prohibiting, except under certain specified conditions, the take, possession, and commerce of such birds. The law does not allow for any project-related take, including that associated with wind energy development projects. The 1972 amendments increased penalties for violating provisions of the act or regulations issued pursuant thereto and strengthened other enforcement measures. Rewards are provided for information leading to arrest and conviction for violation of the act. CEC Guidelines, p. 35* OG7-45

This act does allow permits for take under certain circumstances, as does the MBTA,

*…but incidental take of migratory birds is not allowed. Under all three statutes"* (including FESA),*"unauthorized take may be penalized, even if the offender had no intent to harm a protected species. Direct consultation with the USFWS should occur early at appropriate points in the project development process to ensure that projects will be as consistent as possible with these federal laws. (CEC Guidelines p. 35)*

**2-I. IMPACT BIO-1: Removal and disturbance of special-status plants (less than significant with mitigation)** : As stated in the DEIR:

*The Butte County morning glory is classified as 'rare and endangered' by the California Native Plant Society. Consequently, an evaluation of impacts on the species is mandatory under CEQA.* OG7-46

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The DEIR contends that mitigation measures BIO-1 and BIO-2 would reduce the impact to the plant to a less-than-significant level. This impact would be due to the loss of 11 out of 144 acres of population. The DEIR states that:

*…this permanent removal of 11 acres..does not appear to result in a substantial adverse effect on the population.*

We contend that the destruction of 11 acres of population IS a significant impact because of the rare and endangered status of this species. Therefore, we also contend that this impact will not be minimized to a less-than-significant level by the Mitigation Measures in BIO-1 and BIO-2 as is claimed in the DEIR, because there will still have been a loss of 11 acres of population. The DEIR also states that the disturbance during construction could result in the **OG7-46 cont.**

*…subsequent introduction of non-native species. Changes to the habitat over time may ultimately make the area unsuitable for the species and eliminate it from the area.*

The impact

*…must be assumed to be potentially significant at this time.*

**2J. Mitigation Measure BIO-1: Avoid Butte County morning glory**: The DEIR states:

*Wherever possible, redesign the location of the facilities to avoid habitat for Butte County morning glory. The applicant will, to the extent possible, adjust the location of six turbines and associated access roads currently planned for constriction in Butte County morning glory habitat.*

This contradicts the statement made in Project Description 2.3: Background and Project Overview p.2-2:

*HRW has requested flexibility in the precise spacing and number of turbines in the turbine corridor, as well as in the location of the corridor within the leased area.* **OG7-47**

Obviously, both of these conditions cannot occur. If the lead agency grants this flexibility, Mitigation Measures BIO-1 AND BIO-2 are impossible to implement.

*…all final project location information would be provided to the …County…and other resource agencies prior to the initiation of project construction.*

The lead agency cannot allow the applicant to dictate the placement of the turbines. This is in direct conflict with the provisions of BIO-1 and BIO-2**.** The placement of the turbines must be coordinated with the County and CDFG prior to the granting of the use permit. Mitigation Measure BIO-2 requires that

*…final facility siting must be submitted to the California Department of Fish and Game (DFG) and the Shasta County Department of Resource Management and approved by both agencies prior to construction.*

Again, this needs to be approved by both agencies prior to the granting of the use permit. (as recommended in the CEC Guidelines)

**OG7-47 cont.**

**3. GOALS**

Stated Goals for the impact on the environment are not met by the Project: The project as proposed does not meet these its own objectives in protecting the environment. In the DEIR, Alternatives Screening Section, under Proposed Project: Project Goal and Objectives, the second objective is:

*Develop a wind power project in a location that will have minimal impacts on birds, bats, vegetation, and other environmental resources.*

The project as proposed does not meet this objective. The DEIR itself contradicts this goal by stating the severity of the impacts to birds and bats as *Significant and Unavoidable.* The fourth goal listed is:

**OG7-48**

*Meet regional energy needs in an efficient and environmentally sound manner.*

This goal is also contradicted in the EIR itself by the severity of the impact on birds, bats, and stating that the effects to these animals would be *Significant and Unavoidable.* The project is not even meeting its own stated goals with regard to protecting the environment. If the second and 4th objectives on the Project Goal and Objectives list are not being met, and are as important to the environment as these two are, perhaps it would be better not to build this particular wind farm project, unless changes are adopted such as those we are recommending that would help achieve these goals.

**4. ALTERNATIVES**

When analyzing the Alternatives Screening Report in Appendix F and 'Other Considerations', Section 4.5 of the DEIR and the resulting Range of Alternatives, we were impressed by the obvious lack of any real consideration and research into these alternatives and their feasibility, and the unsubstantiated and weak rationale given for the dismissal of several viable alternatives. This cursory treatment is NOT in keeping with the intent of the CEQA guidelines. In its analysis the DEIR comes to the completely illogical and unfounded conclusion that:

**OG7-49**

*…the proposed project is considered to be the environmentally superior action alternative." ( DEIR Chapter 4.5.3 Environmentally Superior Alternative)*

The DEIR states that:

*The alternative technology, alternative site, phased project, smaller capacity and Butte County morning glory avoidance alternatives do not have the potential to reduce significant impacts to a less-than-significant level;…*

OG7-49 cont.

**4-A. Alternative Technologies:** Alternative technologies for the project were not adequately considered as required by CEQA**,** including available alternative Vertical Axis Wind Turbine technology, (VAWT)**.** This option, however, does meet the criteria for alternatives as set forth in CEQA and quoted in the EIR Alternatives Screening Intro., p. 1. Thus, it should have been considered by the DEIR as a viable Alternative. Use of this design would reduce the bird and bat kills of this project to almost nothing.

OG7-50

**DEIR Section4.5.1 Alternatives Considered but Rejected (p.4-12 to p.4-13):** The Screening process dismissed the VAWT technology as being unavailable and unknown**:**

*The use of a vertical axis wind turbine alternative could theoretically minimize the visual impact because of reduced height; however, the availability—and hence the feasibility—of these devices is unknown. Consequently, inclusions of a vertical axis wind turbine alternative would be deemed speculative, and not appropriate as a viable alternative to the project as currently defined.*

They do not mention that this type of design could remove the extreme impact of this project on avian species and bats!

Furthermore, the DEIR states that these alternatives:

- *are remote and speculative in terms of implementation…* The VAWT is not speculative; The Terra Moya Aqua, Inc. (TMA) design of the VAWT has been in operation at their fully licensed wind farm in Wyoming for over 11 years and they are currently developing another 11,000 acre site in Wyoming. They now have a 500 Kw commercial capacity turbine ready for production that is designed for use in large-scale commercial wind farm applications. The information on this technology *is* available and should be included in the DEIR as one of the alternatives.
- *with effects that cannot be reasonably ascertained…*Its hard to determine the effects of a technology that you don't investigate.
- *would not meet one or more of the project objectives…* We suggest that the VAWT could meet most of the project objectives.
- *the alternative could attain most (but not necessarily all) of the basic project objectives.* It does not have to meet all of the project objectives, so this argument is invalid. As we discussed earlier, the project as proposed does not meet two of its own stated objectives.
- *or would reduce the scale and power production capacity so as to render the project economically infeasible.* First of all, how can the DEIR draw this conclusion without any information? This technology option is dismissed as 'unavailable and unknown'. The VAWT technology may be just as efficient as the most efficient conventional HAWT designs, and we believe this option should be considered. The VAWT is not less efficient than conventional turbines**:**

OG7-51

*The energy cost generation for the TMA Company's turbine design is about 2.5 to 3.5 cents per kilowatt hour, depending on the regimen, comparable to the most efficient propeller designs available (PureEnergy Systems.com News, 11-7-05)*

- *the availability …of these devices is unknown.* Apparently, no effort was made to determine the availability of these turbines. This is an instance of CEQA non-compliance. We were able to learn of this non-lethal design using just a 5-minute internet search, and the availability of this 'unknown' technology in just one phone call to the President of TMA, Duane Rasmussen. He stated that the Company could have 500 Kw turbines for this project ready as early as 2009. (This timeline is pretty close to the goal of production starting in 2008, as since it is already 2008, and we are still in the DEIR process. Mr. Rasmussen also stated that his Company could build the VAWTs locally in northern California, thus reducing costs associated with production and contributing to the local economy. This company is located in the United States and is American-owned. We realize that the lead agency might not normally mandate the use of the product of one particular company, but in this case they are the only company who own the patents for this non-lethal design of turbine.

In addition, the units are only 150' tall, compared with the over 400' tall conventional horizontal axis wind turbines proposed. This lower height will greatly reduce potential collisions by birds and bats who may be flying low enough to collide with them at night or in poor visibility daytime conditions. The lower height also will reduce the visual impact on the natural environment. The design also offers the advantage of being able to operate at much colder temperatures. The proposed conventional HAWT's proposed do not operated well in freezing temperatures. This certainly would be an advantage to the VAWT given the climate characteristics of the site.

**OG7-51 cont.**

The DEIR Alternatives Screening Introduction, p.1 (per CEQA Guidelines) state:

*The criteria for alternatives that must be considered are listed below:*

- *The alternative could attain most (but not necessarily all) of the basic project objectives.*
- *The alternative is feasible.*
- *The alternative would avoid or substantially reduce one or more significant impacts of the proposed project.*

This alternative satisfies these criteria.

If the use of this type of windmill design is not possible due to the current project construction timeline, the project should be delayed to accommodate installation of this type of windmill. But if the County decides this is not possible, the project should be implemented in phases that allow for the inclusion of the VAWT in the later phases. (As also discussed in the 'Phased project' option of alternatives.) After all, the project has a projected lifetime of 20 years, which means 20 years worth of avian and bat deaths, so a

potential delay (if any) of 6 months to a year when viewed in this larger context is insignificant, and well worth the tradeoff.

OG7-51 cont.

**4-B. Alternative Sites** for the project were not considered adequately and should not have been dismissed. The DEIR states that an alternate site could reduce a number of impacts associated with the current chosen site, including those to birds:

*…it is possible that avian impacts at another location could be less than those associated with the proposed project…*

OG7-52

They go on to state that more monitoring data would be required, but we feel that given the severity of the impacts to birds and bats at the proposed site, the time and effort required to find and analyze another suitable site would be justified.

**4-C. Alternative Siting** would reduce the impacts to the birds and possibly bats. It is possible to site the wind turbines down-slope somewhat from the ridge. Although this would possibly result in less windpower generation, it would certainly reduce significantly the impacts to the birds and bats by removing the turbines from the top of the ridge.

*Strickland et al. (2001) concluded that wind turbines located away from the edge of the ridge at Foote Creek Rim, Wyoming, would result in lower raptor fatality rates than turbines located immediately adjacent to the edge. Smallwood and Neher (2004) had similar findings… (CEC Guidelines Chapter 4 p.64)*

In light of this significant reduction in avian mortality, this alternative should be considered and not be dismissed. The DEIR states that a different site plan could be implemented:

*The arrangement of the turbines and other facilities could be reconfigured within the boundaries of the area that has been leased to accommodate the proposed project. (Other CEQA Considerations, Alternative Site Plan, p. 4-15)*

OG7-53

Also:

*…the development of an alternative site plan does not have the potential to avoid or reduce significant impacts…*

As we have stated, it does, because placing the windmills below the ridge will obviously significantly reduce avian mortality. There may be other options that would reduce the impacts to avian species as well. These need to be investigated

*…wind turbine siting contributes substantially to bird fatalities and that careful siting of new wind turbines could substantially reduce fatalities… (Smallwood and Neher 2004) (CEC Guidelines, p.64)*

The DEIR states that:

*The majority of large birds flew perpendicular to and across the prominent ridgeline..(Ecological Baseline Study p. ii)*

This means that most large birds will be confronted by a 6 mile long 'curtain of death'. The current proposed general siting configuration of arranging the turbines along the ridge really gives birds passing though a minimal chance for avoidance, given the large horizontal and vertical area covered by the blades per windmill and the 6 mile length of the line of turbines.

**OG7-53 cont.**

**4-D. Smaller Project:** Under Preliminary Range of Alternatives, p. 6,

*The alternatives listed below meet most or all of the project objectives, are considered feasible, and would avoid or substantially reduce one or more potentially significant impacts of the proposed project.*

These include the 'Smaller Project' alternative.

*A smaller project could permanently reduce the magnitude or extent of some impacts. A reduced project with a smaller capacity (e.g., 30 MW) would be possible and may be feasible. A smaller project would theoretically reduce the magnitude of biological impacts associated with the proposed projects, including a proportional reduction in avian and bat mortality. (Other CEQA Considerations, p. 4-15)*

Given the above analysis, and the potential reduction in significant mortality, this alternative should not have been dismissed.

**OG7-54**

**4-E. Phased Project:**

*The project could be developed in phases. This alternative would meet most of the project objectives. (Preliminary Alternatives Screen, Alternatives Screening, p.4)*

This one had no justification for being rejected as an Alternative, especially since it could be coupled with the VAWT option. A phased project would allow more feasible implementation of this technology, if necessary. This option met the screening criteria, and would significantly reduce one or more of the significant impacts if coupled with the installation of VAWT turbines for the later phases.

**OG7-55**

**4-F. Butte County Morning Glory Avoidance Alternative:** This alternative was dismissed because it did not reduce the other significant impacts of the project. Obviously, this alternative needs to be incorporated into the mitigation measures or one of the other Alternatives, such as the Alternative VAWT option. Also the claim that Mitigation Measures BIO-1 and BIO-2 would reduce the significant impact to a less-than-significant level is unfounded, as we have already discussed.

**OG7-56**

**4-G. No Project:** A no-project alternative is required by CEQA, and for a good reason. Sometimes, the negative impacts of a project are so damaging, and so outweigh the advantages, that a no-project alternative is the only responsible option available. Unless the County and the applicant are willing to act responsibly to adopt real measures to avoid the huge number of avian and bat deaths that will occur with this project, the only reasonable and prudent option IS the no-project alternative. Under CEC Guidelines, this project would be classified as CATEGORY 4: PROJECT SITES INAPPROPRIATE FOR WIND DEVELOPMENT; **OG7-57**

*Sites for which existing data indicate unacceptable risk of bird or bat fatalities might also be appropriately classified as Category 4, particularly if no feasible avoidance or mitigation measures are available to reduce impacts. (CEC Guidelines, p.9)*

**5. FUNCTIONAL MITIGATIONS**

No functional mitigations are being required. This is because no mitigations exist that would minimize to an acceptable degree the on-site impact for this project as proposed. As stated in the DEIR,

*Impacts of the Proposed Projects, Biological Resources (significant and unavoidable) – The project is expected to result in significant and unavoidable mortality to avian and bat species. No mitigation is available to reduce this impact to a less-than-significant level;…* **OG7-58**

As we discuss under the 'No-Permit Option' earlier in this document, this project can be classified as 'Category 4: Project Sites Inappropriate for Development', because

*…no feasible avoidance or mitigation measures are available to reduce impacts. (CEC Guidelines, p.9)*

In addition, as stated in the DEIR: Mitigation Measure BIO-6:

*Monitor avian mortality rates and implement adaptive management measures, if necessary.*

This is only a carcass count, with no mandatory mitigation requirements or plan being triggered by the count findings. The implementation of **OG7-59**

*…adaptive management measures…implemented at the discretion of USFWS or DFG…(DEIR p. 3.4-20)*

is unacceptably vague and does not constitute an actual mitigation monitoring and operations impact mitigation plan. The CEC Guidelines are very clear that concrete detailed mitigation plan requirements as a prerequisite for the use permit are essential, as is a firm commitment by project owners to accountability and remedial action in response to avian and bat mortality levels, and that

*This commitment must be included in permit conditions during the permitting process so that a mechanism is available to implement mitigation recommendations after the project is permitted. (CEC Guidelines p. 69)*

**OG7-59 cont.**

The Carcass count included in the CEC Guidelines is most effective as a tool to assess the impacts to birds and bats at EXISTING wind farms, where real and more effective mitigation options are much more limited than with a new project. A new project has many more available options: proper site selection, siting of windmills, appropriate wildlife-friendly windmill design is selected, etc. If done properly, mitigation is minimal or not required. This project hasn't considered these options carefully enough, given the extreme magnitude of number of deaths to birds and bats that will occur. So they can only count dead bodies. This is not mitigation! The birds, bats and the public need to be assured that a mitigation plan is in place BEFORE the use permit is issued and is triggered by data collected, not at the discretion of an agency after the fact. The issue of liability is a very real one for everyone involved. The CEC Guidelines state that:

*Other state and federal protective wildlife laws, some of which mandate avoidance of 'take' without options for permitting, can also influence project siting and operations. Project developers, permit decision makers, and the resource agencies involved should consider these strict liability laws during the permitting process to ensure that impacts to bird and bat species are minimized and mitigated to offset impacts. Implementing the methods recommended in the Guidelines during the permitting process will demonstrate a good faith effort to develop and operate projects in a fashion that is consistent with the intent of these state and federal wildlife protection laws. Such good faith efforts will be considered by CDFG before taking enforcement actions for violation of a California wildlife protection law.*

**OG7-60**

If this project is permitted as proposed, which we feel is unacceptable and ill-advised, then the 'mitigation measures' should be in the form of a mandatory detailed mitigation plan, the elements of which are to be triggered by a pre-determined number of bird and/or bat fatalities and/or other impacts, such as nest disturbance, etc. These mitigation measures need to be monitored by an independent third party to ensure their execution. The plan should include the elements already stated in the DEIR under Mitigation Measure BIO-6:

- *Timing restrictions on the operation of one or more turbines (time of day or seasonal shutdown)*
- *Permanent shutdown of one or more turbines*
- *Relocation of one or more turbines*

**6. ADDITIONAL RECOMMENDATIONS**

**Color Schemes:** We recommend that the turbine blades be painted according to the Hodos scheme. This paint scheme is thought to increase visibility to diurnal raptors, and is required as a condition for the 2005 use permit renewals at Altamont Wind Farm in Alameda County, CA.(Use permit for Altamont Wind Farm, Attachment G, Avian Wildlife

**OG7-61**

Protection Schedule, p.2) This would not preclude the painting of the support towers themselves in the required color(s) as mandated by FAA regulations. **OG7-61 cont.**

**Rock Piles:** We recommend the location of any man-made rock piles well away from the turbines, as these attract raptor prey species of rodents and reptiles. This condition is also required as a condition for the 2005 use permit renewals at Altamont Wind Farm in Alameda County, CA. This is also in keeping with the CEC Guidelines, "Reduce Habitat for Prey Near Turbines", ( Chapter 4, p.65). **OG7-62**

**Lighting:** It has been shown that lighting on and around turbine towers can attract avian and bat species. The CEC Guidelines discuss this and recommend

*Avoid Lighting that Attracts Birds and Bats (CEC Guidelines, Chapter 4, p.65).*

Different light colors attract different species under different conditions (such as fog and low cloud cover), so ANY lighting will attract birds and bats. The FAA requires safety lighting on towers over 200 feet tall, so use of the TMA VAWT turbines, which are only 150 feet tall, would not require any safety lighting. This is our preference. **OG7-63**

*Plans for lighting should balance FAA requirements with protection of birds and bats (CEC Guidelines, Chapter 4, p.65)*

For general lighting of facilities and buildings,

*Keep lighting at both operation and maintenance facilities and substations to the minimum required to meet safety and security needs. Use white lights with sensors and switches that keep the lights off when they are not required. These lights should be hooded and directed to minimize backscatter, reflection, skyward illumination, and illumination of areas outside of the facility or substation. CEC Guidelines, Chapter 4, p.65)*

We recommend the use of Meteorological towers that do not require the use of guy cables. Guy wires present a collision hazard to birds. If the installation of meteorological towers that require guy cables is permitted by the County, then those should be equipped with flight diverters to lessen avian collisions. **OG7-64**

*Communications towers should not be guyed at turbine sites. If guy wires are necessary, then use bird deterrents. (CEC Guidelines, Chapter 4, p.66)*

The management of mitigation measures is the responsibility of the lead agency, Shasta County. We would like to see them contract the California Energy Commission to manage the mitigation measures, as they have extensive expertise and experience in this area, and are an independent party. **OG7-65**

**7. CONTINGENCY MITIGATION PLAN**

There is no requirement to establish a detailed contingency mitigation plan to mitigate higher than anticipated levels of fatalities. The CEC Guidelines emphasize the importance of establishing such a plan before a use permit is issued. This contingency mitigation plan should include detailed adaptive operations and mitigation mechanisms per CEC Guidelines to mitigate high levels of unanticipated fatalities, which

*...becomes even more important when choices for operational impact avoidance or minimization are so limited. (CEC Guidelines p. 69)*

as is the case for this project as currently proposed. These mitigation measures need to be monitored by an independent third party to ensure their execution. This Contingency Mitigation Plan needs to be in place before the use permit is issued.

OG7-66

**8. COMPENSATORY MITIGATION PLAN**

The DEIR is conspicuously lacking any form of compensatory mitigation which is recommended in the CEC Guidelines for projects with effects on avian and bat mortality that cannot be avoided or minimized such as the Hatchet Ridge project. This type of mitigation is designed to offset the impacts to the avian and bat population (both specific and cumulative) by providing

- *Offsite conservation and protection of essential habitat,*
- *Offsite conservation and habitat restoration"*, and/or
- *Offsite habitat enhancement*

as potential compensation options for affected species. (CEC Guidelines, p. 67) Given the heavy bird and bat mortality the project would cause, and the ineffectiveness of on-site mitigations, compensatory mitigation is the only real alternative. Therefore, it should be mandated and executed in accordance with CEC Guidelines as a requirement for the project use permit.

OG7-67

**9. CUMULATIVE IMPACTS:**

The DEIR states that no significant cumulative impacts would occur with respect to the avian and bat species adversely affected by this project. This conclusion is based on insufficient data and illogical, contradictory analysis and conclusions. As such, it is contrary to the intent and requirements under CEQA. Because the extent the effects of this project have not been adequately determined, its effects cannot be analyzed in the context of cumulative impacts. CEQA requires that

*An EIR shall discuss cumulative impacts of a project when the project's incremental effect is cumulatively considerable, as defined in section 15065(a)(3), which states that: "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.*

OG7-68

The DEIR mentions several potential wind projects within relatively close regional proximity to the project site: Pondosa in Siskiyou County, three prospective wind project sites in the Plumas National Forest, and one in Lassen National Forest. For the Pondosa site, the DEIR states:

*…it may be assumed that the Pondosa site is being investigated by a prospective wind energy developer…*

They dismiss this potential project from consideration as a future project;

*Due to the lack of formal documentation regarding any proposed wind energy development in the Pondosa area, it will not be included as part of this cumulative analysis."(DEIR p.4-2*)

Just because the

*…Siskiyou County Planning Department staff has not received a formal application from a project applicant to date…*

does not necessarily mean that this project should not be considered as a 'probable future project'. We believe it should be considered. The DEIR analysis of the potential project sites in the Plumas and Lassen National Forests explains that meteorological towers have been erected to gather data and monitor wind speeds and concludes that:

*…one or more of these sites may theoretically be suitable for wind power development.*

However, they don't state that they are not likely to result in probable wind project(s), nor do they give any justification not defining them as probable wind project(s). Given the level of resources being devoted to the acquisition of data and the obvious level of interest by wind developers to determine a suitable site in the region, the likelihood of at least one of these sites resulting in a wind energy project is high. And, given the likelihood of significant avian mortality issues occurring in any wind development in the area, we believe that a significant cumulative impact will occur. In addition, the migratory nature of avian species populations needs to be considered when determining the geographical area contributing to cumulative impacts of this project.

Bird and bat species are highly mobile and migratory in their habits; their populations are not static nor are they confined to a particular region. Therefore, a wind farm in California can have a significant cumulative impact on a bird population that nests in the arctic, migrates through northern California, and winters in South America. By this reasoning, a bird species population that passes through the wind farm at Altamont, in Alameda County during migration, and proceeds via the Pacific Flyway to then pass over Hatchet Ridge, is likely to experience an incremental significant cumulative impact as the result with its contact with these two project sites. Therefore the incremental significant cumulative impacts of the many existing windfarm projects that exist along the Pacific

**OG7-68 cont.**

**OG7-69**

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Flyway Migration Corridor must be factored into the total cumulative impact of which the Hatchet Ridge Project is a significant component. **OG7-69 cont.**

In addition, mitigation measures must be required that offset an appropriate portion of this significant cumulative impact. Compensatory mitigation is a reasonable mechanism to achieve this, as it works especially well given the mobile nature of birds within a population. An off-site mitigation measure can truly benefit the same population that is negatively impacted by the project. **OG7-70**

# Letter OG7 Wintu Audubon Society

## Response to Comment OG7-1

This comment discusses the intention of the group's review and a summary of its conclusions presented in the letter.

## Response to Comment OG7-2

This comment notes the group's position on the project and its support of the California Energy Commission guidelines.

## Response to Comment OG7-3

The analysis of cumulative impacts and alternatives is presented in Chapter 4 of the Draft EIR.

## Response to Comment OG7-4

Comment noted. A discussion of the pertinent state and federal laws is presented in the regulatory setting section of each resource analysis section in Chapter 3 of the Draft EIR.

## Response to Comment OG7-5

Comment noted. The regulatory setting pertaining to avian and other biological resources is discussed in detail on pages 3.4-10–3.4-13 of the Draft EIR.

## Response to Comment OG7-6

An incidental take permit would be required for adverse impacts on northern spotted owl. However, no adverse impacts on northern spotted owls are expected to occur due to the fact that there is no habitat capable of supporting them in the project area and that spotted owls are not known to fly above the canopy where they would be at risk from turbine collision.

## Response to Comment OG7-7

A study of nocturnal migration using marine radar has been conducted. The report, *A Radar Study of Nocturnal Bird and Bat Migration at the Proposed Hatchet Ridge Wind Project, California, Fall 2007*, detailing the results of that study is included as Appendix B of the Final EIR. It should be noted that the results of this study did not alter any of the conclusions regarding potential impacts on avian species.

## Response to Comment OG7-8

The exact intention of this comment is somewhat unclear. One of the project objectives is to "Develop a wind power project in a location that will have minimal impacts on birds, bats, vegetation, and other environmental resources" (Draft EIR, page 2-3). Although this objective is subject to interpretation, it is the conclusion of the Draft EIR that this objective can be met by the proposed project.

## Response to Comment OG7-9

Please refer to the responses to Comments OG3-6 and OG3-7.

## Response to Comment OG7-10

The commenter's intended definition of "functional" mitigation is unclear. All feasible mitigation measures currently available have been required for the project. Contingency mitigation, in the form of an adaptive management program, has been added to Mitigation Measure BIO-6 in Chapter 3 of the Final EIR. Please refer to the response to Comment PA1-8.

## Response to Comment OG7-11

See revised Mitigation Measure BIO-6 in Chapter 3 of the Final EIR.

## Response to Comment OG7-12

The commenter references cumulative impacts but does not provide specific comments on the Cumulative Impacts analysis in Section 4.1 of the Draft EIR, where anticipated cumulative effects are disclosed.

## Response to Comment OG7-13

See the response to Comment OG7-5.

## Response to Comment OG7-14

The commenter notes that mitigation measures BIO-1 and BIO-2 will not reduce impacts on Butte County morning-glory to a less-than-significant level and that the impact should be considered significant and unavoidable. Because the commenter does not provide any rationale for this assertion, further responses to this comment are not possible.

## Response to Comment OG7-15

Please refer to the responses to Comments OG3-6 and OG3-7.

## Response to Comment OG7-16

See the response to Comment PA1-6 for a discussion of the appropriateness of compensatory mitigation and why such mitigation is inconsistent with CEQA in this case. Monitoring methods and requirements were provided in the Draft EIR and have been modified and expanded in the Final EIR. Adaptive mitigation methods presented in the Draft EIR have been expanded in the revised version of Mitigation Measure BIO-6, presented in Chapter 3 of the Final EIR.

## Response to Comment OG7-17

See the response to Comment PA1-8. Most studies to date have shown no relationship between painting schemes and bird and bat mortalities; accordingly, the suggested minimization measure is unlikely to have any effect. The description of the meteorological towers on page 2-8 of the Draft EIR specifies that the towers would be freestanding structures without guy wires to minimize impacts on avian species. Finally, it is not anticipated that the proposed project would result in creation of any artificial rock piles because standard grading practices would be employed. Moreover, as described in Section 2.7 of the Draft EIR, areas of temporary disturbance would be graded and replanted to their original condition on completion of construction activities.

## Response to Comment OG7-18

See the response to Comment PA1-8.

### Response to Comment OG7-19

Comment noted. Mitigation Measure BIO-6 has been revised and expanded to include an adaptive management approach that requires increasing operational constraints until mortality levels remain below the thresholds established in the Final EIR.

### Response to Comment OG7-20

Comment noted. The recommendation for coordination between Shasta County and the CEC is incorporated into the administrative record. The willingness of the CEC to "manage" the mitigation measures, even under contract, is unknown at this time.

### Response to Comment OG7-21

Comment noted. Section 3.4 of the Draft EIR does in fact discuss the potential biological impacts of the proposed project on all special-status species, including all fully protected species, that could potentially be affected by the project.

### Response to Comment OG7-22

Comment noted. These issues were considered in the analysis conducted for biological resources in Section 3.4 of the Draft EIR.

### Response to Comment OG7-23

Impacts on other avian species are addressed in Impact BIO-11 on pages 3.4-22–3.4-23 of the Draft EIR.

### Response to Comment OG7-24

See the response to Comment OG7-4.

### Response to Comment OG7-25

Cumulative impacts are addressed in Chapter 4 of the Draft EIR. There are no other wind farms planned in the immediate vicinity.

### Response to Comment OG7-26

Comment noted. Illegal take is still illegal take, even if it is "compensated for." The commenter implies that implementation of all the recommendations in the letter will make take of a fully protected species legal, even though the comment admits that take cannot be "avoided," but only "reduced."

### Response to Comment OG7-27

Comment noted.

### Response to Comment OG7-28

See the response to Comment OG7-21.

### Response to Comment OG7-29

The CEC guidelines were reviewed in preparation of the Draft EIR and are referenced in that document and in this Final EIR where appropriate.

## Response to Comment OG7-30

See the response to Comment OG7-6.

## Response to Comment OG7-31

See the response to Comment OG7-7.

## Response to Comment OG7-32

See the response to Comment OG7-7.

## Response to Comment OG7-33

Avian use studies conducted at operating wind farms have been correlated with avian mortality studies at those same wind farms; this correlation forms the best currently available basis for predicting what the potential magnitude of avian mortalities will be. This is the basis for drawing conclusions about nocturnally migrating birds from observations of birds during the day. The information and conclusions drawn in the nocturnal migration study using radar provided no additional information that would contradict the conclusions drawn from the baseline ecological study. In addition, inclement weather such as low fog is typically associated with an atmospheric inversion layer, during which there is little to no wind. Therefore, the turbine blades are much less likely to be rotating during these periods, reducing the risks to birds moving through the area. See the response to Comment OG7-35.

## Response to Comment OG7-34

Inclement weather conditions at Hatchet Ridge that could impede visibility for migrating birds (e.g., low clouds and fog) generally result from an inversion layer, a condition that is generally not accompanied by wind; under such conditions, turbine blades would not be rotating and the risk of avian mortality is low.

## Response to Comment OG7-35

The conclusion that waterfowl mortality is expected to be low at Hatchet Mountain is based on (1) the estimate of exposure risk derived from the avian use studies conducted using standardized techniques developed specifically for this purpose, and (2) information on mortality rates of waterfowl at all wind farms in the U.S. with comparable data.

## Response to Comment OG7-36

The WEST report (Appendix C-1 of the Draft EIR) included all observations of birds, and observers noted the altitude and direction of movement of all birds. This is certainly a "component" of migration. Subsequent to issuance of the Draft EIR, a study of nocturnal migration using marine radar was conducted.

## Response to Comment OG7-37

See revised Mitigation Measure BIO-6 in Chapter 3 of the Final EIR.

## Response to Comment OG7-38

The Draft EIR considered potential impacts on all species with a potential to occur within the study area, with emphasis placed on those species considered to be special-status species.

Potential impacts on common species were also addressed in Impact BIO-11 in Section 3.4 of the Draft EIR.

## Response to Comment OG7-39

Comment noted. The estimated number of bald eagle deaths from turbine collision based on the avian use studies was approximately one per year. Even for a long-lived, k-selected species with a low reproductive rate, the mortality of one individual per year is unlikely to result in permanent population declines, unless the population is very small, and adversely affected by other factors. The WEST report concluded that any potential mortality of bald eagles would be most likely to occur during winter; the wintering population of bald eagles in the area likely comprises individuals originating from several different breeding populations, and not necessarily only from the local breeding population. Nevertheless, because of the *potential* for a higher than expected numbers of mortalities, this impact is considered significant.

## Response to Comment OG7-40

See the response to Comment PA1-12.

## Response to Comment OG7-41

Comment noted. Mitigation Measure BIO-6 has been revised to include mortality thresholds for diurnal raptors as a group, and thus would include red-tailed hawk and other diurnal raptors. Mitigation measures are included to reduce mortality of red-tailed hawk and other diurnal raptors if the thresholds are exceeded.

## Response to Comment OG7-42

See revised Mitigation Measure BIO-6 in Chapter 3 of the Final EIR.

## Response to Comment OG7-43

See the response to Comment OG7-38. The WEST report collected data on all avian species and all bat species detected in the project area. The Draft EIR addresses potentially significant impacts on biological resources. These include impacts on deer, other avian species, and bats as well as on special-status birds. Finally, the legality of an action is not necessarily correlated with its biological impact.

## Response to Comment OG7-44

Comment noted. Please see the response to Comment OG3-7.

## Response to Comment OG7-45

Comment noted.

## Response to Comment OG7-46

CEQA requires that impacts on a rare, threatened, or endangered species be "substantial" in order to be considered significant. The status of a species alone cannot be used to indicate whether or not the impact is substantial. Factors such as distribution and number of occurrences, size of the population, biology and ecology of the species, and known threats to the species must be considered in order to make a determination regarding the severity of the impact. The Draft EIR finds that the loss of approximately 8% of one occurrence of Butte

County morning-glory does not rise to a "substantial" level under CEQA. Because additional indirect effects on the population may occur as described in the Draft EIR, effects of the project may result in a substantial impact over time. The County maintains that the mitigation measures addressing this impact would reduce the impact to a less-than-significant level.

## Response to Comment OG7-47

The flexibility to site turbines as described in the project description is not inconsistent with mitigation measure BIO-1. This siting flexibility will enable the applicant to revise project design in response to identification of sensitive resources such as Butte County morning-glory. The commenter also notes that final facility siting must be submitted to the California Department of Fish and Game and Shasta County Department of Resource Management and approved by both agencies prior to granting of the use permit. As stated in Mitigation Measure BIO-2 in the Draft EIR, the applicant must conduct detailed surveys for Butte County morning-glory at the time of year it is identifiable. Delaying issuance of the use permit until final design documents have been completed will not change the outcome of the mitigation measure, but it will create an unnecessary delay for the project proponent. Moreover, final design should consider the results of the surveys.

## Response to Comment OG7-48

Please refer to the response to Comment OG7-8. According to CEQA, for a project to be viable, it must meet *most* of the stated project objectives, not *all* stated objectives. As indicated throughout the entire Draft EIR document, most of the project objectives have, in fact, been met by the project as outlined.

## Response to Comment OG7-49

In evaluating project alternatives, CEQA requires only that a proposed alternative meet most of the stated objectives (CEQA Guidelines 15126.6 (a)).

The County has prepared what it considers to be a thorough and complete investigation of all feasible alternatives to the proposed project, in full compliance with the spirit and intent of CEQA. An appropriate level of rationale and analysis was provided in both the supplemental alternative screening analysis and the Draft EIR.

## Response to Comment OG7-50

Please refer to the responses to Comments OG3-6 and OG3-7.

## Response to Comment OG7-51

The commenter provides additional information from a single manufacturer of VAWTs. Please refer to the responses to Comments OG3-5 and OG3-6.

## Response to Comment OG7-52

CEQA requires that alternative sites be evaluated based on the following criteria: environmental impacts; suite suitability; economic viability, social and political acceptability; technological capacity; availability of infrastructure; General Plan consistency; regulatory limitation; jurisdictional boundaries; and whether the proponent could reasonably acquire control, or otherwise have access to an alternative site. (State CEQA Guidelines Section 15126.6(f)(1).

Because the proposed project would result in significant and unavoidable impacts that cannot be fully mitigated, the County chose to evaluate alternative sites. A reasonable attempt to locate a suitable site for the proposed project was conducted and the results of this assessment are provided in the Draft EIR. Lacking confidential information from wind energy companies seeking sites, finding a site comparable to Hatchet Ridge was difficult, but several possibilities were identified. Ultimately, an *alternative site* alternative was rejected due to the high number of variables that exist in the selection of a site (beyond the purview of the Draft EIR) and because there was no clear evidence that the significant and unavoidable impacts on avian and visual resources would be mitigated by selecting another site.

## Response to Comment OG7-53

The commenter suggests that by placing the turbines "down-slope" from the ridge, avian mortalities would be reduced. However, the reference to "down-slope" is spatially unclear. Because Hatchet Mountain is a ridge, "down-slope" could be construed to refer to either side of the ridge. In support of the recommendation to move the turbines "downslope", the commenter cites studies from two operating wind farms as well as the CEC guidelines. These studies do not suggest that moving turbines "down-slope" would reduce avian impacts, but rather that placing turbines "away from the edge" reduces avian impacts. This is because winds coming in contact with the mountainside result in updrafts that raptors and other birds use to soar. The proposed project design places the turbine string as far from the southwestern edge of the ridge as possible in conformance with the CEC guidelines and the studies cited by the commenter. Avoidance of this edge is most beneficial because the prevailing wind is from southwest to northeast. Moving the turbines "down-slope" to the southwest would put them nearer the area where raptors are likely to be soaring on updrafts. Moving the turbines to the northeast is not feasible due to the steep dropoff on that side of the ridge.

## Response to Comment OG7-54

Please refer to the applicant's supplemental information provided in this Final EIR (Hatchet Ridge Wind, LLC Jan. 28, 2008). On record, the applicant deemed a smaller project alternative infeasible.

## Response to Comment OG7-55

Please refer to the applicant's supplemental information provided in this Final EIR(Hatchet Ridge Wind, LLC Jan. 28, 2008). Neither a phased project alternative or a VAWT design alternative was deemed feasible by the applicant on record.

## Response to Comment OG7-56

Please refer to the response to Comment OG6-9.

## Response to Comment OG7-57

This comment will be included in the administrative record for the project, available for review by the Shasta County Board of Supervisors. The impact analyses do not indicate that this project is a Category 4 project according to the CEC guidelines. In addition, Mitigation Measure BIO-6 requires the project proponent to continue adjusting operations until mortality rates remain below threshold levels for 2 consecutive years.

## Response to Comment OG7-58

The Draft EIR indicates that no feasible mitigation to reduce avian mortality *to a less-than-significant level* exists. However, mitigation does exist, and is required in the revised Mitigation Measure BIO-6 (see Chapter 3 of the Final EIR), that would result in the reduction of avian mortality to below threshold levels at which population-level effects might occur. As stated in the response to Comment OG7-10, the commenter's definition of "functional" mitigation is unclear. The opinions of the Wintu Audubon Society become part of the administrative record for this project.

## Response to Comment OG7-59

Mitigation Measure BIO-6 has been revised to include measures that would have to be implemented to reduce mortality rates, as did the original version in the Draft EIR.

## Response to Comment OG7-60

Comment noted. As noted above and in the revised Mitigation Measure BIO-6, the mortality monitoring study is designed to determine if mortality thresholds at which population-level effects could occur are being met or exceeded. If the mortality thresholds are met or exceeded, then measures are required that would reduce the level of mortality. Additional measures must be implemented incrementally until avian mortality levels remain below threshold levels for 2 consecutive years.

## Response to Comment OG7-61

Comment noted. There is no information to suggest that the suggested mitigation reduces avian mortality. Most studies conducted to date indicate that this measure would have no effect.

## Response to Comment OG7-62

See the response to Comment OG7-17.

## Response to Comment OG7-63

See the response to Comments OG3-6, OG3-7, and OG7-17. Impacts on aesthetics and visual resources (including the effects of lighting) are disclosed in Section 3.1.2 of the Draft EIR. Moreover, Section 2.6.4 of the Draft EIR specifies that site lighting would be designed to minimize light scatter beyond the necessary footprint for function and security purposes.

## Response to Comment OG7-64

See the response to Comment OG7-15.

## Response to Comment OG7-65

Please refer to the response to Comment OG7-20.

## Response to Comment OG7-66

Please refer to the revised Mitigation Measure BIO-6 in Chapter 3 of the Final EIR.

## Response to Comment OG7-67

See the response to Comment PA1-8 and revised Mitigation Measure BIO-6 in Chapter 3 of the Final EIR.

## Response to Comment OG7-68

There is minimal information on any nearby potential wind energy sites. There are no other known proposals in close regional proximity that are reasonably foreseeable.

## Response to Comment OG7-69

Comment noted.

## Response to Comment OG7-70

Comment noted.

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