SIERRA CLUB GUIDELINES ON TRANSMISSION AND LARGE SCALE RENEWABLE ENERGY PRODUCTION ON PUBLIC LANDS

CONTENTS

Introduction—Context for Guidelines on Utility Scale Renewable Energy Projects and Transmission on Public Lands

Transforming the nation's electricity sources from dirty fossil fuels to clean renewable energy is an essential part of meeting Sierra Club's climate goal of 80% carbon reduction by 2050. This is an extremely ambitious goal and will require huge changes in all our energy uses, from electricity to shipping of goods to transportation and more.

The Club is working to rapidly increase our nation's energy efficiency and use of renewable energy by advocating improved appliance and buildings efficiency as well as a rapid ramp-up of both distributed generation (mainly rooftop solar) and large scale renewable energy including solar, wind and geothermal generating plants. We believe all of these will be necessary to meet our very ambitious, but critical, climate goal. While over time rooftop solar may overtake large-scale facilities, in the short term we must not only advocate for both, we must respond to the many proposals for large scale renewables and transmission that are already underway to minimize their impacts on wildlife, air and water quality, and other important environmental values. [Note: Sierra Club is working with energy experts to analyze how much large scale renewable energy we will need to reach our long-term 80% reduction by 2050 goal, and within that, how much public land will be needed for renewables production, as well as how much energy efficiency and community solar and wind can contribute; we hope to complete that analysis by later this year (2010).]

The purpose of these guidelines is to help Sierra Club members, committees, Groups, Chapters, and campaigns be effective in advocating for the responsible and appropriate siting of renewable energy facilities on public lands. We recognize that siting large-scale renewable energy generation and transmission is only one part of the transformation needed

in our energy systems,, but it's an important piece and one in which the Sierra Club has a unique role to play.

These guidelines represent a shift in the traditional Sierra Club approach to developments located within a Group or Chapter. In the past, except for litigation, most Groups and Chapters have been free to oppose projects within their territories so long as the opposition was generally following Club conservation policies. Now, we have an overarching goal of reducing global warming--and thus a compelling need to support renewable energy. At the same time, we maintain our 118-year commitment to protecting natural ecosystems and treasured landscapes. So we are seeking a balance: we will support some large scale renewable plants; we will try to avoid, minimize, or mitigate the impacts and thus support or be neutral on a second set; and we will oppose some projects where the conflicts with wildlife and other environmental values are simply too high.

While these guidelines focus on public lands, the impacts of such facilities will be similar on private lands. In general, we are working to try and site projects on degraded private land, but in some rare cases we may decide that resource impacts are too great even there. **In either case, Chapters should consult the Large Scale Renewables Review Committee before taking a position on any large scale renewable projects or transmission proposals in their region.**

Context: the need for some large-scale renewable energy facilities

Large-scale renewable energy development presents the challenge of new land-consumptive activities with potentially significant impacts on public lands. Without careful planning, significant areas of affected ecosystems may be fragmented, degraded and lost, along with the species that inhabit them. Large-scale renewable energy generating and transmission facilities can create and leave serious impacts on the land where they are sited. Some of these technologies such as solar thermal plants require large amounts of land and minimize or eliminate the possibility of other ecosystem functions where they are sited both in the present and the future as well. Other technologies such as wind farms may impact complete ecosystems less but have significant impacts on certain species including birds and bats.

Given the potential impacts of renewable energy technologies, some individuals and groups have chosen to oppose all renewable energy development on public lands.

However, the Sierra Club recognizes that global warming is the most serious environmental threat facing our nation and planet today. Having failed so far to make the significant, necessary changes to curb global warming, we face a planet-wide crisis of almost unfathomable proportions. Therefore, we must act quickly and decisively to reduce carbon emissions through a revolution in energy systems. Failure to turn this tide threatens much of the conservation work we have done for over a century. According to the Intergovernmental Panel on Climate Change, business as usual -- climate change combined with overuse of resources and direct destruction of habitat -- will result in the loss of up to one-third of all species on earth by the end of this century. Some ecosystems will suffer more than others. A single degree Celsius increase in the southwest deserts could result in the loss of 20% of species found there, according to climate scientists.

It is not a simple thing to make radical shifts in our nation's energy systems—in this case, electrical energy production and distribution—in a short period of time. Ideally, we must move rapidly as a nation to maximize energy efficiency in all economic sectors and rapidly deploy small-scale solar and wind while we close coal and oil burning power plants. Distributed generation, such as rooftop solar photovoltaics, is preferable to centralized generation in its dramatically lower level of impacts. However, although changes are occurring in technology and price, even the most ambitious assumptions of growth suggest rooftop solar alone won't be able to meet our goals for minimizing global warming in a very short timeframe. Therefore, we believe that some centralized utility-scale renewable energy production and associated transmission will be an essential part of the transformation we need. Finding the balance between renewable energy development and land conservation is a significant challenge for us as we take on the responsibility of avoiding the worst impacts of climate change.

In sum, we do endorse some utility scale renewables on public lands. But at the same time, the Sierra Club is pushing aggressively for policies that will enable much greater energy efficiency and use of distributed generation (smaller scale, localized production as in rooftop solar) of renewable energy in cities, states and nationwide. Together these changes will lessen our need for large-scale generation as they come online. We

are also working hard, with significant success, to stop and eventually eliminate coal plants and other fossil fuel power generation. Chapters are encouraged to assess the energy needs of their regions, including the opportunities for distributed (rooftop) and centralized generation, in order to **both** maximize the conversion to clean and renewable energy sources while retaining existing unroaded* and critical habitat areas and increasing the amount of land and habitat

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*The term “unroaded” is universal and is intended to describe all lands in a “natural,” “near natural” as well as a “less developed” condition, whether they have been inventoried as “roadless” by a government agency or not. in protective status. Success depends on attaining both goals simultaneously. [For more information on how Sierra Club activists all over the U.S. and Canada are working on renewable energy and energy efficiency through the Cool Cities program, go to: http://www.coolcities.us/. For more information on how to get involved in state utility planning work, or state legislation to increase efficiency and renewables, contact your state Sierra Club lobbying office.]

Sierra Club activists and staff are also urging the Obama administration to clarify system-wide goals for public lands’ contribution to solar, wind and geothermal resources and transmission, so that we can all understand and influence the scale of development. This is extremely important because, until now, there has been a proliferation of applications to develop these technologies with no clear plan or guidance on how the agencies, particularly the Bureau of Land Management (BLM) in the case of solar, should proceed or prioritize applications. We are also encouraging appropriately sited large-scale renewable facilities on private, disturbed (i.e., already degraded, roaded, developed, ecologically compromised or fragmented) lands.

Finally, we are working to analyze how much large-scale renewable electric generation and transmission should contribute relative to the goal of stabilizing atmospheric CO2 levels. An overall understanding of how much will be required will inform our response to the critical question of how many projects are needed, and in what locations, as we move forward.

Since some large-scale renewable energy projects will be developed on public lands, we will work to site those facilities on lands with the fewest impacts on ecosystems, air and water quality, and wildlife, and will focus on protecting lands needed for ensuring habitat resiliency and wildlife migration corridors in a climate-changed environment. We will also work with state and federal agencies to clarify the actual necessary contribution of renewable energy from public lands.

Regardless of what kind of large-scale renewable facilities are proposed in your Chapter or Group location, the number one piece of advice we offer is this: get involved as early as possible in the siting decision-making processes, learn about the proposed technologies and their potential impacts on the land, and reach out to others who are working on this issue. While some of the proposed facilities represent the first time these technologies have been used in the U.S., a lot of information is available from experiences both here and abroad. Also, many other national and regional conservation organizations are focused on siting these facilities in an environmentally responsible way and can be your allies.

The Sierra Club's approach to large scale renewables on public land

In focusing on climate change, the Sierra Club has made a conscious decision to diverge somewhat from our traditional focus when presented with large new developments, particularly on public lands. Historically we have opposed a large percentage of development proposals. With mining, logging, or oil and gas development, that approach was and still is valid. But given the climate crisis, we are looking at proposed renewable energy developments through a different lens, one which sees the need for major new renewable facilities, but also seeks to preserve our public lands to the greatest extent feasible. This means we are actively advocating that renewable energy be sited on private, disturbed land wherever possible. But it also means we are open to supporting or remaining neutral on some proposals for renewables on public land that have certain characteristics that are discussed below.

Our experience to date suggests that most projects proposed on public lands will fall into one of three main groups.

1) Disturbed land: this group includes places where the land is already fragmented, degraded, roaded or otherwise has a lower value for the

purpose of providing ecosystem services including producing clean water, essential habitat, migration corridors and other important purposes. These are the kinds of places where we will generally try to encourage renewables development.

2) On the other end of the spectrum are those locations that are simply too ecologically important to be developed. These include lands statutorily or administratively off limits to such development including wilderness, national parks, other congressionally protected areas, and administratively protected lands. This category may also include endangered species habitat, rare plant communities, migration corridors for wildlife, aquatic values, and other features that make them inappropriate candidates for large-scale development. Projects on such lands will be opposed.
3) The last group of proposed locations presents the most challenges to us—places that have some important ecosystem values, but where the negative impacts may be mitigated or otherwise addressed if development is done sensitively.

The following criteria have been developed so that we can methodically assess proposed renewable energy facilities and transmission by first grouping them into one of these categories and then working to eliminate or minimize impacts of those projects in the third category.

Criteria for Siting Large Scale Renewable Energy Facilities on Public Lands

The criteria below apply to solar, wind, geothermal and transmission proposals on public land. They represent an overall guidance on where to prioritize projects, where they are not acceptable, and where they may be acceptable if appropriate avoidance and mitigation measures are applied. Additional specific guidance will be found relative to each technology in the subsequent sections. For example, under the wind section, you will find more details on avoiding bird and bat mortality through proper placement and operation of turbines.

While the criteria listed below are not ranked, they are intended to inform planning processes and were designed to provide ecosystem level protection to critical public lands (including Department of Defense (DOD) lands) by giving preference to disturbed lands, steering development away from lands with high environmental values, and avoiding large undeveloped

cores. These criteria were developed with input from field scientists, land managers, and conservation professionals and fall into two categories: 1) areas to prioritize for siting and 2) high conflict areas. The criteria are intended to guide renewable energy and transmission development to areas with comparatively low potential for conflict and controversy in an effort to help the U.S. meet renewable energy goals in a timely manner.

Regardless of the application being evaluated, we advise everyone to become involved in the siting process as early as possible. It is to our advantage to prevent big investments in high-conflict areas as soon as possible, and to steer development to areas with the fewest environmental impacts. Research on possible conflicts is critical in the early stages. Although it may not be conclusive or adequate for development of an Environmental Impact Statement (EIS) pursuant to the National Environmental Policy Act (NEPA), it will flag potential problems such as endangered species.

Further, we recommend that Chapter or Group leaders visit the site and observe the condition of the land, plant life, water features if any, and other aspects of the location. While much wildlife and even their signs (tracks, burrows, etc.) may remain invisible, a firsthand feel for the location can help you properly understand where the proposed development would be and how it might impact the local ecology. Please see Appendix B, “Ground-truthing,” for more ideas on what to look for on a site visit. Appendix C, “Working with the Club’s Environmental Law Program,” provides helpful guidance on how to effectively engage from the first notice of a proposed energy facility.

Areas More Likely to Be Acceptable for Renewable Projects

Below are locations where (recognizing that every site is unique), we generally should be able to support or remain neutral on proposed renewable energy facilities.

- Lands that have been mechanically disturbed, i.e., locations that are degraded and disturbed by mechanical means such as agricultural lands.

- Public lands of comparatively low natural value located adjacent to degraded and impacted private lands, outside landscape-level core areas and connecting corridors.
- Brownfields (idle or underutilized industrialized sites).
- Locations adjacent to populated areas.
- Locations near existing roads and that minimize the need to build new roads.
- Locations that could be served by existing substations and local transmission facilities.
- Areas proximate to sources of municipal wastewater for use in cleaning.
- Locations relatively close to load centers (major population and/or industrial centers).
- Locations adjacent to federally designated utility corridors with existing major transmission lines.

High Conflict Areas to Avoid

The following criteria define areas that are clearly off limits under current Sierra Club policy, as well as other areas of concern that should be evaluated as part of a specific on-site review.

According to the Sierra Club Energy Policy,

> "The Sierra Club opposes energy development on public and private lands and in waters that are currently protected by legislative or administrative designations or that the Sierra Club has proposed for special designation based on specific environmental or wilderness criteria. Exceptions are allowed only where the proposed development can be shown to have insignificant effect on the resources for which the special designation was, or would be, established. This overarching consideration applies to all energy resources covered in this policy."

The high conflict areas covered by the Energy Policy include:

1) Areas statutorily or administratively protected from major development, including (but not limited to) the following federal and state protected lands:

a) National Parks and Preserves, Recreation Areas, Marine Sanctuaries
b) Designated Wilderness Areas
c) Designated Wilderness Study Areas and lands managed for wilderness characteristics
d) National Historic Sites and Historic Parks
e) Inventoried Roadless Areas (by agency) and other significant unroaded areas
f) National Monuments
g) National Conservation Areas
h) Areas of Critical Environmental Concern
i) Designated Critical Habitat Areas
j) National Historic and National Scenic Trails
k) National Wild, Scenic, and Recreational Rivers, both designated and recommended
l) National Wildlife Refuges
m) Administratively withdrawn areas
n) State Parks
o) Other state lands designated or proposed for designation to protect conservation values

2) Locations designated or proposed for designation to support sensitive biological resources, including
   a) critical habitat (other than designated under the Endangered Species Act)
   b) significant[1] populations of federal or state threatened and endangered species, including candidate species under federal or state law[2]
   c) significant populations of sensitive, rare and special status species as recognized by federal and/or state agencies
   d) rare or unique plant communities as defined by state native plant societies or by federal, state and county agencies
3) Wildlife habitat management areas protected by states, counties or other governmental entities
4) Designated and proposed state conservation reserves

[1] Determining "significance" requires evaluation of population size and characteristics as well as linkage.
[2] Some listed species have no designated critical habitat or occupy habitat outside of designated critical habitat. Locations with significant occurrences of federal or state threatened and endangered species should be avoided even if these locations are outside of designated critical habitat or conservation areas in order to minimize take and provide connectivity between critical habitat units.

5) Lands purchased for conservation including compensation lands purchased for mitigation directly by the BLM or transferred to the BLM by other parties
6) Proposed Wilderness Areas, proposed National Monuments, and Citizens' Wilderness Inventory Areas
7) Wetlands and riparian areas, including the upland habitat and groundwater resources required to protect the integrity of seeps, springs, streams or wetlands and species dependent on them
8) National Register eligible sites and other cultural resources as identified by archaeologists, tribes, etc. See appendix G for further guidance on cultural resources.

Locations within two miles of National or State Parks unless they already have one or more impacts as described above under "Areas More Likely To Be Acceptable For Renewable Projects.

Resilient Habitats protection areas

Other areas that do not fall strictly under the terms of the Sierra Club Energy Policy may be critical to the Resilient Habitats component of the Sierra Club's Climate Recovery Campaign Partnership (http://clubhouse.sierraclub.org/conservation/climate-recovery/habitat-resilience.aspx). This campaign focuses on the reality that climate change is already affecting numerous species and ecosystems. Wildlife must adapt, move, or expand habitats in order to survive these changes. Protecting resilient habitats will provide species with as many options as possible to adapt successfully when habitats are modified through climate change.

Areas vital to protecting habitat resiliency include landscape-level core areas, buffers and connecting corridors, which are required for the continued functioning of biological and ecological processes. In many cases these may not have been identified, inventoried or defined yet, although scientists are studying these processes.[3]

[3] Landscape-level cores, buffers, and linkages provide secure habitat and connectivity between species populations, ecological process corridors (e.g., desert sand movement corridors), and climate change adaptation corridors. Core areas provide the ecological integrity necessary to sustain the diversity of life and the ecological services that diversity makes possible for humans. Buffers maintain a degree of ecological integrity for the core and corridors while providing some economic uses that are compatible with the ecological network as a whole. Corridors provide connections between the large core areas. The long-term viability of existing populations may be dependent upon habitat, populations or processes that extend outside of their boundaries. While it is possible to describe current wildlife movement corridors, the problem of forecasting the future locations of such corridors is confounded by the

- The primary defining characteristic of core areas is their unroaded status, which is frequently a surrogate for pristine and/or high quality habitat. Such places will include designated wilderness, national parks, administratively withdrawn areas managed for roadless character, and other unroaded lands similar to the types of places identified in the Energy Policy. Their key feature is that these areas will be large and situated together. Core areas should be considered high conflict areas.

- Buffers are areas adjacent to core areas and corridors that soften the impact of development and where some non-climate stressors are likely present. These areas may include both public and private ownership.

- Corridors may be largely wild or may be buffers which, via specific modifications, can provide critical wildlife linkages between the large core areas. Wildlife movement patterns in a climate-changed environment may not be currently defined. These areas may include both public and private ownership.

Both buffers and corridors which may also serve as a buffer should be evaluated on a case-by-case basis for low-impact siting of renewable projects while recognizing that organic and non-industrial agriculture often maintains habitat for some species.

Determine if a science-based blueprint for creating resilient habitats exists or is being developed for the project area being considered for siting. Use this plan to help determine if the siting development is compatible with resilient habitat considerations in a future climate-changed world where ecosystems and habitats are shifting and reassembling.

Determine, if possible, if the siting will be compatible with likely ecologically based habitat manipulation such as prescribed burning, captive breeding

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lack of certainty inherent in global climate change. Hence the need to maintain broad, landscape-level connections. To maintain ecological functions and natural history values inherent in formally designated areas (i.e. parks, wilderness and other core areas) trans-boundary ecological processes must be identified and protected. Specific and cumulative impacts that may threaten cores and vital corridors and trans-boundary processes must be avoided.

and reintroduction, control of pests or disease, and other management options.

[For more information on the Sierra Club Resilient Habitats Campaign, please follow this link: http://connect.sierraclub.org/post/ClimateCrossroadsBlog/what_is_resilient_habitats_part_1.html]

To sum up:

Support or remain neutral: Degraded habitats, places with low natural values, areas adjacent to development.

Proceed with care: Areas that may be suitable for some compatible developments, including buffers or places with species of concern that do not qualify as critical habitat. These may provide opportunities to site certain projects with fewer conflicts than others in areas with excellent renewable resources.

Proceed with extreme caution: Any area in numbers 7 - 9 of the High Conflict areas, plus wildlife corridors (including resilient habitat corridors), should be scrutinized with great care.

Oppose: Large-scale renewable developments in any area in numbers 1 - 6 above, plus resilient habitat core areas (significant unroaded areas, whether inventoried or not, including lands managed by the BLM, Forest Service or other government agencies), should be deemed to nearly always be off limits, where, in the words of the Energy Policy, “Exceptions are allowed only where the proposed development can be shown to have insignificant effect on the resources for which the special designation was, or would be, established.”

Applying the Criteria

The first step in determining our position on a proposal will be to apply these criteria to the area proposed for development. For example, if the proposal is located in critical habitat for a designated threatened or endangered species and is in an unroaded area within a Citizens Wilderness Proposal, then it’s pretty clear that this is a proposal we will

oppose. Projects on lands that have been recently farmed, have been permanently degraded by livestock grazing, or have been plowed, bulldozed or otherwise abused by mechanical impact, plus where there are no species of special concern or other conservation designations, may be relatively non-controversial.

Many projects will fall in between the above extremes. For these, we will need to be thoughtful in applying and responding to the criteria.
For example: A solar thermal project is proposed on several thousand acres of BLM lands near roads and transmission corridors. While much of the project area has no special designations and does not contain significant species, wildlife corridors, water features, etc., about a quarter of it contains some rare plant communities that include state species of special concern. How do we respond to a project like this?

Our first step is to read the documentation and then visit the site. By ground-truthing (see related Appendix B), we can get a better feel for the location and potential problems with the siting plans. As noted earlier, project applicants are often more than willing to take you to the site to show you where they want to build and discuss potential impacts and/or proposed mitigation they are already contemplating. We may also want to talk to the local land managers, state and federal wildlife agencies and other environmental groups. We should explore how to address possible damage that this development may cause, either by **avoidance** (not disturbing a particular area) or **mitigation** (making up for the damage by land and resource protections on a similar site elsewhere in the same ecosystem). Mitigation could be achieved through private land acquisition of fee title or conservation easement and ongoing protection; or possibly through intensified management on public lands (see Mitigation and Avoidance Considerations, Section 8).

In a case such as this, it may be that the plant communities are scattered randomly throughout the acreage, which would be more difficult to address. But it may be that plants are concentrated in one corner of the site, so there may be another area of the site where impacts would be reduced or avoided altogether. Requiring fencing and a monitoring plan could address any remaining issues. Alternatively, there could be places on private land nearby that could be purchased for mitigation and properly managed to maintain these plant communities.

Thus, in this middle group of projects, our approach should be to work to find solutions to real, but not insurmountable impacts. Of course, in some cases we will succeed in getting the proponent to pursue solutions; in other cases, we won't. It may be the impacts are so significant that we will still oppose the project. In that case, it may be possible to suggest an alternative location. See Working with the Legal Team (Appendix C) for more guidance and information.

Large scale solar development

Solar technologies

Most large-scale solar development proposals on public land are in the Southwestern states, where the most intense sunshine in the nation is found. The solar resource in the southwestern U.S. is arguably the best in the world and has the added value of being located close to population centers needing power. Large-scale solar plants produce electricity during the day and in early evening, which can offset the need to build or operate fossil-fueled "peaker" plants that provide electricity when demand and strain on the system are greatest.

The technologies utilized in large-scale solar fall basically into two categories: solar thermal and photovoltaic, or PV.

Solar thermal plants use mirrors to concentrate sunlight to heat a fluid to create steam to move a turbine or power an engine that drives a generator. Some include a system for storing the heat, enabling the facility to continue to produce electricity even at night or during cloudy periods. While there are several types of concentrating solar (linear concentrating solar power, dish/engine systems, and power tower systems), their impacts are similar on the land. They require substantial acreage (around 7-8 acres per megawatt {MW} of energy produced in the best resource areas), all of which is stripped of any native vegetation, graded and replaced with solar generation equipment.

In addition to the acreage devoted to mirrors, connecting roads, transmission, support facilities, and substations are required. To be most efficient, solar thermal requires water for evaporative, or wet cooling. Dry cooling technologies are available but are slightly less efficient; due to the scarcity of water in some environments, dry cooling may be required in

some states. There are also some hybrid technologies which use wet cooling only in the hottest months of the year. Water is also needed for mirror cleaning, although that is relatively little in comparison to the needs for cooling.

“Power tower” technologies include a large tall tower upon which sunlight is focused by numerous mirrors that encircle the tower, following the sun’s rays throughout the day. While some power tower facilities have allowed ground cover to grow and thus some habitat to remain, most companies remove all vegetation.

Photovoltaic (PV) arrays convert solar energy directly into electricity through individual cells made of semiconductor materials. Large PV arrays include thousands of individual cells arranged together. PV systems do not necessarily require the complete removal of all surface vegetation because they are usually mounted above the ground and angled toward the sun’s greatest light, but lands are generally graded and herbicides may be used to keep vegetation below the surface of the PV arrays. Chemical dust suppressants may also be used. Roads must be built during construction and kept open for maintenance once the facility goes online, and transmission and substations must also be built.

Solar technologies are rapidly developing and over time, some will emerge as most efficient in acres required per megawatt of power produced as well as in water used. At this point, the Fresnel lens system is most land efficient, with other solar trough systems close behind; power tower and Stirling systems use more land per megawatt. Thermal systems with dry cooling or photovoltaics are most water efficient. We do not rule out other technologies but prefer those that are most efficient in both land and water use. We will attempt to keep this guidance updated accordingly.

Wildlife surveys are critical

Surveys of sites proposed for large-scale solar should be done several different times during the year, particularly for threatened, endangered and sensitive species. Unfortunately, in a dry ecosystem some species are only present or active for a few weeks each year. In dry years, some plant species will not appear at all, although viable root systems are present underground.

Impacts of large scale solar developments

Construction impacts include removing vegetation, disturbing habitat and soil, as well as degrading air quality. Air quality impacts occur when heavy construction equipment emits dust and particulates during grading and road construction.

Solar thermal and PV facilities are high-impact projects because they remove all or most of the existing vegetation which in turn can be devastating to habitat. In addition, depending on the technology, some projects require high water usage in a dry desert environment. As a general rule we recommend that only dry cooling technologies be used in desert areas, particularly in locations with sensitive and rare water features such as springs, seeps and streams. Using wet cooling may be more appropriate if the developer has access to degraded wastewater from industrial, agricultural or municipal use. There may be a limited number of other cases where wet cooling may be an acceptable solution; for example, if a developer bought water rights previously used for growing alfalfa, utilized only half and retired the rest of the water rights permanently, thus resulting in a significant net reduction in water use.

While all large renewable projects should include plans for restoration, on a practical level, complete restoration may never be possible in sensitive locations, especially where significant grading and leveling has occurred. Thus, when considering impacts from these facilities, we should presume that full restoration will be difficult and unlikely. This underscores the importance of finding more disturbed sites and sites that have already lost some habitat values as better suited for large-scale solar.

Cumulative Impacts

The impact of multiple solar facilities in a specific area can be significant, particularly to threatened or endangered species such as the Mojave population of desert tortoise. For this reason, it is essential to focus development on locations with the lowest wildlife and sensitive plant values possible. As you assess solar proposals, be aware of other nearby projects and how their impacts will affect the one before you. How will they together affect the watershed, the drainage patterns, and other features? Keep in mind that in some cases, it may be preferable to site more than

one project in an area with few resource conflicts in order to prevent their proliferation across the landscape in more sensitive areas.

Through comments on the Solar Programmatic Environmental Impact Statement (Solar PEIS), and other policies, Sierra Club volunteers and staff are working to convince agencies such as the BLM to weed out speculative solar proposals and to steer all solar development on public lands in the Southwest to those with the lowest habitat values. For more information on the Solar PEIS, go to: http://solareis.anl.gov/.

Large scale wind development

Wind energy is the most mature and widely distributed renewable energy technology in the U.S. Major wind regions include the northern and southern plains, Texas, the Pacific coast states, the upper Midwest and the Atlantic coast states from Maine to the Carolinas. (Note: Offshore wind issues are being addressed by a separate task force, the Offshore Renewables and Transmission Siting Taskforce, and will not be included here.)

Large-scale wind turbine groupings, often called wind farms, can have significant impacts on populations of plants as well as on birds, bats and other animals. How, where and when equipment is sited and operated can help minimize these impacts.

The most publicized impacts of operating large-scale wind turbines are to birds and bats through collision with moving turbines, which leads to almost certain mortality. There is also some evidence that bats are affected by barotrauma (rapid pressure change that causes tissue damage or pulmonary hemorrhage) related to the change in air pressure near the moving turbine blades. Other species including small mammals and plants may be impacted by ground disturbance, during migration, and from other impacts of construction and operation.

Importance of surveys and monitoring

Thorough surveys of birds, mammals, plants and other wildlife are an essential first step in avoiding impacts. This includes surveys in all seasons to capture migration periods and fluctuations in population depending on the season. Surveys should be done at night as well as

during daylight as migration, particularly of birds, often happens at night. Since less is known about impacted species such as bats, monitoring is very important to determine the baseline presence of bat species. Post-construction monitoring is also essential, and all monitoring reports should be subject to public review and made available on the internet.

Pre-construction impacts

Before any wind project goes forward, there should be at least three years' analysis of the wind resource as there can be wide fluctuations in annual wind potential. A necessary precursor to siting wind is measuring the wind direction and speed at all times of the day and night. Usually this is done by constructing a meteorological ('met') tower which records data. Unfortunately, met towers themselves can have negative impacts, including interfering with species that avoid any tall structure, such as sage grouse. Met towers, if used by perching raptors, can also be associated with increased predator take of small animals.

Regardless of whether wind energy is developed on a site, it is important to remove met towers and any associated roads and restore the lands when the study is completed.

Construction impacts

Many of the significant impacts from large-scale wind development occur during construction. Most wind farms include several large towers, each of which requires grading, vegetation removal and placement of a large concrete footing for the tower itself.

Gravel roads are necessary for construction and for regular access to the turbines for maintenance. Roads can help the project owner restore the land more cheaply and rapidly upon decommissioning. However, in locations where erosion and water contamination from runoff are issues, roads can also be problematic.

The towers that support today's turbines are huge, about 15-18 feet in diameter at the base and 400-450 feet tall. Turbine components must be transported in large, heavy vehicles, contributing to greater soil disturbance

on temporary roads and near the footprint of each turbine. Usually each tower is also enclosed within a fence during construction and operation to prevent vandalism or other direct access to the large towers. The actual footprint is between 3% and 7% of the overall site.

During construction, impacts include: soil disturbance and eradication of plant communities; disturbance of ground-dwelling animals including amphibians, mammals and ground-nesting birds; soil erosion; interference with large mammals such as pronghorn, elk and deer that prefer locations distant from roads; and interference with birds and bats, whether migrating or not. Some species such as sage grouse will likely be significantly impacted during all phases of wind projects, and are specifically addressed below under “operation.”

To assess construction impacts, consider how such impacts can or cannot be “undone” when and if the site is decommissioned. Large cut and fill road projects are difficult and expensive to restore, for example. Identifying ways to keep the construction impacts as minimal as possible will also allow the land to be restored more readily if and when the use for wind power is terminated.

Each major project also requires construction of a local electrical substation to connect the power from several turbines to transmission. The “gen tie” transmission from the project to the grid is typically buried underground, which makes the projects less of an eyesore.

Operation and maintenance of wind farms

After construction, some species and uses will be compatible with wind power operation. For example, many ranchers and farmers have welcomed wind power leases in order to help keep their farms viable. The U.S. Geological Survey has found that desert tortoises in California appear to be able to coexist with wind towers, which was a surprising result that requires further study. (See www.werc.usgs.gov/hq/pdfs/lovich2000.pdf.)

The most significant impacts of wind turbine operation are bird and bat mortalities and local extirpation of any animals that avoid disturbed lands, tall structures, roads, etc.

- Birds suffering mortality from moving wind turbine blades include raptors, songbirds (passerines), and others. Bird mortality has been severe at some locations, but changes to location and operation of turbines may reduce the toll.
- Sage grouse is a species of concern in many Western states with great potential to be negatively affected by large-scale wind projects. The primary issue with sage grouse is their avoidance of any tall structure in breeding, nesting, and winter habitats; thus, construction of meteorological towers, wind turbines and above-ground powerlines within this habitat is almost certain to reduce populations of this already declining species.
- Two species of migratory tree bats, the hoary and silver-haired bat, appear to account for 75% or more of wind power related bat mortality in the West. The reason for mortality is still under study, but most of it occurs during late summer and fall which coincides with their main migratory period. Much remains to be studied about bat locations, behavior, and migratory patterns.
- Large game animals including elk, deer and pronghorn can be affected by long rows of turbines along migration routes or in calving areas. In addition, elk and to some extent mule deer, avoid areas with roads or other human development.
- Small mammals can also be negatively affected by wind turbines.
- Lighting on turbines and met towers should be minimized. Federal Aviation Authority guidelines require structures over 200’ be lit for aviation safety. Current experts recommend that only a few turbines in a project be lit and that they use red strobes pulsing at 24 times per minute, which do not appear to attract birds. Lighting on related structures such as substations should be kept to an absolute minimum or removed.

Decommissioning and site restoration

Wind farm applicants' plans must address decommissioning and site restoration, although in the foreseeable future, most will not be likely to shut down. Plans will likely include road decommissioning, replanting with native vegetation, recontouring to return the land back to its original contours and of course removal of all structures, fencing and electrical equipment. In some locations, recontouring roads may be cost prohibitive so these landscape changes may become permanent.

Cumulative impacts

While one wind project may have minor impacts on bird and bat mortality, or other wildlife impacts, multiple wind farms within a region may have cumulative impacts that are significant on numerous species. It is critical to take into consideration these cumulative impacts in a region when analyzing proposed facilities. Such impacts may include bird and bat migration patterns, nesting, foraging, sheltering and roosting habits, and others. Further, although impacts tend to be understood related to specific turbines, the entire area encompassed among large groups of turbines may affect some species. Much remains to be understood about the larger scale impacts of wind energy. The internet is a good resource for scientific papers about impacts of these and other technologies.

Measuring and minimizing negative impacts of wind farms

While much has been said about improvements to turbine design to reduce bird and bat mortality, the rates of mortality appear not to change significantly with different designs. However, research over the past two decades has pointed to a number of siting and operational options that can greatly reduce wildlife impacts based upon where turbines are sited and when they operate.

- Monitor before and during construction and operation to to identify and minimize bird and bat mortality. Studies suggest that frequent surveying of footprint areas for dead birds and bats is important as they may quickly disappear due to scavengers. Monitoring should include a baseline analysis of the nocturnal migration of songbirds as well as any detected bat migration.

- Avoid raptor concentration areas. Much has been written about the high raptor mortality at Altamont Pass in northern California. By avoiding raptor nesting and migration corridors, raptor fatalities can be minimized. Through wildlife surveys, scientists can also identify where raptors spend their time searching for prey, and these areas can then be avoided for turbine placement.

- Avoid canyons, passes, and other migration pathways. Valleys, swales, and low passes have been found to be used most by migrating birds and should also be avoided.

- Require setbacks from windward rims. Various studies have shown high use by raptors of rim edge habitats. Required setbacks of 100 meters for turbines can help reduce loss of raptors.

- Require setbacks from grouse leks(a lek is a traditional place where males assemble during the mating season and engage in competitive displays that attract females) . The U.S. Fish and Wildlife Service recommends that wind turbines be sited at least 5 miles away from the leks of both sage and sharp-tailed grouse.

- Bury transmission lines within five miles of grouse breeding, nesting or winter habitats. Lines connecting a substation to the grid cannot be buried, so new transmission lines are a problem in these areas.

- Site turbines in open habitats at least one mile from woodland areas in order to reduce the likelihood of bat mortality. The main bat species known to be affected by wind turbines are woodland species. It is particularly important to completely avoid any old growth forest areas.

- Shut down turbines in late summer and early fall when bats are migrating and mortalities are highest.

- Require a minimum “cut-in” speed of six meters per second to avoid bat mortalities at slow turbine speeds (“cut-in speed” is defined as the lowest wind speed at which a wind turbine begins producing

usable power). There is a correlation between bat mortality and turbine operation during light wind speed.

- Study the impacts of wind energy facilities on large ungulates before construction in any of these areas. Not enough is known about the tolerance for wind energy facilities by large ungulates including elk, deer and pronghorn or the impacts on crucial habitats as well as migratory corridors.
- Construct wind facilities in a season when animals are not migrating in areas where these facilities intersect with critical ranges or migration corridors of large mammals.
- Close turbine areas to vehicles and human use during the period of habitation by sensitive species of wildlife.

The wind energy Programmatic EIS can be found on the following website: http://windeis.anl.gov/. American Bird Conservancy's detailed Wind Energy Policy and Guidelines can be found at: https://www.abcbirds.org/abcprograms/policy/wind/wind_policy.html.

Geothermal Electric Power Generation[4]

Geothermal production is among the most important of U.S. renewable energy sources because it is not intermittent as are wind and solar. Thus, it can supply base load power (power that runs all the time and can be "dispatched" to meet system reliability needs when the wind stops or clouds block the sun). Geothermal can complement solar and wind energy, enabling us to forego fossil fuel "peaking plants" to supply extra energy at times of highest electrical usage.

Geothermal technology

[4]Note: there are other forms of geothermal energy including direct use of geothermal heat in buildings and for other heating purposes including industrial drying and other applications. This section refers only to electricity generating geothermal facilities.

Geothermal power plants use groundwater that is heated by magma or heat emanating from the earth's core to produce electricity. Most existing U.S. geothermal plants are located in Western states where the geothermal resource is greatest. The resource is highest in areas with volcanic activity, places where the earth's crust is thin, or near plate boundaries. Since they are seismically active, these regions' underground rock layers may include moving magma or rock broken by frequent earthquakes; this frequently means water can travel through the underground rock and to the surface more readily. Features common to such areas are hot springs and geysers.

There are three types of geothermal electric plants: dry steam plants which directly use steam from underground to turn generator engines; flash steam plants which pipe superheated water from underground, "flash" or convert it to steam, and use the steam to generate power; and binary cycle power plants that transfer heat from pumped hot water to another liquid, which turns to vapor and then powers a generator.

A fourth technology known as "hot dry rock" has been used in a few locations but further research on its safety is needed. In this process, highly pressurized water is injected deep in the ground to create fissures in the rock layers; a recent project was three miles deep. The water, heated by the subsurface rock, is then brought to the surface as steam. Earthquakes generated by a project located in Basel, Switzerland have pointed to the need to proceed cautiously with this approach.

Which technology is used depends on the nature of the resource: if there is ground-level steam available dry steam can be used; if there is sufficiently hot water the flash system can be used; and hot water that is lower in temperature can be used in a binary system.

Impacts of geothermal power facilities

The impacts of geothermal energy generation depend on the technology used. The largest plant in the U.S., the geysers in northern California, releases 60 to 80 percent of the steam used to the air rather than reinjecting it into the ground. This releases air pollutants including hydrogen sulfide ("rotten egg" gas), and trace amounts of various minerals, some of which are toxic, such as arsenic and mercury. In other plants such

as one at California's Salton Sea, the hot water is full of dissolved salts which cause problems of corrosion and precipitation.

Closed-loop plants have zero air emissions and thus are the environmentally preferred technology. They are also the most renewable, because the water is returned into the ground and reused over and over again. At places such as the Geysers in California, ongoing escape of steam means that the resource is declining and eventually will be completely depleted. Thus, we should advocate closed-loop systems on all geothermal energy generating plants both to preserve the resource and eliminate toxic air pollutants and runoff.

As noted earlier, geothermal resources are often found on public lands in seismically active places, with land features that are prized such as hot springs and geysers. Yellowstone National Park, for example, would certainly have high geothermal energy production potential. Like Yellowstone, many such areas are already off limits to geothermal production by virtue of being in wilderness or national parks. Other places that are not off limits may have recreational, wildlife, and scenic values which would be impacted depending on where and how large geothermal facilities were. In addition, some geothermal proposals have been opposed by Native American tribes because they are in locations considered sacred.

All geothermal generating facilities can trigger earthquakes. Removing steam or water from underground increases stresses on underground layers of rock; most locations experience some small, shallow quakes in the vicinity of the facility while it is operational. The "hot dry rock" method may have potential to create more serious earthquakes because it is creating new instability in deep rock layers. Scientists largely downplay the potential to cause major new faults, but the jury is still out.

Geothermal plants require the use of added water, but it is on the order of five gallons per megawatt per day for geothermal plants—small, but in the arid west it could still be of concern. In addition, as noted earlier, some plants do vent potentially harmful gases including hydrogen sulfide, methane and ammonia.

Finally, transmission access is an important consideration. Some geothermal resources are in remote locations, and some are proposed in forested areas such as old growth forests, wilderness areas, unroaded

areas, and areas managed for certain species, where building new transmission to access it may be problematic. These are all considerations when assessing new geothermal proposals. However, in general, geothermal can pose a relatively small footprint, and local impacts may be low.

Cumulative impacts

With certain locations that have strong potential for more geothermal power production, such as northern Nevada, problems can arise if several geothermal facilities are simultaneously proposed. While lease areas tend to be large compared to the actual facility's footprint, potential impacts on migratory animals and other habitats should be studied prior to development through site-specific NEPA analysis. The BLM and Forest Service have jointly developed and completed a Programmatic EIS for geothermal leasing which is available at: http://www.blm.gov/wo/st/en/prog/energy/geothermal/geothermal_nationwide.html.

Transmission Planning and Development for Renewable Energy

Upgrades and changes to our national electrical transmission system are a necessary part of transitioning to a renewable energy economy. While energy efficiency and localized solar and wind (small wind turbines and rooftop solar panels, sometimes called "distributed generation" or DG) will be essential components of new energy, large scale solar, geothermal and wind resources need to be built in order to reduce greenhouse gas emissions as quickly as we can. These facilities must be built where the resource is—they can't be transported as oil, coal and natural gas are.

Large-scale renewable energy resources—such as solar in the Southwest, wind in the Rocky Mountains and Great Plains, geothermal in areas of thermal activity—tend to be located far from industrial and population centers ("load centers"). Although some of these areas already have nearby transmission, many will need upgrades and even new transmission rights-of-way identified and built.

Renewable energy is not like oil or coal, which can be burned any hour of the day or night to produce energy. Although some systems have storage capabilities, most solar energy is produced when the sun shines, and wind

when the wind blows. Geothermal energy taps into the heat beneath the earth's surface and is available around the clock. But because both solar and wind are intermittent sources, we need a "smart" electrical grid[5] which can send power to load centers when needed from whatever sources are available at that time. Thus, not only do we need some new transmission lines, we need to build the capability for managing energy flow in a more sophisticated way within regions of the country. Add to that caps on importing energy from new coal plants by states like California, and managing electrical flow becomes very complex. Fortunately, reducing demand through increased energy efficiency and small scale local renewable power systems can diminish some of the need for new transmission.

Some advocates propose that we develop a nationwide transmission system that can transport renewable electricity over thousands of miles, such as from giant wind farms in the Great Plains to distant East Coast cities. Such a system would be inefficient, because transmitting power over very long distances incurs line losses in direct proportion to the distance. In addition, it could lead to overbuilding transmission capacity, causing needless impacts. We support a more cautious focus on regional planning coupled with aggressive conservation measures, efficiency, and distributed generation. We want to be sure electricity is sufficient and reliable; we also want to reduce demand and minimize new infrastructure to what is truly necessary.

Planning for new transmission is occurring across the West and the nation, including statewide efforts, regional planning efforts like one initiated by the Western Governors Association, and other approaches including proposed federal legislation to upgrade the electrical grid. Although these processes are focused on developing rational plans, we can expect that even where state or regional plans are developed, individual utilities may still propose to build other new transmission facilities not included in any official plans.

[5] An "electricity grid" is not a single entity but an aggregate of multiple networks, power generators and operators employing varying levels of communication and coordination, most of which has historically been manually controlled. "Smart grids" increase the connectivity, automation and coordination between suppliers, consumers and networks for either long distance transmission or local distribution. A smart grid uses digital technology to save energy, reduce cost and increase reliability and transparency. A modernized electricity network combined with renewable energy resources and new transmission can help address energy independence, global warming and emergency resilience issues.

As environmental advocates analyzing the need for new transmission and related facilities, our job is to ensure that:

- any new transmission built is truly needed,
- new transmission minimizes local and regional environmental impacts,
- utilities expend significant resources developing efficiency and distributed generation so as to minimize the need for new transmission,
- new transmission purported to carry renewable energy must not instead turn out to be a major conduit for coal power, and
- environmental interests have a seat at the table wherever transmission decisions are being made.

There are many useful background materials on these issues and we recommend first reading "Smart Lines" by Western Resource Advocates (http://www.westernresourceadvocates.org/media/pdf/SmartLines_Final.pdf), which lays out in more detail issues related to siting new transmission in the West. For the purposes of this guidance, we are focusing on the issue of transmission planning and development that involves public land and that is being developed at least partially for carrying ('wheeling,' in utility-speak) renewable energy.

Utilities are regulated because they provide a basic public good and because early on, they developed into monopolies or near-monopolies. Congress passed laws to protect consumers from price-gouging and other unfair practices. Utilities fall into two basic categories, private and public. Private utilities ("investor-owned" utilities, sometimes called "IOUs") can be licensed to provide energy to the public and are normally regulated through state Public Utilities Commissions as well as through federal and state laws. They are allowed to make a reasonable rate of return on their investment in return for the public good of providing electricity at a fair value to consumers. Municipally owned utilities, such as Seattle City Light, are locally regulated and do not make profits in the usual sense of the word. Finally, some energy companies only produce power and sell it to utilities on the market. Their facilities are sometimes called "merchant" power plants.

Different kinds of utilities can operate quite independently from one another; furthermore, the private and public utilities can even have separate transmission systems. Without a history of sharing corridors or lines, one utility may propose an entirely new transmission corridor and line

to carry renewable energy to a city, despite the fact that a perfectly good corridor that is not built to capacity already exists next door to it and could be utilized instead.

As you and your Chapter or Group venture into these siting issues, you will learn more about how electrical utilities operate in the U.S. (see Appendix for additional resources to help you understand how the national electrical system works). Once you dig in, you will discover that the regulation and operation of our national electric energy system is not necessarily rational or efficient, as the example above illustrates. Moreover, there are many policies that have been developed for 20th century electricity needs and systems, and which are currently barriers to rapid deployment of energy efficiency, distributed generation and larger-scale renewable energy technologies. This guidance does not address all these barriers, but many Chapters are working on these issues around the country.

As noted above, numerous statewide and regional planning processes are underway to identify gaps in transmission, needed upgrades, and needed new lines for wheeling renewables. California's "Renewable Energy Transmission Initiative," for example, is a stakeholder process for transmission planning involving state agencies, utilities, renewable energy developers and environmentalists. Nevada has the Nevada Renewable Energy Transmission Access Advisory Committee (RETAAC), which is a planning group appointed by the governor to plan renewable transmission. Arizona has the Arizona Renewable Resource and Transmission Identification Subcommittee which just issued its final report in September 2009. In these larger planning arenas, if possible Sierra Club Chapters should try to be active players either as one of the stakeholders at the table, or as intervenors with public utility commission processes.

In addition to the planning processes, decisions concerning proposed transmission rights-of-way on public lands will always involve a NEPA process, generally by the lead agency such as BLM. These will drill down more deeply regarding actual, on-the-ground impacts, so that is a place our input is critical.

Impacts of transmission lines and related facilities

Transmission lines can have serious environmental impacts. Poorly sited, they may interfere with wildlife corridors, damage wetlands or other water sources, degrade culturally important lands, and cause other damage.

Many powerlines are fought primarily because of the visual impacts. This is important in iconic places, most of which already prohibit transmission, such as national parks and wilderness areas. Visual impacts alone are rarely a sufficient reason for the Sierra Club to oppose transmission that is needed to carry renewable energy to markets, because the role that renewable energy will play in reducing global warming provides a critical environmental benefit.

Transmission differs from our previous impacts discussions in that one project can cover a much greater area and variety of ecosystems than any individual solar, wind or geothermal project. In terms of siting, the same criteria are still useful to screen out places where transmission lines and towers are inappropriate. Our overall analysis and response to transmission projects is likely to be complex, as portions of a proposal may have insignificant impacts while in other areas, it may require rerouting to avoid key resources.

In general, the best places to locate new transmission are in existing transmission or transportation corridors. In many cases multiple utilities, such as a natural gas pipeline and transmission towers, can be co-located, which decreases cost as well as impacts. New transmission lines can sometimes be added to existing towers, significantly reducing added impacts. Another alternative often involves building a new line adjacent to existing lines.

Numerous impacts may result from construction, utilization and maintenance of new transmission, including larger substations. Transmission lines include construction of tall towers and extensive power lines that can cover hundreds of miles. They require roads both for construction and maintenance. In areas with vegetative cover including deserts, scrub and forests, utilities frequently remove all vegetation under powerlines using herbicides. New standards for reliability of lines, which has led regulators to require that they be spaced farther apart and has caused some utilities to remove large amounts of vegetation, are a concern we are working at a national level to resolve.

The following is not an exhaustive list but provides a good overview of what to look for when evaluating potential environmental impacts from new transmission proposals. In many cases, serious impacts can be avoided completely by changing the route to steer it away from high conflict areas and resources.

- Damage or loss of habitat for plants and wildlife, including sensitive, threatened and endangered species, can result from construction and maintenance of towers and roads. Sometimes these maintenance roads are opened to off road vehicles.
- Impacts may include removal of extensive areas of habitat to keep vegetative clearance under existing or new powerlines. This can interfere with protection of old growth and other species requiring forest cover; it can interfere with migratory patterns of wildlife; it can also involve use of herbicides that pollute local streams and watersheds. Important plant communities may be destroyed though use of herbicides as well. Understand the proposed methods to be used to control vegetation height under power line towers.
- Powerlines can cause harm to individual species such as sage grouse, which avoid any tall structure; and ungulates (such as deer, elk, pronghorn) which avoid powerlines and whose migration corridors may be disrupted as a result of new powerline construction.
- Significant air quality impacts can occur during construction through use of heavy equipment and their emissions as well as fugitive dust emissions; this is of special concern for regions in non-attainment for PM10 under the Clean Air Act.
- Water quality can be affected by improper placement of towers (too close to rivers, streams, wetlands and other water features), by runoff from herbicides and roads, or location on unstable soils or too-steep slopes.
- Soils may become eroded or compacted through construction, which can impact water quality as well as habitats of numerous species.
- Drainage patterns may be altered by construction of towers and roads.
- Indirect impacts from increased access to lands near powerlines, such as increased illegal off-road vehicle use, can damage multiple resources.
- Cultural, historic, and paleontological resources may be impacted by transmission construction and operation.
- Roads and other intrusions can increase the spread of noxious weeds.

Mitigation for large scale renewable projects and transmission

The Sierra Club support for renewable energy and transmission projects will in many instances depend upon how well impacts can be mitigated. Mitigation may take the form of private land set aside for habitat through purchase or easement, additional protections for habitat on public land, or mitigation funds used for a variety of purposes including increased monitoring, management or other actions to preserve habitat values. Evaluation of proposed mitigation must consider not only what is proposed to be protected and how it will be managed in the short term, but how strong the assurance is that, over time, areas set aside for mitigation will continue to be preserved for their habitat values.

Mitigation is a tool frequently used for private lands that ensures other, similar habitat will be protected if habitat is lost through development. However, this type of mitigation is difficult on public lands in the West for a number of reasons. In Western states where a large percentage of the land is federally owned, such as Nevada, there is unlikely to be any private land that can be dedicated to use for mitigation purposes. Also, some of the most important unprotected habitat may be on federal land; for example, some of the prime desert tortoise habitat in the Mojave Desert is located on U.S. military lands.

In view of the very large footprint of most large-scale renewable energy projects, the cumulative impacts of multiple proposed projects in some locations, and the impacts of required new transmission, some form of mitigation is essential for most projects on public lands. The purpose of mitigation is to maintain or improve long term persistence of species and populations, the functional integrity of the ecosystems, the landscape level movement corridors on which they depend, and to compensate for any cultural resources affected by development. [See next section, Cultural Resources Considerations, for more on that topic.] To be useful, mitigation must be proportional to the impacts and targeted at the specific impacts of the project. For example, if desert tortoise habitat is lost, mitigation must provide habitat appropriate for desert tortoise, ideally very nearby. Mitigation efforts are not always successful, and thus any kind of mitigation plan must be fully funded and results monitored on a regular basis to change management based on results.

To acquire fee title or conservation easements and/or manage habitats for mitigation purposes, both short- and long-term funding is needed. This may mean some upfront fees from developers and also regular payments over the life of a project (or multiple projects). In many cases, funds would go to purchase lands for conservation as well as provide ongoing funding so that capable scientists and administrators can determine what actions are needed to assure functional ecosystems and, most importantly, have the resources to implement needed actions and manage the land for conservation.

However, where this option is not available because there is no suitable land to purchase and no system to assure the conservation of the purchased lands over a long time frame, other approaches need to be considered. One idea for mitigation is enhanced management for protection of endangered species and/or suites of species on public land through the creation of mitigation zones to be managed exclusively for habitat and species protection.

The use of public lands for large-scale solar, wind, geothermal and transmission to bring them to load centers is brand new. The impacts from some of these facilities will be significant and especially for solar, essentially permanent, particularly the associated habitat loss. Many locations being considered for renewables are already home to dwindling species and habitat for a variety of reasons, from inadequate resources to properly manage the land, to decades of abuse from illegal off-road vehicle use.

Even assuming we are successful in focusing these projects in the lowest conflict areas, in any location with no private land for mitigation we will need to propose ways in which better management can improve habitat and thus make up for inevitable losses from renewables development. The following are some recommendations on how mitigation agreements that focus on better management can be as sound as possible:

Lands that will receive enhanced management should be put in a permanent reserve status (a mitigation zone or other protective status) and the land management plan should be amended to reflect that change.

A long-term source of funding not subject to being ‘raided’ for ongoing agency operations that do not enhance habitat (i.e., put in the general fund)

needs to be established to enable protection to continue. (The funding would come from developer fees, but some mechanism is needed to deal with protection even beyond the lifetime of the energy facilities.)

A scientific advisory panel should be set up, either for an area that includes mitigation for multiple projects or for each project's mitigation zone, to guide the goals, objectives, evaluation and adaptive management of each zone.

Each mitigation zone should serve to mitigate for projects located in areas with comparable ecosystem and species composition; i.e., an area in the West Mojave Desert where the key species is Mojave ground squirrel cannot mitigate for desert tortoise habitat loss in the East Mojave.

Each mitigation zone should have a management plan that articulates the overarching goals; the status of the ecosystem as well as specific endangered, threatened and species of concern whose habitat will be managed and monitored; and the strategies to be employed to improve the current species diversity and numbers, and similar goals. Strategies need to include elimination of threats from a variety of sources including illegal off-road vehicle (ORV) use and agency practices such as grazing. A plan could include retiring grazing leases or providing more enforcement or fencing, for example.

Annual goals and objectives should be developed which are evaluated through on-site monitoring.

Utilizing the data from regular monitoring, agency managers in collaboration with the scientific advisory panel should use adaptive management to continually improve protections for species and ecosystems, and minimize or remove any new threats that emerge through monitoring and evaluation.

Cultural Resources Considerations

The Sierra Club supports efforts by its tribal partners to protect sacred lands and cultural resources. All parties involved in planning or developing large-scale renewable energy projects on public lands should consult potentially impacted tribes early and often for their input. People who

depend on the land and consider it sacred are especially vulnerable to habitat destruction and development, so consultation and respect are critical.

It's important to ensure that federal agencies are in robust consultation with surrounding tribes that ascribe historical and/or ancestral affiliation to landscapes impacted by the project. This includes potential grave sites, archaeological sites and other Traditional Cultural Properties that might require avoidance and project mitigation. It is important to have an understanding if these areas have been inventoried with consideration for eligibility for nomination to the National Registry. If this is the case it triggers the review process required by the Advisory Council on Historic Preservation Act, section 106. NAGPRA (Native American Graves Protection and Repatriation Act) may also apply. When talking about specific sacred sites, often times confidentiality is preferred by tribal members, so care should be taken not to unnecessarily reveal or promote these sites.

If cultural resource inventories have been done, federal archaeologists are the officials likely to have that information. Groups or individuals within tribes, or Tribal offices, may have knowledge of cultural resources, as would public land offices including the BLM, Forest Service, and Department of Energy. Often there will be several tribes that have affiliations to a specific site, and here consultation will be key.

Mitigation may only come about after thorough tribal consultation, including the NEPA process. Tribes may have their own understanding of what constitutes mitigation as will federal or state land managers. Mitigation is most sensitive with significant sites, or areas pertaining to "sacred sites." As we have learned from the San Francisco Peaks in New Mexico, some traditional practitioners will ask, "How can you mitigate the sacred?"

Environmental Justice must be considered and impacts to local diverse communities' social, economic and other realms must be understood and mitigated to ensure fair treatment and participation for all. Local communities should be part of the discussion so that local benefits and impacts can be understood by all, especially low-income communities.

Often times, project developers can begin a dialogue with the local communities near the project site to craft a "Community Benefits

Agreement" to spell out how the project will mitigate impacts and benefit the nearby community.

Please see further information in Appendix H, Cultural Consultation Guidance 2009 for California.

APPENDICES

Appendix A:
Charge for Transmission Line and Renewable Energy Siting Taskforce

To achieve our overall goal of a sustainable energy future, the Sierra Club is addressing the challenge of meeting our energy needs while "moving beyond coal" and reducing carbon dioxide emissions. To do so we must drive progress on two broad fronts: reducing energy demand through efficiency and shifting to energy generated from clean, renewable sources. This is the transition towards a sustainable energy economy outlined in the 2006 Energy Resources Policy (ERP). The policy provides that we should seek to maximize reliance on the preferred technologies of wind power, central station solar, on-site solar, combined heat and power, and low-temperature geothermal.

To fully implement the ERP and advance the deployment of renewable energy, the Sierra Club needs an appropriate process and criteria to evaluate not only the siting of renewable energy facilities but also the transmission lines that will provide essential access to the market. The ERP provides some high level guidance as to facility siting. It indicates that,

“Resource siting and deployment must always take into account the specific conditions of each location and minimize the damage to natural systems, flora and fauna, wild places and nearby communities.”

Further, it provides that Sierra Club entities taking positions on facilities as a result of environmental impacts must do so on a site-specific basis. Previous siting guidance [the Energy Facility Siting Policy] and other

guidance are noted as potentially useful to activists, though the ERP takes precedence. And transmission is not explicitly addressed.

The Transmission Line and Renewable Energy Siting Taskforce is being tasked with providing assistance to Club activists and staff in furthering the deployment of renewables, consistently with the ERP. Specifically, the Taskforce is tasked with developing a recommended framework that would identify three categories of projects and/or transmission line alignments:

- Projects/alignments that would cause minimal to no harm to wildlife, habitat, and other public land values. The Sierra Club would either support or take a position of neutrality on these projects.
  - Projects/alignments that have some environmental impacts that can be eliminated or largely mitigated. The Sierra Club would support or take a position of neutrality on these projects once the appropriate mitigation is provided.
  - Projects/alignments that would incur significant environmental damage that cannot be mitigated. The Sierra Club would oppose these projects as currently configured.

The Transmission Line and Renewable Energy Siting Taskforce should develop a recommended evaluation process and criteria that will guide volunteers and staff in analyzing proposed renewable facilities and transmission line projects on a site-by-site basis. The Taskforce should define the criteria referenced in Section Six of the ERP:

Consideration for Special Designations

The Sierra Club opposes energy development on public and private lands and in waters that are currently protected by legislative or administrative designations or that the Sierra Club has proposed for special designation based on specific environmental or wilderness criteria. Exceptions are allowed only where the proposed development can be shown to have insignificant effects on the resources for which the special designation was, or would be, established. This overarching consideration applies to all energy resources covered in this policy.

In addition, the Taskforce's proposal should help Club staff, chapters, and volunteers identify what their action options are for any particular development. These Taskforce proposals should include:

- Criteria for each of the three categories above should be developed, including but not necessarily limited to impacts on air and water quality and quantity, impacts on wildlife, fish, and flora, visual impacts, cumulative impacts, recreational impacts, etc.

- Recommendations for mitigation if appropriate.

- Recommendations regarding energy source requirements for supported transmission lines.

The Taskforce should review, analyze, and disseminate best practices for development of renewables and transmission corridors and lines. These recommendations may come from federal and state agencies, conservation organizations, scientific experts, or other sources. The Taskforce should develop electronic communication mechanisms and materials to maximize access to useful information and guidance throughout the Club as well as experience gained and recommendations from those addressing projects at the local level. This will most likely involve gathering and posting information on Clubhouse. Finally, the Taskforce should identify training needs for activists and staff to become more competent in this nexus of issues, and recommend how to provide such training.

Taskforce members:

Jim Dodson, California, regional Wilderness/Desert Committees volunteer, co-chair
Barbara Boyle, Organizing Department staff, co-chair
Sandy Bahr, Arizona Chapter staff
Clayton Daughenbaugh, national Wildlands and Wilderness Team volunteer
John Hiatt, Nevada, regional Desert Committee volunteer
Connie Wilbert, Wyoming, Wyoming Chapter volunteer
Carl Zichella, Clean Energy Solutions staff

With special assistance from:
Gloria Smith, Legal Department energy specialist

Appendix B:
Ground-truthing

Ground-truthing is as important with proposed renewable projects as it is with traditional power plants and other facilities or with a proposed wilderness area. We need to understand and know the characteristics of proposed renewable energy sites in order to keep our credibility relative to supporting or opposing a proposed facility.

Many times project proponents will be willing to provide access to their environmental consultants and the work they are doing as part of their outreach to the environmental community. Local federal land managers may also have significant information about the resources in a location. In particular, obtain a copy of the agency land use plan or equivalent that covers the project area so that the current management direction can be fully understood. These contacts provide valuable opportunities to get specific information on project areas, as well as to develop working relationships with project proponents and land managers. We encourage leaders to avail themselves of such opportunities, which can often result in productive problem-solving.

Ground-truthing entails assessing the land at the site itself and making observations about what is there. While GIS layers can and do provide a great deal of information, seeing the site, what is there, and how it is situated is extremely important.

For example, in desert areas, washes are vital for many species of wildlife. Some smaller washes may not appear on maps, especially if the topographic information is at a coarse scale. Siting facilities to accommodate natural drainage and avoiding washes that are essential for wildlife in the area will be an important consideration. This information may not be readily apparent on a map. You may be able to ask agencies or proponents to produce maps at the topographic scale needed to assist your assessment.

Ground-truthing helps us better assess the effectiveness of a particular technology for a specific site. At times developers have recommended areas based largely on maps, without onsite evaluation which gives a fuller understanding of the resource.

Ground-truthing can help provide information to support, modify or oppose projects. It may just help you to ask more informed questions and ensure that an agency and an applicant have done their due diligence.

What to consider when ground-truthing a site

Some things you might consider in your ground-truthing:

- Prior to visiting the site, review the maps and information provided by the agencies and applicants. Catalogue important values and features. Understand the current management direction for the area.
- Do the maps and information provided by the agency and/or applicant accurately reflect what is on the ground? Some major topographic features may be depicted inappropriately or not be reflected at all on the maps provided. Note major washes, drainage patterns, seeps, springs, streams, etc.
- Regarding wildlife, note any evidence of wildlife activities including nests, wildlife trails, scat, etc. Is what you observe consistent with the information that has been provided? (Note that some wildlife assessments may not accurately reflect the significance of an area depending on the time of year the assessment was done.)
- Observe the vegetation. Any unique or unusual plants? Protected plants? Are there invasive non-native plants in the area?
- Assess and note any archaeological/cultural information.
- Photograph the site and take careful notes on observations. Whenever possible, bring along someone who knows the wildlife, plants, and hydrology of the area.
- Note if there are any impediments to generating the energy on site, for example a major feature that would shade solar collectors during a critical portion of the day.

- Note any key evidence of bird and bat habitat. This is especially important with wind projects.

Appendix C: Memo from the Sierra Club Environmental Law Program

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MEMORANDUM

TO: Barbara Boyle, Western Renewables Task Force

FROM: Gloria D. Smith

RE: Effective Club Participation in State and Federal Agency Approvals for Large-scale Renewable Energy Projects

DATE: October 20, 2009

The goal of this memo is to help Sierra Club staff and volunteers facilitate appropriately sited renewable energy projects while protecting public lands, wildlife and other important ecosystem values. This memo, as a component of the Guidelines, is designed to help Club leaders understand how best to work with the legal team to achieve these goals.

A. Sierra Club Participation in the Siting of Renewable Energy Projects

Each proposed large-scale renewable energy project will require at least one agency approval, e.g., a license to operate and/or, for projects on federal land, a BLM or other agency right-of-way, permit or lease. In addition, federal agencies will prepare a NEPA document and/or related state environmental document, in states like California, Montana and Washington who conduct environmental review under CEQA, MEPA and SEPA. Project applicants may also need to comply with state and federal laws protecting endangered species, water quantity and quality, air quality, and cultural resources, among other things. Finally, projects may be proposed for sites on Indian reservations or may otherwise affect tribal lands.

Project approval and compliance are public processes that afford Sierra Club numerous opportunities to participate and ultimately influence the final decision, including project conditions for environmental protection and mitigation. This memo provides a roadmap for timely and effective Club participation in approval processes for most types of large-scale renewable energy projects in the West.

B. The Importance of Early Involvement

The footprint for large solar projects is typically in the thousands of acres; wind farms can be nearly as large; and geothermal projects are often sited in remote areas. In general, applicants choose sites based on solarity, wind direction, and the availability of necessary infrastructure and proximity to transmission and natural gas lines, water and load centers. Initially, applicants have little or no understanding of the site itself in terms of the density or distribution of wildlife and plant communities, drainage, or other ecosystem values. As such, an applicant will configure a project to best facilitate energy generation and distribution with little initial attention to anything else.

It can be highly advantageous for Sierra Club to become involved in projects as early as possible. For example, with early involvement we may:

- Have the opportunity to informally work with the applicant and land managers as they study the site and begin configuring the project.

- Help maximize the protection and/or avoidance of natural resources while still ensuring project viability.

- Preserve habitat and plant communities up front without requiring the applicant to go back to rethink and redesign certain aspects, saving everyone time and money.

- Win the support of stakeholders if we help the applicant avoid environmental harm in the first place and avoid fighting at the end of the process over mitigation that may be inadequate and/or expensive.

- Support the project.

Applicants routinely begin working with staff from the permitting agencies before an application is even filed. Relationships are formed. In the interest of building trust and credibility, The Sierra Club would do well to become informally involved in a project as soon as it learns of the proposal. For those who come late, it can be difficult to fully understand all that has transpired, why certain decisions were made, and establish important relationships with the all of the stakeholders.

Given the sheer number of projects and scarce resources it is not always feasible to get involved early and participate fully for the length of a proceeding. However, the benefits of early involvement are undeniable in terms of gaining project improvements when project design is still in the preliminary stages.

If you are aware of a potential project, do not hesitate to contact the law program. The staff lawyers will help you quickly find out who the applicant is, the status of a particular project and other details concerning participating agencies and site status.

C. Projects Requiring Public Utility Commission or Energy Commission Approval

Projects approved by utility or energy commissions typically involve a "quasi-adjudicatory" process where a Commission makes a final licensing decision, and requires conditions for project construction, operation and

decommissioning. In California, the Energy Commission approves solar- and geothermal projects (for photovoltaic and wind projects, see below).

Such proceedings take at least one year, and involve other permitting agencies such as Fish and Wildlife, BLM, state fish and game, state historic preservation officers, state air districts and water boards. Typically, the licensing commission will try to coordinate all of the various permitting agencies' processes to streamline public hearings and comment periods. This type of consolidation helps the public identify all of various agencies that may have some type of authority over the project. On the other hand, commission proceedings can be time-consuming and difficult to navigate for those new to the process.

In any case, like any member of the public, the Sierra Club can intervene and become a party to any renewable energy proceeding. Intervention is not required to participate; the Club may simply review documents filed in the case, submit comments and speak at public hearings. For projects deemed a priority to support per the Task Force Guidelines, the Club should consider sending letters of support and attending a public hearing. For projects the Club opposes based on the Guidelines, the Club should consider intervening. Note that intervention is for both project opponents and proponents: anyone with an interest in a project may intervene, even if that interest is to ensure the project is built. However, given the complexity of these proceedings, the Sierra Club should only intervene in cases it considers significant one way or another.

1. How to Intervene

Chapters should submit a new matter form to the law program as early in the process as possible. Once the new matter form is approved, the law program can draft and submit a petition to intervene. If the petition is timely filed, it is typically granted automatically. An untimely petition must show cause and is subject to greater scrutiny and even opposition.

2. Advantages of Intervening

- Intervention confers full party status on the intervenor, meaning the Sierra Club holds the same rights, obligations and access to information as commission staff, other agencies and the applicant.

- During the investigation phase, intervenors can propound discovery/data requests to the project applicant. This means parties send written questions to the applicant about the project. Through discovery, intervenors can develop an evidentiary record on priority issues such as habitat requirements, etc.
- Intervenors can also bring motions to compel responses to discovery the applicant refuses to answer, or to resolve other procedural issues.
- Intervenors can propose and/or respond to settlement offers.
- Intervenors still comment on environmental documents and draft permits.
- Intervenors file testimony and participate in the evidentiary hearings, offer expert witnesses and cross examine other party witnesses. After the hearings, intervenors file legal briefs to the Commission asking for a particular decision.

3. Disadvantages of Intervening

Keeping in mind the Sierra Club's goal of facilitating appropriately sited projects, intervention is often viewed as an adversarial step. The mere act of intervening can draw criticism from the media and developers. Commission staff, the applicant and other agencies also expect the Club to fully participate and bring to the process its environmental expertise and perspective. The process can be very time consuming and requires large commitments of time and resources.

D. Projects Requiring Federal Agency Approval

Projects sited on federal land will require a right-of-way from the Bureau of Land Management. Given that BLM lands are multiple use, including, for example, ranching, grazing, recreation, and mining as well as conservation, renewable energy projects are considered consistent with the BLM's purpose. A BLM right-of-way is a grant authorizing the use of a certain parcel for a specific purpose. BLM will circulate an environmental assessment or environmental impact report for the proposed right-of-way grant, and will solicit comments from the public prior to preparation of the NEPA document. This will allow the Sierra Club to weigh in on the appropriateness of the site. Note that BLM does not evaluate the merits of a project itself, just the site impacts. If the right-of-way grant is significantly

flawed, the Sierra Club may appeal the decision to a board within the Department of the Interior.

Other approvals required for projects on federal land include permits for wind facilities, leases for geothermal developments, and rights-of-way for transmission.

E. Projects Requiring County or City Approvals

Some projects, such as photovoltaic installations, will fall outside the scope of a state energy commission's jurisdiction. For these, the Sierra Club should look to local regulations, such as rules promulgated by a City Council or Board of Supervisors. Because these projects are site specific, they require a search of the local rules. For example, many of these projects could be governed by city or county zoning laws. However, in California and some other states, PUC approval is still required when an energy company seeks to increase their rates to offset costs associated with switching to photovoltaic power generation. The Sierra Club could file a motion to intervene if it was determined that the siting of the project was not within the Guidelines established by the Taskforce.

Finally, projects would still be subject to any state environmental review under state environmental protection acts, such as CEQA in California, MEPA in Montana and SEPA in Washington. Other states may have such statutes, but not all do. The law program will investigate this for you.

F. Transmission

Rules for siting transmission lines vary from state to state. For example, in California**,** for upgrades to the power grid or for new transmission lines, investor-owned utilities ("IOUs") must obtain approval from the PUC/PSC (Public Utilities Commission/Public Services Commission). Once the IOU files an application, the PUC begins the review process under CEQA, and if across federal lands, NEPA. The PUC/PSC may also enter into a memorandum of understanding (MOU) with the relevant federal agency, such as the BLM or the Forest Service, to coordinate the siting approval and environmental review process. Thus, the Sierra Club can provide comments and attend hearings on transmission line approvals.

Publicly owned or municipal utilities in California do not need PUC approval to upgrade or build new transmission lines. There, approval comes from the utility's elected board. For lines crossing state lines, approval from the Federal Energy Regulatory Commission (FERC) is necessary. The FERC process is highly specialized. The law program can answer any questions you may have.

Other state specific examples include: in Oregon, Energy Facility Siting Standards govern transmission. The standards require a proposed project to comply with all applicable Oregon laws and rules. Solar and other renewable energy projects are eligible for an expedited review, but are still open to public comments. All projects under review are listed on the Energy Facility Siting website. Under the Montana Major Facility Siting Act, the Montana Department of Environmental Quality approves or denies a certificate for new or upgraded transmission lines. The Montana Department of Natural Resources and Conservation must report to the DEQ regarding the possible impact of the project, and must comply with MEPA.

Transmission line siting can be complicated, involving numerous agencies. Do not hesitate to contact the law program for help.

G. Litigation

In very rare instances the Club may decide to litigate a renewable project in state or federal court. Given the highly fact-specific circumstances under which litigation would be approved, there are no universal principles on the types of projects for which we might file suit. Please contact the law program to discuss litigation.

H. Conclusion

The Sierra Club will affirmatively support appropriately sited renewable energy projects. However, there may be projects that present significant but fixable impacts. This memo shows that staff and volunteers will be afforded a wide variety of opportunities to work with project applicants and agencies to improve project design so that the Club may ultimately support the agency's final decision or stay neutral. Early involvement in these types of projects is critical. Finally, as this memo

shows, there may be projects so inappropriately sited that the Club may have to oppose. Still, early, informal involvement; intervention in PUC hearings; comments or challenges to a BLM grant of a right-of-way; participation and comment on NEPA documents or other state environmental protection acts; and local zoning rules are all ways that the Sierra Club can positively influence the increase in large-scale renewable energy projects. The law program will work with you to determine the options which may yield the best results.

Appendix D:
Glossary of Energy Terms

The California Energy Commission has an excellent glossary of energy terms on its website. Here is the link:
http://www.energy.ca.gov/glossary/glossary-p.html

Appendix E:
Large Scale Solar Technologies

The following four fact sheets include more details about four types of large scale solar generating facilities. [insert solar pdfs here]

Appendix F:
Further resources for assessing wind energy impacts

Some states are considering adoption of development and operating guidelines for wind projects. California, for example, has adopted a set of guidelines that has worked effectively so far. A federal committee led by the U.S. Fish and Wildlife Service is finalizing a national set of guidelines.

The National Wind Coordinating Collaborative (NWCC) (http://www.nationalwind.org/default.htm) is a consensus-based collaborative formed in 1994 comprised of representatives from the utility, wind industry, environmental, consumer, regulatory, power marketer, agricultural, tribal, economic development, and state and federal governments. Its goal is to support the development of an environmentally,

economically, and politically sustainable commercial market for wind power and it has been exploring the environmental impacts related to the industry for 15 years.

In 2008, the Sierra Club, Natural Resources Defense Council, National Audubon Society, The Nature Conservancy, Union of Concerned Scientists, Environmental Defense Fund, American Wind Energy Association, Association of State Fish and Wildlife Agencies formed the American Wind and Wildlife Institute (AWWI, www.awwi.org) to explore solutions to wind energy and wildlife conflicts. AWWI is initiating research work to help inform this discussion and has developed a mapping tool to identify possible conflicts in early stages of location assessments. The importance of wind energy to meeting our climate goals has been a driver for this intensive atmosphere of collaboration.

National Audubon Society, working with state and federal agencies in the Intermountain West Joint Venture, has developed information on Important Bird Areas as well as a number of Bird Habitat Conservation Areas in this region. These areas are mapped and should be consulted; it is likely that Audubon in other states is also developing such tools to help guide development away from important habitat areas.

The wind energy Programmatic EIS can be found on the following website: http://windeis.anl.gov/.

American Bird Conservancy's detailed Wind Energy Policy and Guidelines can be found at: https://www.abcbirds.org/abcprograms/policy/wind/wind_policy.html.

Appendix G:
Additional Resources [these are currently hyperlinked via Clubhouse; we need to continue to have Clubhouse page for posting these and other items]

Electricity Transmission: A Primer provides detailed information about how the electrical transmission system works. Written for state legislators and

utility commissioners, it also includes information on policies to address numerous problems in the system. [pdf]

Cultural Consultation Guidance 2009 is a State of California document discussing state and federal requirements for working with tribes on cultural resources, how to work with tribes, analyzing cultural resources, and mitigation. [pdf]

Key Principles: Balancing Renewable Energy Development and Land Conservation in a Warming World outlines the overarching perspective of numerous environmental organizations on protecting public land while we develop some large scale renewable facilities. [pdf]

California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development is State of California detailed guidance on evaluating potential impacts, siting considerations, surveying and monitoring. [pdf]

The Design, Construction and Operation of Long Distance, High Voltage Electricity Transmission Technologies by Argonne National Laboratory, Science Division could be retitled, Everything you ever wanted to know about our electric transmission system and a whole lot more. This is an excellent resource but pretty heavy reading. [pdf]