

Thank you for your comment, Johanna Wald.

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Comment Submitted:

[See Attachment.](#)



July 15, 2008

U.S. Bureau of Land Management
U.S. Department of Energy
Solar Energy PEIS Scoping
Argonne National Laboratory
9700 S. Cass Avenue – EVS/900
Argonne, IL 60439

Re: Scoping Comments for the Solar Programmatic Environmental Impact Statement

To whom it may concern:

These scoping comments on the Solar Programmatic Environmental Impact Statement (PEIS) are submitted on behalf of the Sierra Club and the Natural Resources Defense Council (NRDC). Our two organizations and our more than 2.5 million members, supporters and activists care deeply about the management of the nation's public lands and their wilderness, wildlife, water and other resources. NRDC, Sierra Club and our members are also deeply concerned about global warming and the threats that it poses to those resources and we believe that increased renewable energy generation, including solar generation, is a key part of the solution to that challenge. While solar generation at or near load centers is the ideal, development of the solar resources of the public lands will undoubtedly be necessary and we are prepared to support the latter, provided that projects and necessary transmission to access those projects are sited in an environmentally responsible manner. We commend the Bureau of Land Management (BLM) and the Department of Energy (DOE) for their decision to prepare this PEIS in order to develop needed policies and mitigation strategies for use in deciding whether to grant rights of way for utility scale solar projects on public lands and for deploying DOE-supported solar projects, respectively.¹ We also commend the agencies for the positive approach taken to date to public participation and specifically the willingness to hold numerous hearings in areas likely to be affected by the outcome of this process.

In what follows below, we address the following topics: avoidance areas and related issues and issues deserving analysis in the PEIS, including climate change and socio-economic, water, best management practices and transmission impacts. As you will see, we focus most of our attention on climate change.²

¹ See Department of Energy, Department of the Interior/Bureau of Land Management, Notice of Intent to Prepare a Programmatic Environmental Impact Statement to Evaluate Solar Energy Development, 73 Fed. Reg. 30,908, 30,909 (May 29, 2008) (hereinafter "NOI").

² In addition to submitting these comments, Sierra Club and NRDC have signed on to the comments that will be timely submitted by The Wilderness Society on behalf of itself and others.

Avoidance Areas and Related Issues

We are convinced that California and other western states need utility-scale solar development to meet our energy needs in a carbon-constrained world.³ Such development will not be without significant environmental costs, however. We commend the BLM and DOE for explicitly recognizing the need to avoid siting projects in unique and sensitive areas.⁴ The list of “off limits” areas set out in the scoping notice includes the great majority of areas managed by the BLM that we have previously characterized as such – but it should be expanded to ensure that this goal is met on our public lands.

We specifically encourage you to add to your list lands with wilderness characteristics, including both citizen-proposed wilderness areas and areas that the BLM has itself recognized as having wilderness characteristics. The BLM does indeed have “the authority to develop protective management prescriptions for lands with wilderness characteristics,” as the NOI explicitly acknowledges,⁵ and we urge you to exercise it here. We also urge you to protect/avoid development on significant cultural resources, including historic and Traditional Cultural Property areas, unique archaeological sites, and areas of Native American human remains and associated artifacts, and on important wildlife habitat areas, including wildlife corridors, to be consistent with the recent recognition by the Western Governors Association (WGA) of the significance of, and threats to, these crucial areas.⁶

Ensuring that all these unique and sensitive areas are protected will minimize controversy over siting of utility-scale projects and thus also minimize delays in getting these facilities built and on-line, helping to meet the climate challenge. Not only these specific areas, but also lands immediately adjacent to them may need to be protected, particularly if development on adjacent areas would have significant adverse impacts on scenic and/or wilderness characteristics. In addition to identifying the public land areas where solar development will not be permitted, we urge you to ensure that these lands are accurately mapped and so identified in applicable resource management plans.⁷

In addition to avoiding unique and sensitive areas, we urge you to develop criteria for use by field managers in identifying areas that are appropriate for development. Such criteria

³ See, e.g., *Smart Lines: Transmission for the Renewable Energy Economy*. 2008. Western Resource Advocates and Resource Media, Boulder CO, at 2-3, 6 (hereinafter “Smart Lines”) (Enclosed as Exhibit 1).

⁴ *Id.* at 30,910.

⁵ *Id.* at 30,911.

⁶ These areas are identified in the WGA’s Wildlife Corridors Initiative Report (available at <http://www.westgov.org/wga/publicat/wildlife08.pdf>)

⁷ The Wilderness Society, in its comments, will be providing GIS data layers for citizen-proposed wilderness areas and wilderness inventory units for Arizona, California, Colorado, New Mexico and Utah and contact information for Nevada. As noted above, Sierra Club and NRDC are also participating in those comments.

should ensure that managers look closely at BLM lands that have already been disturbed as well as non-public lands.⁸ Already disturbed areas include sites that have been mined and areas that have seen extensive oil and gas development. Such areas have existing infrastructure and are likely to have had previous environmental analyses prepared on the potential impacts of using them for their past and/or current activities. Still other areas include abandoned mine lands, brownfields sites and lands that have experienced significant type conversion such as lands previously farmed. By focusing development on such areas, the time necessary to actually get project(s) built may be reduced and, equally importantly, controversies over siting may also be reduced.

Other issues/areas that these criteria should address include:

- Proximity to existing infrastructure (transmission interconnects);
- Proximity to major highways;
- Availability of wastewater resources for cooling and cleaning;⁹
- Availability of existing roads (so that new roads are either not needed or the need for same is diminished; and
- Minimization of scenic impacts.

Issues Deserving Analysis in the PEIS

Climate change

Climate change has been intensely studied by the world's scientists, and broad consensus exists around its causes, magnitude and effects. The planetary warming that scientists predict will result from human emissions of heat-trapping gases is already underway. In February 2007, the Intergovernmental Panel on Climate Change (IPCC) declared, "[w]arming of the climate system is unequivocal," and it is "very likely" that most of the warming since the middle of the 20th century is the result of human pollutants. Climate change is a global phenomenon with well-documented and serious local impacts. Those impacts affect the both ecosystems and the welfare of citizens not only around the world, but in the United States and the nation's Western states in particular. The choice is not between protecting our public lands from utility scale solar development and avoiding the impacts of climate change on those lands. Climate change is already affecting our public lands and utility scale solar can help minimize those impacts, if the right policies are adopted by the BLM. While we are very pleased that the BLM now appears to be committed to "consider and analyze relevant climate change impacts in its land use plans

⁸ It is important for the PEIS to acknowledge that public lands are not the only lands where development is appropriate and, even more importantly, that focusing only on BLM lands is not only unnecessary but could inappropriately skew the location(s) of the development we need, excluding lands that are better suited for solar development.

⁹ See also discussion of water resources below.

and associated NEPA documents,”¹⁰ we urge that these impacts, “including the anticipated climate change benefits of solar energy,”¹¹ be discussed in this PEIS.

This PEIS provides the BLM and DOE with a great opportunity to inform both the public and decision-makers about both of these key issues. In fact, we believe the agencies are obligated to provide information about climate change and related issues. In any case, we submit that it is clear that, by addressing climate change at the programmatic level, analysis at the RMP level will be facilitated and made significantly easier for land managers – thus maximizing the utility of the PEIS.

To our knowledge, no BLM EIS has yet provided information on this critical topic. Accordingly, in order to assist the agencies in addressing it, we provide relevant information immediately below.

The Climate Change crisis

Global warming is a threat to public health, welfare, and the environment. The Intergovernmental Panel on Climate Change (IPCC) was established by the World Meteorological Organization and the United Nations Environment Programme in 1988. The IPCC’s mission is to comprehensively and objectively assess the scientific, technical and socioeconomic information relevant to human-induced climate change, its potential impacts, and options for adaptation and mitigation.¹² The IPCC completed its First Assessment Report in 1990, its Second Assessment Report in 1995, its Third Assessment Report in 2001¹³ and its Fourth Assessment Report in 2007. The summaries of the most recent report, “Climate Change 2007,”¹⁴ include the following significant conclusions that are relevant to public lands and the West:¹⁵

¹⁰ 73 Fed. Reg. at 30,911.

¹¹ *Id.*

¹² See <http://www.ipcc.ch/about/index.htm>.

¹³ See <http://www.ipcc.ch/ipccreports/assessments-reports.htm>.

¹⁴ *Id.*

¹⁵ IPCC, 2007: Summary for Policymakers. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA; IPCC, 2007: Summary for Policymakers. In: Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 7-22; IPCC, 2007: Summary for Policymakers. In: Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 7-22. IPCC, 2007: Summary for Policymakers. In: Climate Change 2007: Synthesis Report, Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)].

- By mid-century, annual average river runoff and water availability are projected to decrease by 10-30% over some dry regions at mid-latitudes, some of which – particularly in the West – are presently water stressed areas;
- In the course of the century, water supplies stored in glaciers and snow cover are projected to decline, reducing water availability in regions supplied by meltwater from major mountain ranges, where more than one-sixth of the world population currently lives;
- Warming in the mountains of western North America is projected to cause decreased snowpack, more winter flooding, and reduced summer flows, exacerbating competition for over-allocated water resources;
- Disturbances from pests, disease and fire are projected to have increasing impacts on North American forests, with an extended period of high fire risk and large increases in area burned;
- In North America, major challenges are projected for crops that are near the warm end of their suitable range or depend on highly utilized water resources;
- Approximately 20-30% of plant and animal species assessed so far are likely to be at increased risk of extinction if increases in global average temperatures exceed 1.5-2.5 degrees Celsius;
- Even the most stringent mitigation efforts cannot avoid further impacts of climate change in the next few decades, which make adaptation essential, particularly in addressing near term impacts. Unmitigated climate would, in the long term, be likely to exceed the capacity of natural, managed and human systems to adapt;
- Global greenhouse gas (GHG) emissions have grown since preindustrial times, with an increase of 70% between 1970 and 2004; and
- The largest growth in global GHG emissions between 1970 and 2004 has come from the energy supply sector (an increase of 145%).

The IPCC reports authoritatively document the adverse environmental and socio-economic impacts of global warming at local, regional, national and global scales, and the primary role of the burning of fossil fuels in causing global warming. The evidence in the IPCC reports conclusively shows that greenhouse gases, including CO₂, endanger public health, welfare, and the environment.

Many researchers have highlighted the severity of the threats posed by global warming. A recent study found that from 2000 to 2006, the average emissions growth rate was 3.3% per year, compared to 1.3% per year during the 1990s.¹⁶ The study estimates that global warming is happening faster than expected, and attributes this to recent growth in the

Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. Available at http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf

¹⁶ Canadell, J.G., *et al.*, *Contributions to Accelerating Atmospheric CO₂ Growth from Economic Activity, Carbon Intensity, and Efficiency of Natural Sinks*, Proceedings of the National Academy of Sciences, October 25, 2007.

world economy, increasing carbon intensity, and decreasing efficiency in carbon sinks on land and in oceans.¹⁷ This evidence suggests that even the estimates of the IPCC6 are too conservative, and that the threat of global warming may be even more imminent than originally anticipated.

The World Health Organization reported in 2005 that, over the past 30 years, global warming has contributed to 150,000 deaths annually.¹⁸ EPA has already recognized this and other potentially adverse effects of climate change on public health: throughout the world, the prevalence of some diseases and other threats to human health depend largely on local climate. Extreme temperatures can directly lead to loss of life, while climate-related disturbances in ecological systems, such as changes in the range of infective parasites, can indirectly impact the incidence of serious infectious diseases. In addition, warm temperatures can increase air and water pollution, which in turn harm human health.¹⁹ One threat identified by EPA is fatalities due to extreme temperatures. Indeed, increased heat waves lead to heart failure and other heat-related deaths. Global warming also exacerbates the problem of ground-level ozone (“smog”), intensifying the public health dangers associated with air quality violations. Breathing ozone can trigger a variety of health problems, including chest pain, coughing, throat irritation, and congestion, and repeated exposure can lead to bronchitis, emphysema, asthma, and permanent scarring of lung tissue.²⁰ In addition, global warming will result in increased surface water evaporation, which in turn could lead to more wildfires and increased dust from dry soil, both of which generate particulate matter emissions. Particulate matter triggers a host of health problems, including aggravated asthma, development of chronic bronchitis, irregular heartbeat, nonfatal heart attacks, and premature death in people with heart or lung disease.²¹

Public Land Resources are already being adversely affected by climate change

Many of the public resources managed by the Department of the Interior are being harmed by climate change resulting from increased greenhouse gas emissions.²² The West in particular is being affected more by a changed climate than any other part of the United States outside of Alaska: compared to the 20th century average, the West has experienced an increase in average temperature during the last five years that is 70 percent greater than the world as a whole.

¹⁷ *Id.*

¹⁸ Jonathan A. Patz, *et al.*, *Impact of Regional Climate Change on Human Health*, *Nature*, 438, 310-317, November 17, 2005, available at <http://www.nature.com/nature/journal/v438/n7066/full/nature04188.html>

¹⁹ EPA, *Climate Change, Health and Environmental Effects*, December 20, 2007. See also Centers for Disease Control, *CDC Policy on Climate Change and Public Health*.

²⁰ EPA, *Ground-Level Ozone: Health and Environment*, March 6, 2007.

²¹ EPA, *Particulate Matter: Health and Environment* January 17, 2008.

²² See generally, GAO, *Climate Change: Agencies Should Develop Guidance for Addressing the Effects on Federal Land and Water Resources* (Aug. 2007).

The West Is Getting Hotter

The American West has heated up even more than the world as a whole. For the last five years (2003 through 2007), the global climate has averaged 1.0 degree Fahrenheit warmer than the 20th century average. RMCO found that²³ during the 2003 through 2007 period, the 11 western states averaged 1.7 degrees Fahrenheit warmer than the 20th century average. That is 0.7 degrees, or 70 percent, more warming than for the world as a whole. And scientists have confirmed that most of the recent warming in the West has been caused by human emissions of heat-trapping gases. The West has also experienced more frequent and severe heat waves, with the number of extremely hot days increasing by up to four days per decade since 1950. These heat waves, particularly those with excessive nighttime heat, can be deadly. Climate change has eroded the severe winter cold of the West's mountains. This has resulted in declining springtime western snowpacks.²⁴ This limits winter recreational opportunities on public lands and diminishes water supplies that the public lands provide residents across the West.

The West Is Getting Drier

In the arid and semi-arid West, global warming is already having serious consequences for the region's scarce water supplies, particularly the snow that makes up most of the region's precipitation and, when melted, provides 70 percent of its water. Already, decreases in snowpack, less snowfall earlier snow melt, more winter rain events, increased peak winter flows, and reduced summer flows have been documented. Scientists have recently attributed more than half of these changes in the West between 1950 and 1999 to the effects of heat-trapping pollutants. As global warming continues, the IPCC also predicts more intense and longer droughts, and characterized the severe drought that began in the western United States in 1999 and continues today as a "notable extreme climate event."

Utah has seen 5 year average temperatures rise +2.1°F. In Utah, ongoing drought has qualified most of the state for disaster relief during several years. In the summer of 2007, the U.S. Department of Agriculture (USDA) declared 24 of 29 Utah counties primary disaster areas due to drought, wildfire, and flash floods.²⁵ In 2003, the USDA declared all

²³ Saunders, S. and others. "Warming in the West: Evidence of Climate Disruption in Western States". The Rocky Mountain Climate Organization and Natural Resources Defense Council, March 2008.

²⁴ Mote, P. W., Hamlet, A. F., Clark, M. P., and Lettenmaier, D. P. 2005. Declining Mountain Snowpack in Western North America. Bulletin of the American Meteorological Society. 86: 39-49. See also Intergovernmental Panel on Climate Change (IPCC), "North America," in *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, M.L. Parry and others, eds., Cambridge University Press, Cambridge, UK (2007), 621-22.

²⁵ U.S. Department of Agriculture, *USDA designates 24 Utah counties primary natural disaster areas* (news release), August 23, 2007,

29 counties primary disaster areas due to drought, insect infestations and high winds.²⁶ In 2002, the amount of non-irrigated farm lands that were harvested fell by more than 30 percent, compared to 1997.²⁷ Drought hit Utah so hard in 2002 that every county in the state qualified for disaster relief. 2,600 Utahans lost their agricultural jobs and the dryland harvest shrunk 30 percent. In northeastern Utah in 2002, the fourth straight year of drought, depleted water sources and loss of forage led to a 75 percent drop in pronghorn numbers.²⁸

Climate change is disrupting ecosystems

The IPCC also concluded that “recent warming is already strongly affecting” ecosystems and wildlife. One study found that warmer spring and summer temperatures are responsible for increases in wildfire in the West. The researchers found²⁹ that spring and summer temperatures in the West in the 17 years after 1987 were 1.5 degrees Fahrenheit warmer than in the previous 17 years, leading to: 1. a 78-day increase in the length of the fire season; 2. a fourfold increase in the number of fires; 3. a fivefold increase in the time needed to put out the average wildfire; and 4. 6.7 times as much area being burned.

Forests across the West have suffered as warming has extended the range of some damaging insects, such as bark beetles. As outlined in Saunders et al.,³⁰ the IPCC concluded that recent warming trends have led to “proliferation” of mountain pine beetles in the West. Because they kill their host trees to reproduce, mountain pine beetles are agents of great disturbance in western forests. Their populations normally are held in check by extreme cold, but now western mountains are warmer and so more beetles can survive winters; they can survive at higher latitudes and higher elevations where it used to be too cold; and they even can complete their life cycles in just one year rather than two.³¹ Largely for these reasons, beetle outbreaks are now widespread across the West. In

http://www.fsa.usda.gov/FSA/newsReleases?area=newsroom&subject=landing&topic=edn&newstype=edn&newsrel&type=detail&item=ed_20070823_rel_1510.html.

²⁶ Utah Department of Agriculture, *USDA designates Utah federal drought disaster area* (news release), July 2, 2003,

http://www.fsa.usda.gov/FSA/newsReleases?area=newsroom&subject=landing&topic=edn&newstype=edn&newsrel&type=detail&item=ed_20070823_rel_1510.html.

²⁷ U.S. Department of Agriculture, *2002 Census of Agriculture – State Data, Utah* Vol. 1, Ch. 1, Part 44, Table 11 (Washington, D.C.: National Agricultural Statistics Service, 2004), 17, http://www.nass.usda.gov/census/census02/volume1/ut/st49_1_011_011.pdf.

²⁸ W. Donaldson, “Drought to impact wildlife,” *Vernal Express*, July 31, 2002, http://droughtreporter.unl.edu/map.jsp?Cmd=filter&scn=rv&st=Utah&co=Garfield&c_en=on&src=&daterange=custom&month1=1&day1=15&year1=2002&month2=2&day2=15&year2=2003.

²⁹ A. Westerling and others, “Warming and earlier spring increases western U.S. forest wildfire activity,” *Science* 313, no. 5789 (August 2006): 940-943.

³⁰ Saunders S and others. “Warming in the West: Evidence of Climate Disruption in Western States.” The Rocky Mountain Climate Organization and Natural Resources Defense Council.

³¹ Regniere J, Bentz B. 2007. „Modeling cold tolerance in the mountain pine beetle, *Dendroctonus ponderosae*”, *Journal of Insect Physiology*, 53: 559–572,

Colorado, the U.S. Forest Service (USFS) and the Colorado State Forest Service recently predicted, "At current rates of spread and intensification of tree mortality, the MPB [mountain pine beetle] will likely kill the majority of Colorado's large diameter lodgepole pine forests within the next 3-5 years."³² Beetles are also now causing widespread devastation of whitebark pines, a high-altitude species that grow where winters almost always have been too cold to allow beetle populations to reach outbreak numbers.³³ In the Yellowstone ecosystem, the loss of whitebark pines threatens the survival of the region's grizzly bears, which depend on the fatty seeds of the whitebark pine as their single most important food source.³⁴

Also newly linked to global warming is a rapid mortality of aspen trees that scientists call "sudden aspen decline." New research by the USFS has, for the first time, linked the sudden aspen decline in Colorado to the hotter and drier conditions that represent an altered climate in the interior West.³⁵

Glaciers are melting across the West. U.S. Geological Survey researchers projected in 2003 that all glaciers in Glacier National Park could be completely melted by 2030, but they actually are melting so fast they are likely to be gone by 2022. In Washington's North Cascades Mountains, 47 glaciers monitored since 1984 have lost, on average, 20 to 40 percent of their volume, with five having melted entirely away. In North Cascades National Park in Washington, the total area covered by glaciers has fallen by 13 percent since 1971.

Warming is reducing the amount of alpine tundra in the West. For instance, scientists studying the effects of climate change on Rocky Mountain National Park, home to the largest expanse of alpine tundra in the United States outside of Alaska, projected that warming of 5.6 degrees Fahrenheit could cut the park's area of tundra in half.³⁶ An

http://www.usu.edu/beetle/documents/Regniere_Bentz2007.pdf). Logan J., J. Powell. 2003. Ghost Forests, Global Warming, and the Mountain Pine Beetle (Coleoptera: Scolytidae). *American Entomologist*, 47:3 161-162, 166-168. Logan J., Regniere J., Powell J. 2003. Assessing the impacts of global warming on forest pest dynamics. *Front. Ecol. Environ*, 1:130-37.

³² U.S. Forest Service, Region 2, and Colorado State Forest Service, "Forest Health Aerial Survey Highlights," available at http://www.fs.fed.us/r2/news/2008/01/press-kit/survey_highlights.pdf.

³³ J. Connelly, "West Can't Beat Heat of Global Warming," *Seattle Post-Intelligencer*, April 23, 2006, http://seattlepi.nwsource.com/connelly/282173_joel23.html.

³⁴ Logan J., Powell J. 2003. Ghost Forests, Global Warming, and the Mountain Pine Beetle (Coleoptera: Scolytidae). *American Entomologist*. 47:3 161-162, 166-168. C. Petit, "In the Rockies, Pines Die and Bears Feel It," *New York Times*, January 30, 2007, <http://query.nytimes.com/gst/fullpage.html?res=9403E5DB143FF933A05752C0A9619C8B63>.

³⁵ J. Worrall and others, "Rapid mortality of *Populus tremuloides* in southwestern Colorado, USA," *Forest Ecology and Management* (in press), 11 pp. 3-6.

³⁶ N. Hobbs and others, "Future Impacts of Global Climate on Rocky Mountain National Park: Its Ecosystems, Visitors, and the Economy of its Gateway Community – Estes Park," (2003) 1-45, 16-17, http://www.nrel.colostate.edu/projects/star/papers/2003_final_report.pdf.

increase of 9 to 11 degrees Fahrenheit could virtually eliminate the park's tundra.³⁷ And, just last month, new research was published indicating that up to 66% of about 2,500 plants found only in California could see their habitats shrink by up to four-fifths by 2100 as the result of alteration to the state's rainfall and temperature patterns as the result of greenhouse gas emissions.³⁸

Climate Change is Affecting Wildlife

Greenhouse gas emissions are also having direct and indirect impacts on wildlife species, including numerous listed species. The IPCC has reported that 30 percent of animal and plant species could be at an increased risk of extinction if global warming continues unabated.³⁹ Another report chronicles the various types of extinction threats posed by global warming.⁴⁰ Undeniably, failure to respond effectively to the global warming challenge will affect many western wildlife species, including endangered and threatened species, as the result of changes to habitats and migration corridors as well as other impacts.

Indeed, impacts are already occurring as the result of climate change. The warming of the West is also disrupting the natural timing of seasons and leading to loss of wildlife. Lilacs and honeysuckle bushes are blooming earlier in the spring, marmots are emerging from hibernation earlier, jays are nesting earlier, ptarmigan are hatching earlier, and butterflies are emerging earlier. Species of wildlife are adapting to an altered climate by changing where they live (moving toward the poles or to higher elevations) —and in a few cases are being eliminated from areas where they used to live. In Yosemite National Park, for example, 14 of 50 studied animal species can no longer be found in lower-elevation portions of the range they occupied early in the 20th century. In Yosemite, a century ago pikas lived as low as 7,800 feet. Today, they cannot be found any lower than 8,300 feet.⁴¹ As one researcher has said, "We might be staring pika extinction in the Great Basin, maybe in Yosemite, too, right in the face. [...] They don't have much up-slope habitat left."⁴² California's desert bighorn sheep too have been affected by climate change, according to University of California, Berkeley researchers: a 2004 study linked climate to declines in of sheep populations and predicted many of the state's remaining

³⁷ *Id.*

³⁸ Loarie, Scott and others, Climate Change and the Future of California's Endemic Flora, PLoS One 3(6): e2505. doi:10.1371/journal.pone.0002502.

³⁹ IPCC, 2007: Summary for Policymakers. In: Climate Change 2007: Fourth Assessment Report, Synthesis Report, available at http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf

⁴⁰ Randall, J., Climate Change, Wildlife and Endangered Species (2007).

⁴¹ C. Mortiz, "Report – Year 4 of the terrestrial vertebrate resurvey of the 'Grinnell sites' in Yosemite National Park" (2006 report), 1, http://mvz.berkeley.edu/Grinnell/pdf/Yosemite_Report_2006-FINAL.pdf.

⁴² J. Schwarz, "Tiny Pikas Seem to Be on March Toward Extinction in Great Basin," University of Washington Office of News and Information, December 29, 2005. See also, Beaver EA, Brussard PF, Berger J. 2003. Patterns of apparent extirpation among isolated populations of pikas (*Ochotona princeps*) in the Great Basin. J. Mammal. 84:37-54.

populations could face extinction if certain forecasts come true.⁴³ Among others, the Interior Department has acknowledged that changes, including some “dramatic” changes, are already occurring on lands its agencies manage.⁴⁴

Warmer Temperatures Affect Business, Recreation, and Tourism

In the first few years of the 21st century, western farmers and ranchers have suffered significantly from the combination of above-normal heat and drought. Across the country, four of the five top years for crop loss claims due to drought have been since 2000. Warming temperatures and other manifestations of a changing climate are already diminishing fishing and hunting opportunities in the West. Sea-run salmon stocks are in steep decline throughout much of North America. Some have predicted losses of western trout populations as high as 64 percent and of Pacific Northwest salmon of 20 to 40 percent by 2050.⁴⁵ In Montana, drought and higher temperatures have led to fishing closures and restrictions to sustain fish populations in eight out of the last ten years.⁴⁶ During the summer of 2007, closures were in force on 29 rivers in Montana by August 2. Since 2000, the number of annual fishing permits issued to Yellowstone National Park visitors has dropped by nearly a quarter, from 67,700 to 51,900, even as total park visitation remained steady.⁴⁷ One fly fisherman who has traveled from California each of the past 15 years to fish the Yellowstone River reacted to the decline: “I decided yesterday that I won’t be back anymore. There just aren’t enough fish to make it worthwhile.”⁴⁸ Hotter and drier conditions have also led to fewer opportunities for hunting in some places and times. In the West, ski areas at lower elevations have recently suffered from less snow, with the Northwest and the Southwest taking turns having very bad years.

BLM and DOE are required to analyze the impacts of climate change and show how the actions they are proposing to undertake will reduce it

In April 2007, in a case initiated by a dozen states and numerous environmental organizations, the U.S. Supreme Court issued a decision that recognized the severity of

⁴³ See, e.g., “Bighorn sheep threatened by climate change finds new study.” UC Berkeley Press Release. February 10, 2004, http://www.berkeley.edu/news/media/releases/w004/02/10_sheep.shtml (last visited February 21, 2008).

⁴⁴ See, e.g., Berman, D., “‘Dramatic’ effects of rising temps being seen on public lands,” *Greenwire*, April 27, 2007.

⁴⁵ J. Williams, Trout Unlimited, testimony, U.S. Senate, Committee on Energy and Natural Resources, Subcommittee of Water and Power, June 6, 2007, <http://www.livingrivers.org/pdfs/CongressionalTestimony/WilliamsTestimony.pdf>

⁴⁶ *Id.*

⁴⁷ U.S. Department of the Interior, National Park Service, Yellowstone National Park, “Yellowstone Fish Reports,” 2000 to 2005, <http://www.nps.gov/yell/planyourvisit/fishreports.htm> and “Park Statistics,” <http://www.nps.gov/yell/parkmgmt/statistics.htm>.

⁴⁸ R. Tosches, “Warm waters deadly to Yellowstone trout,” *Denver Post*, July 29, 2007.

the climate change crisis, and the U.S. Environmental Protection Agency's obligation to confront the problem. The Supreme Court held, in *Massachusetts v. EPA*, 127 S. Ct. 1438 (2007), that the "unambiguous" definition of "air pollutants" includes carbon dioxide and other greenhouse gases. The Court, even without the benefit of the most recent IPCC Summary Reports, noted that the "[t]he harms associated with climate change are serious and well recognized." *Id.* at 1455. The Court also acknowledged "the enormity of the potential consequences associated with man-made climate change," *id.* at 1458, and the contribution of carbon dioxide emissions to global warming, *id.* at 1457-58. As discussed above, evidence abounds that carbon dioxide is present in the atmosphere at concentrations that will be injurious to human health and welfare, animals and plant life. Accordingly, the federal government has a responsibility to take action to reduce it, even if such action may not completely reverse global warming.⁴⁹ The BLM is not exempt from that responsibility.

In enacting the BLM's "organic act," the Federal Land Policy and Management Act (FLPMA), 43 U.S.C. §§ 1701 et seq., Congress enacted a policy that "the public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values...." *Id.* at § 1701(a)(8). Further, FLPMA directs BLM to manage the lands under its jurisdiction in such a manner that will "best meet the present and future needs of the American people;" "provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions;" and "take[] into account the long-term needs of future generations for renewable and nonrenewable resources, including, but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish...." *Id.* § 1702(c). In addition, the statute requires BLM to "minimize adverse impacts on the natural, environmental, scientific, cultural, and other resources and values (including fish and wildlife habitat) of the public lands involved." *Id.* § 1732(d)(2)(a). As documented above, climate change is already threatening many of these very resources in the West including undoubtedly resources on BLM-administered lands. Thus, FLPMA imposes an obligation on BLM to take the effects of climate change into account in managing and in making decisions about various uses of the public lands under its stewardship.

In fact, an order issued by the Secretary of the Interior requires that:

Each bureau and office of the Department will consider and analyze potential climate change impacts when undertaking long-range planning exercises, when setting priorities for scientific research and investigations, when developing multi-year management plans, and/or when making major decisions regarding the potential utilization of resources under the Department's purview.⁵⁰

⁴⁹ *Id.* at 1458.

⁵⁰ U.S. Dept. of the Int., Sec. Order No. 3226 (Jan. 19, 2001), Section 3.

Obviously, the proposed decisions that this PEIS will be addressing are covered by this order. What's more, NEPA also requires the analysis of climate change impacts and climate change benefits that are likely to result from those decisions.

In addressing climate change, the BLM has two critical roles. First, in making decisions regarding the amount of public lands utilized for various types of energy development including utility scale solar development, the agency directly influences future greenhouse gas emissions. Second, given its role as steward of these lands, the Bureau can influence whether the public's natural resources survive the impacts of climate change.

Existing CEQ regulations and NEPA case law currently require climate change analysis.⁵¹ Greenhouse gas emissions are within the direct, indirect and cumulative effects that NEPA documents must analyze.⁵² Not only are increased emissions of these gases "reasonably foreseeable"⁵³ but so too are their climate consequences. As discussed previously, the overwhelming consensus of national and international scientific evidence supports two conclusions: that the build-up of greenhouse gases in the atmosphere is contributing to global warming, and that the subsequent changes will adversely affect our local, regional and global environments.⁵⁴ Not just the impacts of climate change but also the benefits of utility-scale solar development are much more than "reasonably foreseeable" – and as such BLM and DOE should analyze them in the PEIS and document what both agencies are doing to address the threat climate change poses.⁵⁵

⁵¹ See, e.g., Ctr. for Biological Diversity v. Nat'l. Highway Traffic Safety Admin., 508 F.3d 508, 550 (9th Cir. 2007) (NHTSA failed to evaluate adequately global warming impacts of changes to fuel efficiency standards for vehicles); Mid States Coalition for Progress v. Surface Transp. Bd., 345 F.3d 520 (8th Cir. 2003) (increased coal consumption and global warming emissions was reasonably foreseeable effect of railroad expansion to transport coal).

⁵² See 40 C.F.R. § 1508.8.

⁵³ *Id.* §§ 1508.7, 1508.8.

⁵⁴ See, e.g., U.S. Climate Change Science Program, *Effects of Climate Change on Energy Production and Use in the United States* (Report to Congress by U.S. Secretaries of Energy and Commerce and the Director of the Office of Science and Technology) (October 2007), available at <http://www.climate-science.gov/Library/sap/sap4-5/final-report/default.htm>. The report concludes, "Climate change is expected to have noticeable effects in the United States: a rise in average temperatures in most regions, changes in precipitation amounts and seasonal patterns in many regions, changes in the intensity and pattern of extreme weather events, and sea level rise. Some of these effects have clear implications for energy production and use." See also, National Academies of Science, *Joint Science Academies' Statement: Global Response to Climate Change*, available at <http://nationalacademies.org/onpi/06072005.pdf> (stating "[t]he scientific understanding of climate change is now sufficiently clear to justify nations taking prompt action."); Intergovernmental Panel on Climate Change, *Summary for Policymakers of the Synthesis Report of the IPCC Fourth Assessment Report* (Nov. 16, 2007), available at http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf.

⁵⁵ See, e.g., 43 U.S.C. § 1732(d)(2)(a) (FLPMA requires BLM to "minimize adverse impacts on the natural, environmental, scientific, cultural, and other resources and values (including fish and wildlife habitat) of the public lands involved.").

Other Issues for Further Analysis

With the exception of climate change, the list of impacts and “significant issues” identified by the agencies and published in the Federal Register looks reasonably complete.⁵⁶ We would urge that special attention be provided several of these issues, including socio-economics, water resources, and transmission.

Socio-economic impacts

As you may already know, the economy of the West is no longer based on extraction of its natural resources. Now, the region’s economy is closely aligned with protection of the environment and especially of the public lands which provide the amenities that residents and visitors alike treasure,⁵⁷ while its new energy economy is increasingly focusing on generation of renewable energy resources. Assuming that siting issues are properly addressed, solar development can be not only consistent with environmental protection, but also supportive of both of these economic trends. At least some, if not all, of the western states that are the subject of this PEIS have adopted Renewable Portfolio Standards requiring that specified percentages of their future energy needs be generated through solar and other renewable energy resources. Many rural areas, including for example, eastern Colorado, are experiencing significant wealth including new jobs, additional income for farmers and an influx of hi-tech and manufacturing companies, combined with increases in local taxes and associated revenues.⁵⁸ We urge you to address these kinds of impacts in the PEIS.

Water impacts

With regard to water, we wish to point out that the West has always been an arid region and that, accordingly, this resource has always been both constrained and of great importance. At least in California and probably in other states that are included in the PEIS, we have many aquifers that have been overdrawn and have experienced two years of drought, as the result of which the state ‘is facing an unprecedented water crisis.’⁵⁹ In addition to the demands placed on current water supplies by burgeoning populations and the agricultural sector, western states face increasing demands for water from the energy sector⁶⁰ – all at a time when climate change is threatening an already limited supply. Utility scale solar projects – aka concentrating solar power (CSP) projects – can use significant amounts of water, at least if they employ traditional “wet” cooling to condense the steam back to water. A dry-cooled parabolic trough plant, for example, will only use water for mirror washing, about 120 liters per MWh, whereas a wet-cooled plant would use roughly 3,000 liters per MWh, most of which is for cooling and a small fraction for

⁵⁶ See 73 Fed. Reg. at 30,911.

⁵⁷ See, e.g., Power, T.M. 1996. *Lost Landscapes and Failed Economies*. Island Press, Covelo, CA.

⁵⁸ Pers. Comm., Tom Darin, Esq., Western Resource Advocates, Boulder, CO.

⁵⁹ See, e.g., press release, “Gov. Schwarzenegger and Senator Feinstein Propose Compromise Plan to Provide California Safe, Reliable and Clean Water, July 10, 2008, quoting the governor (Enclosed as Exhibit 2).

⁶⁰ See, e.g., S. Lipsher, “Shell makes run on water,” *The Denver Post*, May 4, 2008.

mirror washing.⁶¹ Hybrid cooling methods also exist.⁶² The state of California has decided not to leave this important issue up to solar generators to decide: the California Energy Commission (CEC) has announced that it will not approve wet-cooled projects, unless the water to be utilized is wastewater and a contract signed by both parties (i.e., the generator and the municipality) is provided to support this use. We commend this option to the BLM which, as noted above, is responsible for stewarding the resources of the public lands, including water, for the benefit of future generations. Compliance with this mandate could lead the agency to adopt either a broad policy such as that adopted by the CEC or, alternatively, a mandatory, non-waivable best management practice (BMP) for dealing with water.

BMPs

As part of this PEIS process, the agencies should develop a list of Best Management Practices (BMPs) that will adequately protect natural and other resources in areas where development will occur – as was done in the Wind PEIS.⁶³ These procedures should be mandatory, non-waivable applicable to every project that the BLM approves or the DOE supports. What is more, as was the case with the Wind PEIS, this PEIS and the policies that are adopted as the result of this process, should require the development of additional site-specific mitigation measures in connection with environmental reviews of specific projects as appropriate. In this way, the agencies can ensure that all utility scale solar projects provide a minimum level of protection to affected lands and associated resources as well as that additional protection is provided where necessary and appropriate.

Transmission impacts

We were pleased to see that the agencies apparently recognize the importance of addressing transmission issues as well as generation projects.⁶⁴ From our perspective, the link between these two topics cannot be overlooked. Solar (and other renewable projects) are viewed as and supported by the general public as “green” in the belief that they have lower environmental costs than traditional fossil fuels. Attention to transmission needs is as important to maintaining this belief as is attention to project siting. It is likely that many utility-scale solar projects will be sited in remote areas and new transmission lines are likely to be necessary. Siting one (or more) of these projects in an area where the necessary transmission line would need to go through a park is guaranteed to generate huge amounts of controversy as well as contribute to a backlash against these projects.⁶⁵

⁶¹ See Black & Veatch Memorandum dated June 25, 2008, to “Environmental Working Group, Renewable Energy Transmission Initiative, Subject: Relative Economics of Wet vs. Dry Cooling for CSP Plants” at 1.

⁶² See *id.*, referencing a forthcoming DOE and NREL report titled “Reducing Water Consumption of Concentrating Solar Power Electricity Generation.”

⁶³ The Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States that was released by the Interior Department in June, 2005, included a list of BMPs and made their incorporation mandatory for all projects.

⁶⁴ See, e.g., 73 Fed. Reg. at 30,911.

⁶⁵ The so-called Sunrise Powerlink, a transmission line that has been proposed by San Diego Gas & Electric, would run through California’s largest state park allegedly to bring solar energy to San Diego and

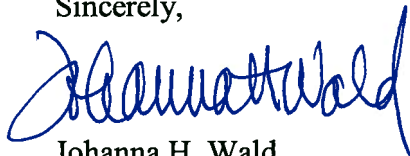
While we welcome the commitment to “consider ongoing transmission planning efforts underway,” more than mere consideration must be given in order to comply with FLPMA⁶⁶ – especially if this PEIS will also be “consider[ing]” “[t]he need to designate additional electricity transmission corridors on BLM-administered lands to facilitate utility-scale solar energy development.”⁶⁷ The ongoing work and work products of California’s Renewable Energy Transmission Initiative (RETI), the Western Governors’ Association Western Renewable Energy Zones Initiative (WREZ) and efforts of individual states need to be incorporated into this PEIS (and vice versa) as well as the results of the West-wide Corridor PEIS.⁶⁸

It is extremely important to plan for transmission smartly – and as comprehensively as possible – relying to the maximum extent possible on existing infrastructure, on technological advances that avoid the need for new lines and on avoiding duplicative lines. Developing solar resources on our public lands should not – and we believe need not – involve the creation of a spider web of new transmission lines and the additive fragmentation of the West’s public lands and wildlife habitats and other environmental damage that would result therefrom. “A poorly sited power line that unnecessarily impacts important public lands and wildlife resources is unacceptable – *even if it connects people to renewable energy resources.*”⁶⁹

Conclusion

In conclusion, we thank you again for committing to preparing this PEIS and for considering our comments. If you have any questions about these comments or think we can help you in any way, please do not hesitate to contact us.

Sincerely,



Johanna H. Wald
Senior Attorney
NRDC



Carl Zichella
Regional Staff Director
Sierra Club

has generated enormous controversy. *See, e.g.,* B.V. Bigelow, “Massive solar plan is linked to SDG&E.” *The San Diego Union-Tribune*, July 1, 2008.

⁶⁶ *See* 43 U.S.C. § 1712(c)(9); 43 CFR § 1610.3-2.

⁶⁷ 73 Fed. Reg. at 30,911.

⁶⁸ For the record, both signatories to this letter are active participants in RETI and one of them, Carl Zichella, is also an active participant in WREZ as well.

⁶⁹ Smart Lines at 9 (emphasis in the original).

Wald, Johanna

Subject: Gov. Schwarzenegger and Senator Feinstein Propose Compromise Plan to Provide California Safe, Reliable and Clean Water

Attachment 1

From: Governor's Office of External Affairs [mailto:governorsofficeofexternalaffairs@gov.ca.gov]

Sent: Thursday, July 10, 2008 4:13 PM

Subject: Gov. Schwarzenegger and Senator Feinstein Propose Compromise Plan to Provide California Safe, Reliable and Clean Water

GAAS:516:08

For Immediate Release:
Thursday, July 10, 2008

Contact: Aaron McLearn
Lisa Page
916-445-4571

Gov. Schwarzenegger and Senator Feinstein Propose Compromise Plan to Provide California Safe, Reliable and Clean Water

Governor Arnold Schwarzenegger and U.S. Senator Dianne Feinstein today proposed a compromise plan to the Legislature to update California's water system by increasing storage, improving conveyance, protecting the Delta's ecosystem and promoting greater water conservation.

"There is an urgent need for comprehensive water reform, and this bipartisan plan is offered as a potential compromise that puts us on the path toward restoring the Sacramento-San Joaquin Delta, expanding water supplies and promoting conservation efforts that will ensure a clean, reliable water supply for California," Governor Schwarzenegger said. "I know that legislative leaders recognize the urgent need to address California's water crisis, and I look forward to working with them to present a plan to voters this November."

"The goal of this plan is to break the long-standing stalemate over water," Senator Feinstein said. "California is facing an unprecedented water crisis. The combination of drought, court ordered water restrictions, global warming, and an increasing population has placed a major strain on the existing infrastructure. We need to prepare now for the future. This language is comprehensive, balanced and could help increase water supplies to meet the needs of the environment, our cities, and agriculture. I hope that all sides can come together around a consensus plan that can be approved this November."

California is facing the most significant water crisis in its history. After experiencing two years of drought and the driest spring in recorded history, water reserves are extremely low and would not be able to meet public demand during a major disruption to the state's water delivery system such as an earthquake or levee breach. With the Sacramento-San Joaquin Delta ecosystem near collapse, court-ordered restrictions on water deliveries from the Delta have reduced supplies from the state's two largest water systems by 20 to 30 percent.

Drought conditions in the Colorado River Basin and a Sierra snowpack is now dangerously unreliable

due to global warming and is leaving many communities throughout California facing mandatory restrictions on water use and/or rising water bills. If the drought continues into next year, the results could be catastrophic to our economy.

Last month, the Governor issued an executive order declaring a statewide drought, which directed his state agencies and departments to take immediate action to address the serious drought conditions and water delivery reductions that exist in California. He also proclaimed a state of emergency in nine Central Valley counties to address urgent water needs: Sacramento, San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, Tulare and Kern.

This year's drought has already significantly damaged California's economy. Agricultural crops are being plowed under, housing and business projects are being delayed, and regional water authorities are instituting mandatory water rationing to a reliable water supply. Due to California's water shortages, thousands of jobs are lost and construction projects are on hold because a water supply cannot be guaranteed.

The crisis is no less severe for our fisheries and critical environmental resources. In two of the past three years, our once thriving Pacific salmon fisheries have been simply shut down as former salmon strongholds throughout the state have become dangerously imperiled. The populations of Delta smelt and other native Delta fish have collapsed to tiny fractions of their former levels. Threats from aquatic invasive species, toxic discharges and pesticides abound. Restoring our fisheries and our riparian ecosystems in the face of all these challenges will require bold action.

The \$9.3 billion bond proposal that the Governor and Senator Feinstein have proposed includes the following elements from all stakeholders and is a compromise approach that will move California toward a reliable water future:

- Increased water storage to ensure our water supply is more reliable year-to-year and we're able to capture excess water in wet years to use in dry years
- Improved water conveyance to reduce water shortages
- Restored Delta ecosystem to allow California to take control of its own water systems
- Increased conservation and tools to use water more efficiently

Safe, Clean, Reliable Drinking Water Supply Act of 2008: A Breakdown

\$2,000,000,000	Water Supply Reliability
	For regional water supply and conservation projects that implement an integrated regional water management plan and to support regional and interregional connectivity and water management.
\$1,900,000,000	Delta Sustainability
	For projects that support delta sustainability options – levees, water quality, infrastructure and to protect and enhance the sustainability of the Delta ecosystem.
\$3,000,000,000	Statewide Water System Operational Improvement
	For water storage projects to improve state water system operations and provide net improvement in ecosystem and water quality conditions.
\$1,335,000,000	Conservation And Watershed Protection

	For ecosystem and watershed protections and restoration, invasive species removal, watershed restoration in fire damages areas, and for fish passage improvement and dam removal.
\$800,000,000	Groundwater Protection And Water Quality
	For groundwater protection, small community wastewater treatment, stormwater management and water quality, and coastal water quality.
\$250,000,000	Water Recycling

The Governor is committed to gaining consensus on a bipartisan legislative solution for California's future.

- In February, Governor Schwarzenegger sent a letter to Senators Perata, Steinberg, and Machado clarifying the administrative actions under consideration as part of a comprehensive solution in the Delta.
- Also in February, the Governor hosted a meeting with Senator Feinstein, legislative leaders and key stakeholders to discuss rebuilding California's water infrastructure.
- In December 2007, the Governor applauded the work of the Delta Vision Blue Ribbon Task Force and committed to continuing to work with legislative leaders on a comprehensive water solution.
- In September 2007, the Governor introduced a comprehensive water infrastructure proposal during the legislative special session, building off of the plan he introduced in January 2007 as part of the 2007-08 budget.
- In July 2007, the Governor directed DWR to take immediate action to improve conditions in the Delta, to help restore its natural habitat and protect the Delta smelt and other species.

###

SMART LINES

Transmission for the
Renewable Energy Economy



SMART LINES

**Transmission for the
Renewable Energy Economy**

ABOUT THIS GUIDE

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WESTERN RESOURCE
ADVOCATES

About Western Resource Advocates: Western Resource Advocates is a nonprofit environmental law and policy organization dedicated to protecting the West's land, air and water.

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About Resource Media: Resource Media provides media strategy and services to nonprofits, foundations and others who are working to protect communities and the environment in the West.

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Part I: Introduction



CLEAN ENERGY: RELIABLE, AFFORDABLE AND BETTER FOR THE WEST

The West is at a crossroads as population growth and rising demand for energy intersect with concerns over air pollution, climate change and increasing impacts to public lands and wildlife resources. Meanwhile, support grows for developing renewable energy from the wind, sun and earth's geothermal stores.

Western states are, in many ways, perfectly positioned to begin an historic shift toward renewable energy. Indeed, the West's transformation to a renewable energy economy is already well underway.

Meeting the West's anticipated energy needs with renewable energy over the next decade and beyond will require new utility-scale generation and delivery through expanded electrical transmission lines as many of the best renewable energy resources are far from major population centers. Given the vast scale of this development, it will be essential to site and configure new energy infrastructure to minimize environmental impacts.

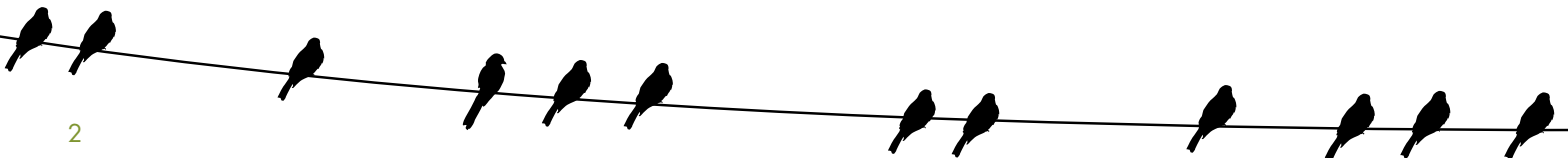
The potential of energy efficiency and distributed small-scale generation, such as rooftop solar, to meet Western energy needs is strong. However these strategies alone can't provide the clean and sustainable energy Westerners need. Without utility-scale wind, solar and geothermal facilities and adequate transmission access, we won't be able to meet future energy demand, much less reduce carbon emissions to levels needed to avoid the damaging effects of climate change.

In the past two years, the prospects for renewable energy development have improved dramatically. Eight of 11 western states have now adopted Renewable Portfolio Standards requiring utilities to generate 15-25

percent of energy demand from renewable sources. The U.S. Department of Energy projects that wind energy could potentially supply 20 percent of the nation's electricity by the year 2030. And in the first quarter of 2008 alone, the American Wind Energy Association reported that industry installed \$3 billion worth of new generating capacity. Solar power also has made significant gains, while efforts to tap additional geothermal energy sources are gathering steam.

But the current lack of transmission capacity could cloud the future of renewables. To ensure the benefits of clean energy are fully realized, Westerners and resource managers must work together to develop the transmission network needed to link wind, solar and geothermal energy to existing grids and to ensure they have equal footing with fossil fuel sources.

The West's near-term projected energy demand, for example, will require the addition of 15,000 megawatts of renewable energy simply to meet the minimum Renewable Portfolio Standard requirements of 2017. That's just the beginning. The Western Governors' Association Clean and Diversified Energy Initiative established adding 30,000 new megawatts of clean energy in the western states over the next decade. Moreover, the governors' Diversified Energy report demonstrated the potential for more than





80,000 megawatts of energy from wind, solar, geothermal and biomass by 2015 if the right incentives and infrastructure are available. Without sufficient transmission capacity, however, the West's clean energy future—and economy—won't materialize.

It is important to acknowledge that developing solar, wind and geothermal resources will have environmental impacts. The tremendous benefits of renewable energy do not eliminate the need to avoid and minimize impacts to Western landscapes and wildlife habitats. Importantly, major planning efforts already underway will decide how to both develop and deliver larger quantities of renewable energy.

Ensuring that these projects capitalize on the region's renewable potential in an environmentally sensitive manner requires the active participation of public lands advocates and wildlife conservationists. Inadequate planning, improper siting, insufficient mitigation and the law of unintended consequences have the potential to link clean energy development to unacceptable—but avoidable—environmental impacts.

The shift to renewables hasn't always been as green as it could be. In the past, poorly sited wind farms have affected birds and bats. Solar power plants can disturb hundreds or thousands of acres. The roads, pipelines and other infrastructure associated with geothermal plants may resemble a gas field. And the new transmission needed to connect these renewable energy sources with cities and towns has the potential to further fragment the West's public lands and wildlife habitat.

While there are a number of ongoing discussions about siting renewable energy projects—particularly wind—the subject of transmission for renewable energy resources needs more attention. This guide is intended to help further that discussion. First and foremost, transmission planning needs to be smart from the start.

The development of new transmission lines is a complex process that can take from five to 10 years. In contrast, large wind farms can be planned and completed in a few years—underscoring the importance of sound transmission planning in the beginning and subsequent stages in order to facilitate responsible renewable energy development in a timely manner.

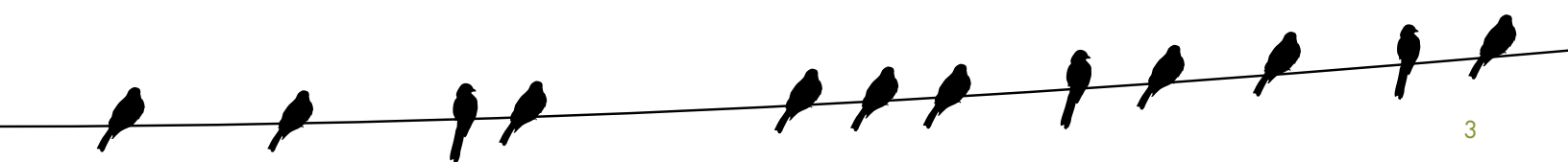
First, efficiency gains and local power generation should be maximized to reduce the overall need for power lines and their associated rights-of-way.

Power line proposals for renewables need careful scrutiny as they can open new conduits for carbon-heavy resources—such as coal—that could ride new transmission lines alongside renewable electricity. Indeed, pairing renewable energy resources with conventional coal on new or upgraded power lines will undermine the climate change benefits associated with the renewable energy economy. To avoid impacts to key western landscapes and wildlife

The West is turning to clean energy. But the future of renewables could be clouded by a lack of transmission.

habitat, the conservation community needs to be engaged early in the planning process, when avoidance and mitigation are most effectively addressed. Some of the key planning principles are outlined in this publication, *Smart Lines: Transmission for the Renewable Energy Economy*.

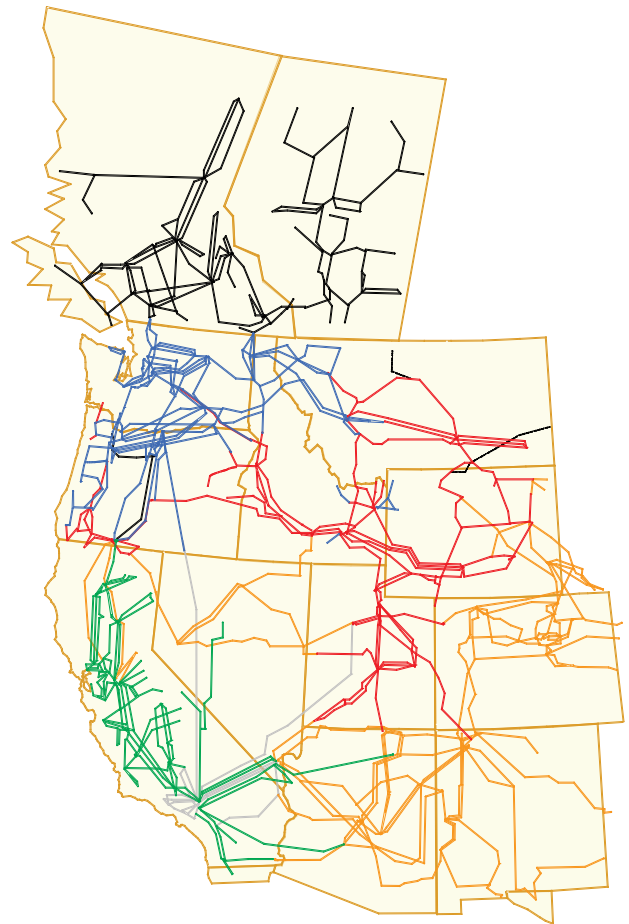
To avoid unnecessary conflict and ensure the timely progress of environmentally smart transmission projects, the public lands and wildlife conservation communities should be advocating for solutions during the critical planning processes that are now moving forward.



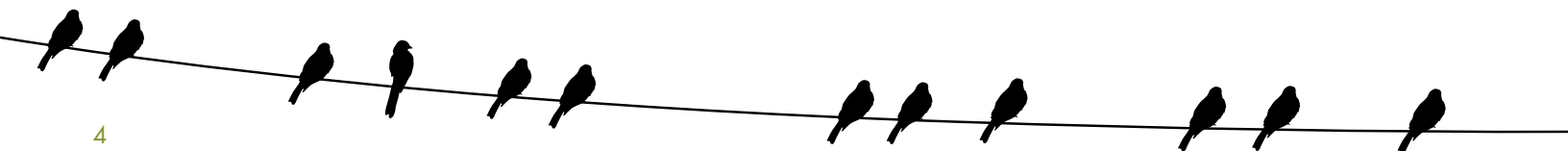


Western states are already developing the projects needed to meet their respective Renewable Portfolio Standards. The time is now for land and wildlife resource interests to advocate for well-planned renewable energy expansion *with linkages* to existing transmission corridors. In some cases, new transmission lines will be needed so that renewable sources can fulfill their promise of delivering a clean energy future for the West.

Without clean energy, we won't be able to reduce carbon emissions enough to ward off the worst impacts of climate change.



WECC
WESTERN ELECTRICITY COORDINATING COUNCIL
Existing power lines in the West, color coded by sub-region.





Part II: Clean energy

CLEAN ENERGY MUST BE GREEN ENERGY

Thanks to the availability of renewable energy sources in the West, wind, solar and geothermal sources will become increasingly important energy players in the region. And given its resources, the West's vast public lands are destined to play a significant role in the future development and transmission of renewable energy.

Despite the benefits of renewable energy, and the key role it will play in combating potentially devastating impacts to wildlife from global warming, the large-scale development of renewable energy resources will still have environmental impacts.

Western lands are home to a number of endangered, threatened or declining species, many of which are vulnerable to habitat fragmentation, disturbance and displacement from the installation of tall structures like transmission towers. In February 2007, the Western Governors' Association approved a resolution titled "Protecting Wildlife Migration Corridors and Crucial Wildlife Habitat in the West," which directed the association to identify key wildlife migration corridors and to make recommendations for habitat preservation.¹

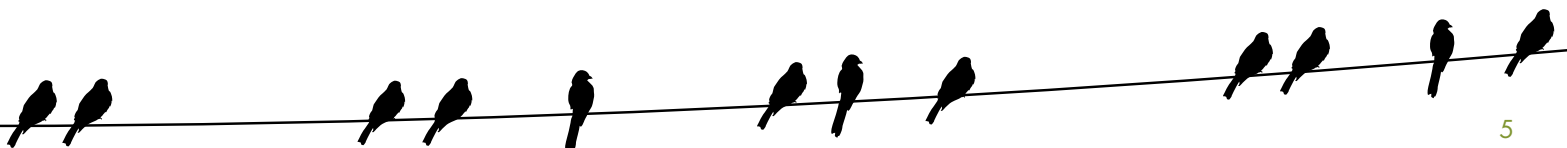
New wind, solar and geothermal projects need to consider foreseeable wildlife impacts before development begins. Currently, the magnitude of impacts from wind energy development on wildlife, particularly migratory birds and bats, is not consistently articulated to wildlife managers, decision makers or the public. Avoiding, minimizing and mitigating harmful impacts to wildlife are important elements of 'green energy' and it is imperative

that renewable energy developers, scientists and natural resource agency specialists cooperate in developing strategies that minimize harm to wildlife.

In general, when siting renewable energy projects:

- Avoidance of key Western landscapes and wildlife habitat is job one.
- Planners should first look to locate renewable generation and transmission projects close to existing corridors or roads in developed, fragmented or otherwise low-value wildlife habitat before considering unfragmented or high-value public lands.
- Requiring best management practices in areas deemed acceptable for development is necessary to keep impacts at a minimum.
- Habitat fragmentation, soil impacts, vegetation disturbance, visual and noise impacts and specific threats to migratory and ground-nesting birds and other species should be considered at the earliest stages of planning.

Projects that are poorly planned and sited, or lack sufficient wildlife mitigation measures, risk losing buy-in from stakeholders.



Part III: Why talk about transmission?



BUILDING A BALANCED ENERGY POLICY

Promoting energy efficiency and local power sources, such as rooftop solar, are important strategies in the effort to build a balanced energy policy in the West. Reducing demand can lessen the need to add new generation sources and transmission facilities.

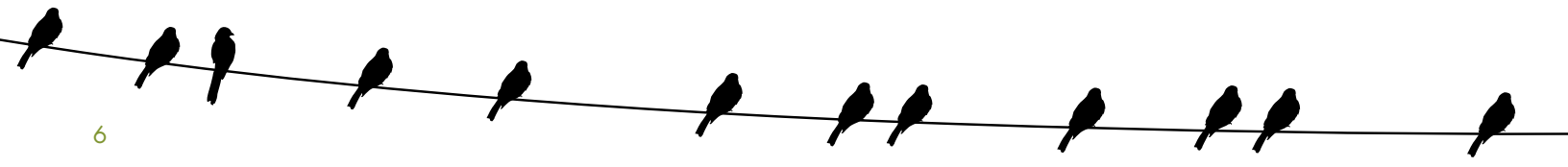
However, efficiency and local generation won't be enough to satisfy future demand, let alone provide the capacity that will be needed to retire older coal facilities in order to make a dent in U.S. carbon emissions. Renewable energy at the utility scale will be required, and in the West, the resources that can provide this type of power are often far from population centers. That means significant new transmission capacity will be needed to tap these resources.

Energy efficiency is a growing part of the West's new energy economy—and it also needs to be commonplace in transmission planning and expansion proposals. In one study, the Western Governors' Association Transmission Task Force found that if high levels of efficiency are reached in the region, 1,150 miles of a projected 4,000 miles of new power lines could be eliminated—approximately 30 percent.² Likewise, rooftop solar can help reduce, but not eliminate, the need for utility-scale renewables. For example, California estimates it needs approximately 20,000 megawatts to meet its Renewable Portfolio Standards goal of 33 percent by 2020. It would take 33 million rooftop installations to accomplish this goal (at the generation rate of the current average-size project).

In 2005, the 11 western states had 7,712 megawatts of installed renewable energy generation capacity, including 4,200 megawatts of wind, 412 megawatts of solar and 3,100

megawatts of geothermal. With eight western states now having Renewable Portfolio Standards, numerous new clean energy projects will be advanced in the next few years. The renewable energy economy will require aggressive investments in renewable energy infrastructure. By 2017, the West will need 15,000 megawatts of renewable energy to meet the bare minimum of state renewable targets, and more than twice that to meet the high renewable energy target set for 2025 by the Western Governors' Association Clean and Diversified Energy Initiative.³

Without transmission, we won't be able to deliver the clean energy projects necessary to combat climate change and build the renewable energy economy.





COMBATING CLIMATE CHANGE

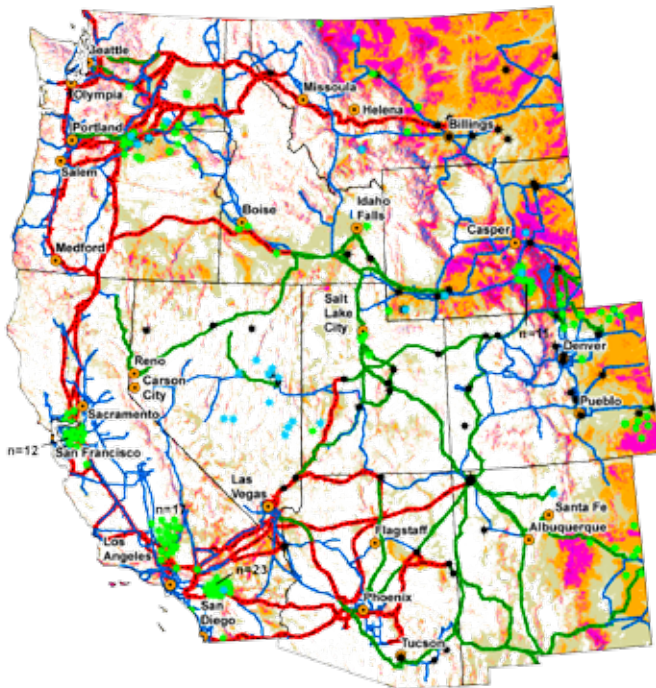
To build a clean energy economy and seriously combat climate change, the West needs to develop large-scale renewable energy projects in renewable rich areas. A major obstacle to getting these sources on the grid and powering western homes and businesses is the availability of transmission.

In fact, the U.S. Department of Energy has concluded that establishing a reliable interstate electricity-transmission superhighway is the critical requirement for achieving a 20 percent wind-power goal. Capacity on the existing grid is absent or minimal—the system under current electrical configurations is maxed out and needs extensive upgrades in many locations. As a result, *thousands of wind turbines in the United States are sitting idle or failing to meet their full generating capacity* because of a shortage of power lines able to transmit their electricity to the rest of the grid.⁴

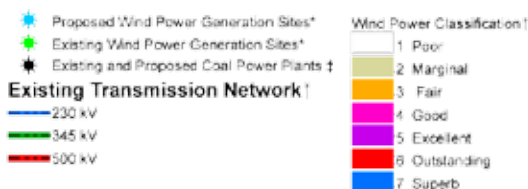
Current proposals call for at least 9,000 linear miles of new or upgraded power lines and associated rights-of-way in the West. Not all of these proposals will materialize, but it is clear the region needs a significant expansion of its aging power grid to accommodate renewable energy development.

Creating this clean energy transmission grid won't require new technical breakthroughs. But it will entail new impacts to federal lands because the best renewable resources have inadequate or no access to transmission.

That means the active participation and cooperation of Westerners is necessary to ensure acceptable projects are developed in a timely manner.



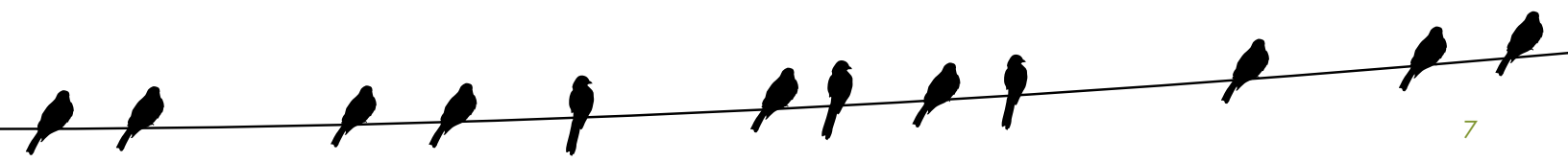
WIND POWER RESOURCES, EXISTING/PROPOSED COAL PLANTS AND EXISTING HIGH-VOLTAGE POWER LINES IN THE WESTERN UNITED STATES



* Data compiled from <http://www.nrel.gov/analysis/2008>, see information on the W. Waters Resource Associates, The Department of Energy, National Renewable Energy Laboratory (2008).

† Department of Energy, National Energy Technology Laboratory (2008).

‡ Global Energy Associates, LLC (2011).





SMART LINES: TRANSMISSION PLANNING PRINCIPLES

Analyze the need for corridors.

The smartest line is the one you don't have to build.

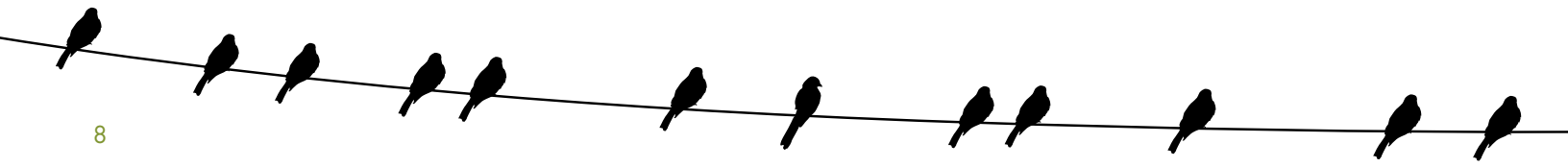
- **EFFICIENCY FIRST:** Employ demand-side management
- Maximize the existing grid
- Connect clean and renewable energy resources
- Ensure long-lasting protection for public lands and wildlife resources

GETTING IT RIGHT FROM THE START

The Western environmental community must get involved in both the renewable generation and transmission-planning processes now underway. Public lands advocates and wildlife conservationists are vital sources of essential natural resource data. They can authoritatively educate planners about where and how renewable energy generation and transmission are acceptable.

If planning and implementation devolve into protracted battles, renewables won't scale up fast enough to have an impact on climate change. Meanwhile, the other benefits that flow from a clean-energy economy, such as a restored tax base, new jobs, high-tech relocations and cost savings to consumers will be lost.

If Westerners aren't able to agree on the need for clean energy and new transmission, renewables won't take hold and we'll be left with yesterday's energy policy. Investors and utilities could fall back on fossil fuel expansion if renewables cannot be delivered on the scale and schedule needed to keep pace with our growing energy demand.





Part IV: Smart Lines

TRANSMISSION PLANNING PRINCIPLES

While energy efficiency and localized energy production such as roof-top solar will make contributions toward meeting future energy demand in major population centers, the bottom line is that Westerners will not be able to aggressively combat climate change without significant additions of utility-scale renewable energy sources.

Without utility-scale wind, solar and geothermal facilities, Westerners won't be able to avoid building new coal-fired power plants, much less retire existing coal plants in order to start rolling back carbon emissions.

In a very fundamental way, the nation's renewable energy transformation hinges on the ability to bring these resources to the market. Two key facts underscore the important role transmission will play in the region's new energy economy.

First, many of the region's best renewable energy resources—Wyoming's impressive wind resources are a perfect example—are far from major population or “load” centers. Renewable energy generation is place-dependent—wind farms need to be built where it's windy; solar plants where it's sunny. Wind, solar and geothermal potential cannot be shipped via rail or pipeline to a power plant for energy production. Generation must take place on-site. Sufficient transmission must be brought to these places in order to bring clean energy resources to market.

Second, the existing power grid in the West is inadequate, both in terms of physical location and overall carrying capacity, to accept large quantities of renewable energy. New and upgraded power lines will be the missing link that brings the West to a new and prosperous energy economy befitting the 21st century.

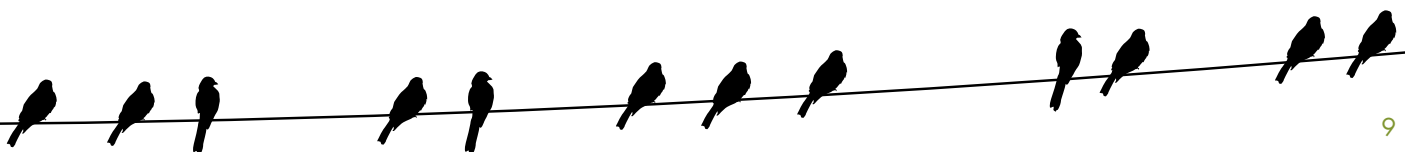
The dilemma is that suppliers cannot crisscross the West with a spaghetti map of new power lines. The resulting transmission network would fragment important wildlife habitat and scar some of the West's treasured landscapes and recreation areas. A poorly sited power line that unnecessarily impacts important public lands and wildlife resources is unacceptable—even if it connects people to renewable energy resources. Transmission planning therefore needs to be careful, thorough and comprehensive in nature.

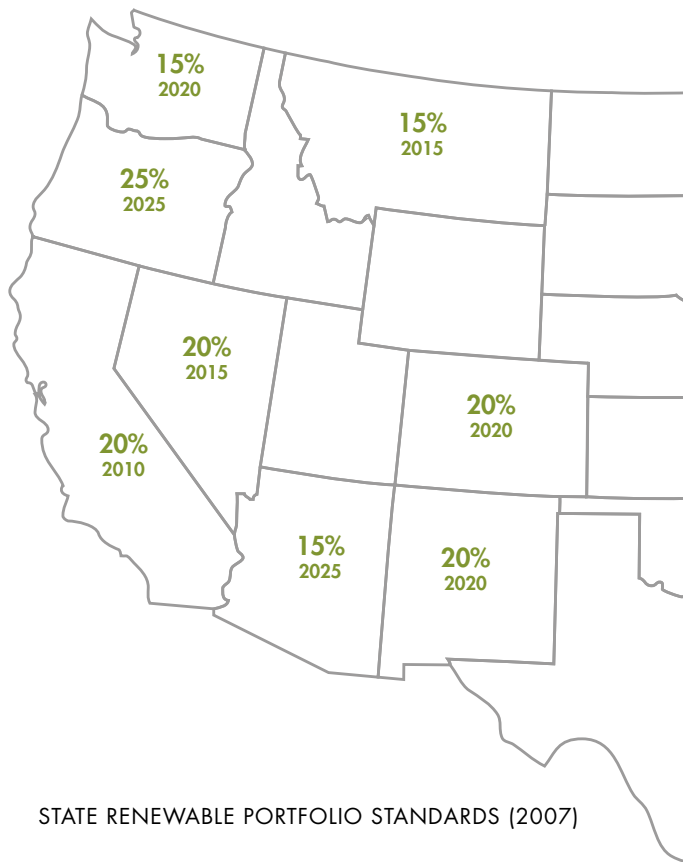
The following four transmission planning principles are essential to ensure we build only Smart Lines for the new West.

STEP ONE—EFFICIENCY FIRST

The smartest transmission line is the one we do not need to build. Decreasing energy demand in our cities through efficiency and other demand-side measures can reduce the need for transmission lines. Alternatives to building new power lines should be exhausted before new projects advance.

One Western Governors' Association study suggested that aggressive investments in efficiency could eliminate the need to build more than 1,150 miles of 4,000 miles of new power lines, a reduction of nearly 30 percent.⁵





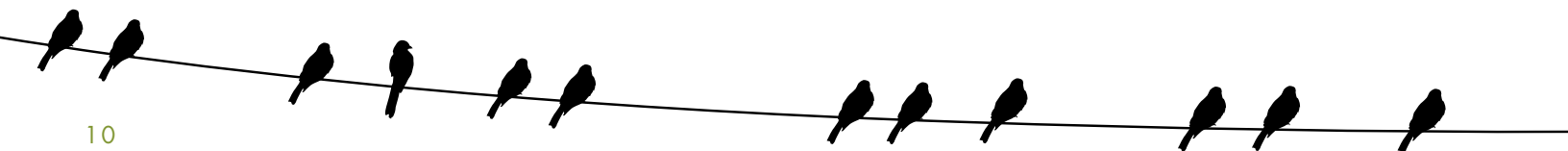
STATE RENEWABLE PORTFOLIO STANDARDS (2007)

STEP TWO—MAXIMIZING THE POWER GRID

More than 100,000 linear miles of high-voltage power lines already exist in the West. Before building new lines, planners should evaluate cutting-edge engineering upgrades for the existing grid, including voltage-class upgrades and more efficient power lines. These technological solutions can reduce the need for some new power lines and their right-of-way clear zones, resulting in fewer impacts to Western landscapes and important wildlife habitat.

STEP THREE—CONNECTING CLEAN, RENEWABLE ENERGY RESOURCES

New or upgraded power lines should be planned and configured to facilitate the development of clean and renewable energy resources. The Western Renewable Energy Zone initiative will help identify the best areas in the West for renewable energy production and transmission. This initiative is important to help set the stage for major renewable energy and supporting transmission projects in the western United States over the next decade.



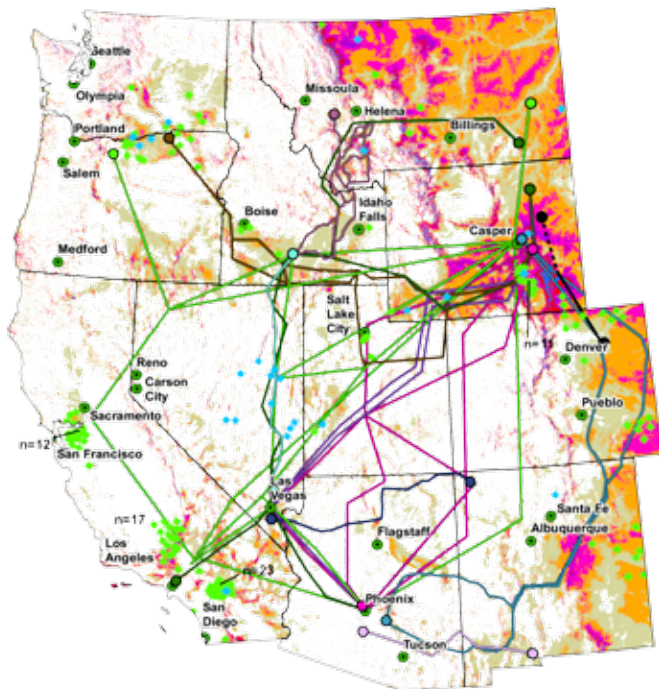


STEP FOUR—SMART ENERGY CORRIDORS TO PROTECT LAND AND WILDLIFE

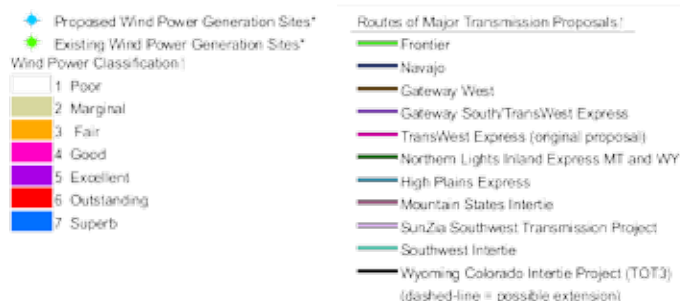
New power lines for renewable energy resources must avoid the iconic landscapes of the American West. The current federal proposal for “west-wide energy corridors” in 11 western states would impact national parks, monuments, wildlife refuges and other wild places. Westerners will not accept new power lines bisecting public treasures such as Arches National Park, Grand Staircase-Escalante National Monument and the Sevilletta and Desert National Wildlife Refuges, for example.

Where new power lines must be located in proximity to critical landscapes, permitting agencies should require industry to use best management practices, such as burying lines to protect visitor experiences or limiting capacity expansion to the upgrade of existing infrastructure, in order to minimize impacts on land and wildlife.

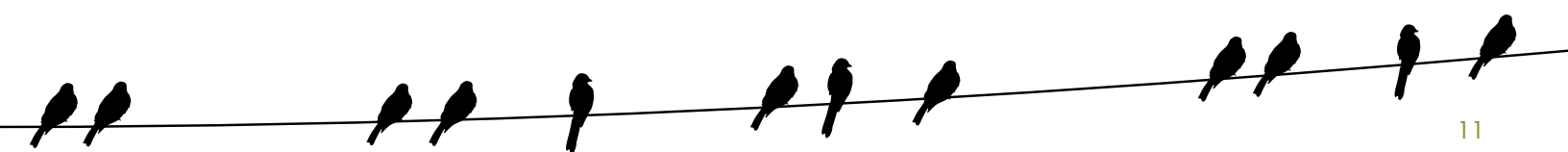
In short, to capture the benefits of the new energy economy and protect the unique resources of the West, planners should exploit demand-side management and existing corridor upgrades to the maximum extent before building new lines to areas of high renewable potential. The smartest line is always the one we don't have to build. For new or upgraded power lines to bring renewable energy resources to market, proper planning and mitigation are essential to ensure long-lasting protection of public lands and wildlife resources.



WIND POWER RESOURCES IN THE WESTERN UNITED STATES AND MAJOR REGIONAL TRANSMISSION PROPOSALS



*Data compilation from <http://www.eia.doe.gov/projects/> (2008) and information from Western Resource Advocates.
[†]The Department of Energy, National Renewable Energy Laboratory (2002).
[‡]Data from the Western Resource Advocates.



Part V: Transmission planning in the West



UNDERSTANDING THE BASICS

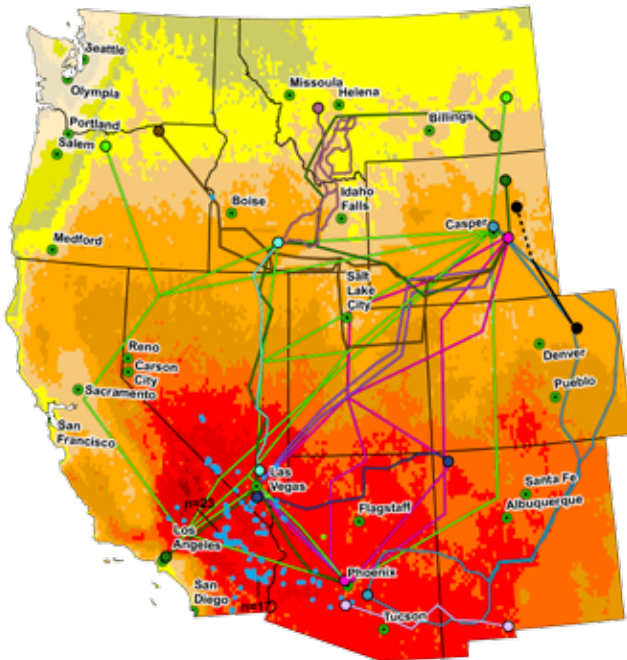
The planning and development of new transmission lines is a complex process that can last 10 years from project inception to commercial operation.

The planning phase of transmission development offers Westerners a critical, early opportunity to help shape well-conceived projects that will serve the new energy economy while protecting the region's unique landscapes and resources. Decisions being made today will determine which resources will connect to transmission lines over the next 10 to 20 years.

Building new transmission generally follows a five-step sequence consisting of the following phases:

- Planning
- Siting and routing
- Permitting, land acquisition and design
- Construction
- Operations, reclamation and decommissioning

Understanding the process will help identify key entry points for conservationists to effectively advocate for smart lines. Focusing on transmission planning and route permitting, here are some key points to remember.



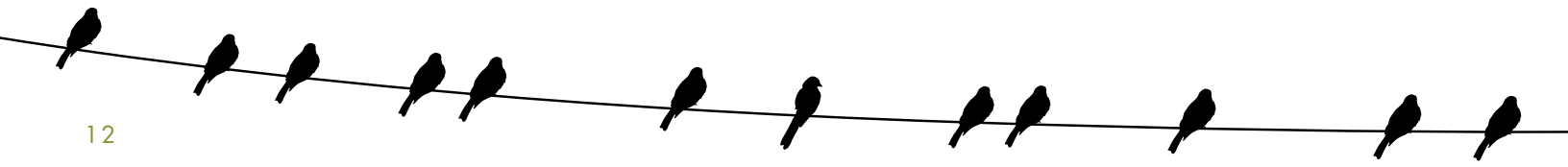
SOLAR RESOURCES AND TRANSMISSION PROPOSALS



* Data compiled from sources at the Interest Energy Alliance (2006).
 † Data on file at Western Resource Advocates.
 ‡ Pending Applications for CSP facilities on public lands (2007) and Global Energy Geoscan (2007).
 † Includes both PV and CSP plants. † Data on file at Western Resource Advocates.
 * The Department of Energy, National Renewable Energy Laboratory (2007).

TRANSMISSION PLANNING

Transmission planning in the West is influenced and facilitated by federal, regional, state and utility initiatives, all of which provide opportunities for stakeholder input. The Federal Energy Regulatory Commission requires transmission planning to proceed in a coordinated, transparent and public manner. Transmission projects are typically announced in the trade press and in public transmission planning venues, each with their own project websites.



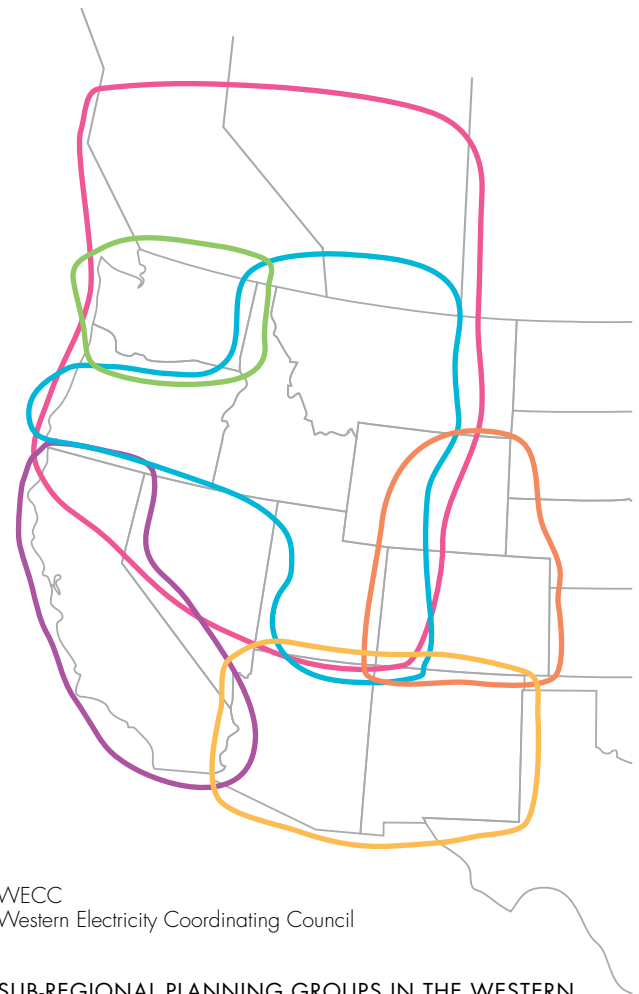


The role of regional and sub-regional transmission planning within the Western Electricity Coordinating Council is important to understand. WECC is the largest regional council of the North American Electric Reliability Council, which coordinates and promotes electric system reliability and transmission planning. Most of the western United States falls within WECC’s jurisdiction. WECC is further subdivided into “sub-regional” planning groups (see map) where major transmission proposals are vetted, coordinated and analyzed.

PERMITTING

Many long-distance transmission projects in the West will involve private, state, federal and even tribal lands. Multi-jurisdictional projects must win approvals from local, state, federal and other authorities. While there is considerable variability in permit approval processes among Western states, state public utility commissions often retain authority for transmission siting. Power lines that would cross over federal public lands must first comply with regulations administered by the National Environmental Policy Act before obtaining a right-of-way.

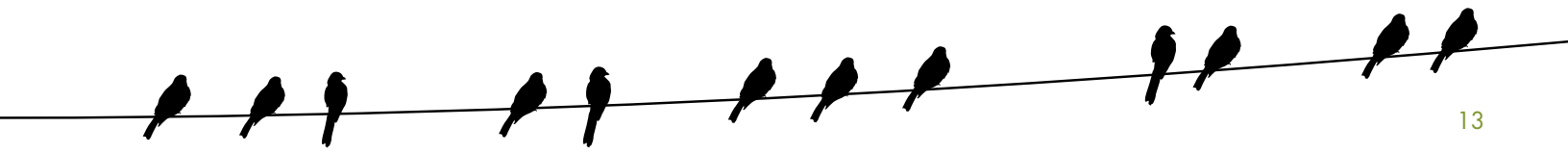
Subsequent to finalization of corridor routes, permits are applied for with applicable county, state and/or federal regulatory agencies. Such permits include requirements to avoid, minimize and/or mitigate the impacts of construction and associated activity, based on studies and input from concerned parties. Once permitted, transmission projects move to the final design, land acquisition, construction, operations and reclamation phases—all important entry points for input on the protection of land and wildlife values.



WECC
Western Electricity Coordinating Council

SUB-REGIONAL PLANNING GROUPS IN THE WESTERN INTERCONNECTION

- NTAC- Northwest Transmission Committee
- Columbia Grid
- NTTG- Northern Tier Transmission Group
- CSPG- California Sub-Regional Planning Group
- CCPPG- Colorado Coordinated Planning Group
- SWAT- Southwest Area Transmission



Part VI: Facts about clean energy



EFFICIENCY, WIND, SOLAR AND GEOTHERMAL

Before talking about clean energy generation, it is important to recognize that the cheapest and cleanest megawatt is the one we can avoid using.

FACTS ABOUT EFFICIENCY

- America is becoming more efficient: Between 1996 and 2002, the economy grew by 21 percent, while energy consumption grew just 2 percent.⁶
- According to the Western Governors' Association, the western United States could easily improve energy efficiency by 20 percent as of 2020 with cost-effective investments in new technologies.⁷
- A 20 percent gain in efficiency could eliminate the need for up to 100 coal plants and associated transmission.⁸
- In addition to new technology savings, individuals can reduce their natural gas use by 20 percent to 30 percent with a comprehensive energy efficiency retrofit.⁹

In certain states, efficiency proposals compete with new generation in state utility bid processes, leading some to describe capacity freed up by efficiency as “negawatts.” But it’s no gimmick: Demand reduction through efficiency decreases the amount of new bulk power generation and transmission needed, which in turn creates opportunities to minimize or avoid environmental impacts. Aggressively integrating efficiency investments with renewable capacity initiatives should be the foundation of smart energy infrastructure planning.

WIND POWER

A wind energy system captures some of the kinetic energy of the wind and transforms it into mechanical or electrical energy that can be harnessed for practical use. Mechanical windmills have been used for decades to pump water in rural or remote locations. Modern electric wind turbines generate electricity for homes and businesses and for sale to utilities.¹⁰

In 2006, the total electric generation capacity in the West was 190,000 megawatts. The following table produced by the National Renewable Energy Laboratory indicates that 750,000 megawatts of wind power could potentially be developed in the region.





**WIND POWER PRODUCTION POTENTIAL BY CLASS
(IN MEGAWATTS)**

STATE	CLASS 4 GOOD	CLASS 5 BETTER	CLASS 6 & 7 BEST	TOTAL DEVELOPABLE POWER CLASS 4-7
AZ	1,670	440	200	2,310
CA	11,900	4,830	4,300	21,030
CO	65,560	3,510	4,060	73,130
ID	2,380	635	395	3,410
MT	237,030	38,860	15,620	291,510
NV	3,700	1,140	720	5,560
NM	62,260	8,980	1,800	73,040
OR	7,130	1,540	850	9,520
UT	2,310	770	410	3,490
WA	7,140	1,590	790	9,520
WY	140,980	59,630	57,040	257,650
TOTAL	542,060	121,925	86,185	750,170

(Source: National Renewable Energy Laboratory 2007)

SOLAR POWER

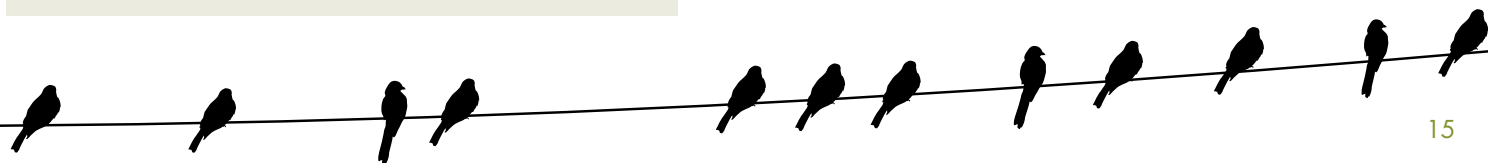
The sunny American Southwest offers some of the best potential for large-scale solar power plant development in the world. Arizona, California, Nevada and New Mexico have the greatest number of “premium” solar sites in the country.¹⁴ Even when limiting estimates to areas of the highest solar potential, more than 7 million megawatts of solar generation capacity could be developed in the Southwest, according to an analysis by the National Renewable Energy Laboratory in Golden, Colorado. Many of these lands are in proximity to Phoenix and Tucson (Arizona) and Las Vegas (Nevada) and to the energy grid supplying Los Angeles and San Diego (California). While the NREL estimate did not screen out sensitive lands and resources that are unsuited for development, it is clear there are still vast opportunities for solar development across the region.



Solel and FPL Energy operate the 354 megawatt Solar Energy Generating Systems in California’s Mojave Desert

FACTS ABOUT WIND ENERGY

- Wind farms comprised more than 30 percent of new generation capacity in the United States in 2007, making wind energy the second largest source of new power generation in the nation behind natural gas.
- At the end of 2007, wind farm capacity totaled about 17,000 megawatts, or less than 1 percent of the country’s electricity consumption.¹¹
- According to the U.S. Department of Energy, the United States could garner 20 percent of its electricity from wind by 2030 — if government agencies and the private sector cooperate.¹²
- Hitting this target would reduce CO₂ emissions by 25 percent and natural gas prices by 20 percent, while creating about 500,000 new jobs and a new source of revenue for private landowners.¹³





HOW SOLAR POWER WORKS

Broadly speaking, there are two types of solar technology: concentrating solar and photovoltaic.

- Concentrating solar power converts the sun's heat into energy with an array of trough-like mirrors that reflect sunlight onto a pipe containing heat-conducting fluid. The fluid drives a conventional turbine connected to an electrical generator.
- Photovoltaic systems (a key source of local or distributed power generation) convert photons in sunlight directly into electricity and are typically installed on rooftops or on land adjacent to buildings, providing electricity to the adjacent structure and sending excess power to the grid. PV systems also are being considered for utility-scale developments.

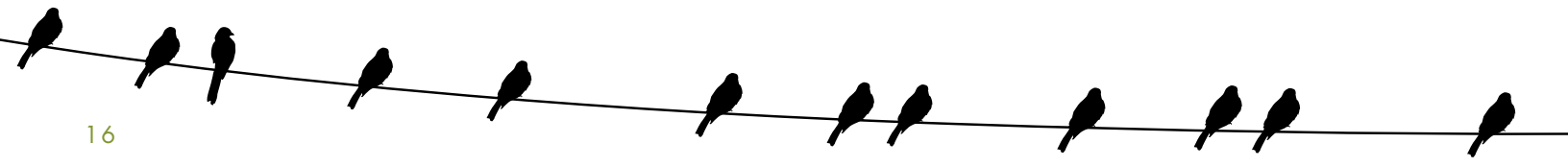
GEOTHERMAL RESOURCES IN THE WEST

Geothermal energy accounts for 17 percent of the electricity generated from renewable sources in the United States. Half of the nation's geothermal energy production occurs on federal land, much of it in California and Nevada, with 90 percent of potential resources located on public lands.

The Western Governors' Association estimates that approximately 5,600 megawatts of geothermal electricity could be developed commercially from some 138 sites around the West by about 2015. This estimate represents known resources. It does not include the potential of undiscovered resources nor does it assess environmental constraints. The infrastructure associated with a geothermal facility may preclude development in sensitive areas. But significant electrical generation potential will remain.

FACTS ABOUT SOLAR POWER

- In 2007, U.S. photovoltaic installations increased by 45 percent. More than 4,000 megawatts of installed capacity is scheduled to come online by 2018.¹⁵ Rooftop solar avoids the need for new transmission.
- In Colorado's San Luis Valley, the Alamosa Photovoltaic Solar Plant, which came online in 2007, generates 8.22 megawatts, or enough power for about 1,500 homes.¹⁶
- Pacific Gas and Electric Co. (PG&E) announced in July 2007 that it had agreed to buy power from a 553-megawatt solar thermal power plant to be located in California's Mojave Desert. The new contract was the largest solar power agreement in the world at the time.¹⁷
- FPL Energy's seven-unit Solar Electric Generating System produces 310 megawatts from mirrors covering 2,000 acres of desert.
- Abengoa Solar announced a contract with Arizona Public Service Co. in February 2008 to build a 280-megawatt solar plant. The 1,900-acre facility would produce enough power to light 70,000 homes, displacing more than 400,000 tons of greenhouse gas emissions annually.¹⁸





HOW GEOTHERMAL POWER WORKS

Geothermal resources, such as steam and hot water, can be used directly to heat buildings and to power greenhouses and aquaculture. It can be used indirectly to generate electric power through steam-driven turbines.

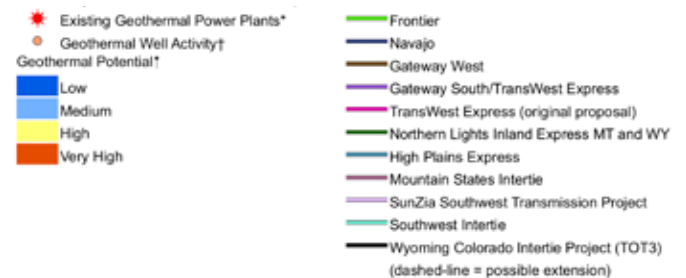
RENEWABLE ENERGY: A BETTER FUTURE FOR THE WEST

OTERO MESA

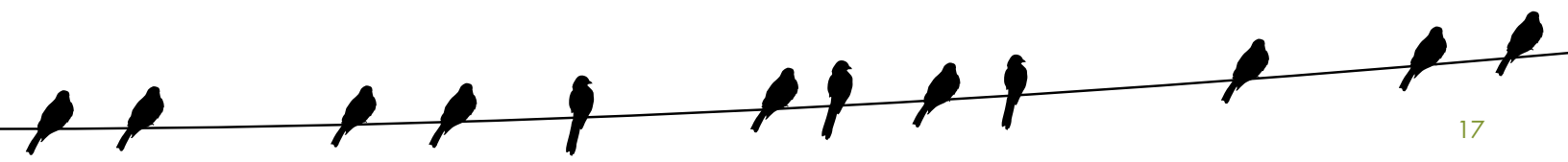
The U.S. Bureau of Land Management estimates that development of Otero Mesa, in southern New Mexico, would yield approximately 68 billion cubic feet of natural gas, barely enough to supply the United States for one day. Developing all of this gas would take up to 20 years. Three new wind farms of 200 megawatts each could offset demand for all of the gas beneath Otero Mesa. Eliminating natural gas development would protect the irreplaceable aquifer beneath the mesa, which could provide water for 1 million people in this arid region for close to 40 years.¹⁹



GEOTHERMAL POWER RESOURCES IN THE WESTERN UNITED STATES AND MAJOR TRANSMISSION PROPOSALS



* Data compiled from sources at the Interwest Energy Alliance and Geothermal Energy Association (2008).
 † Data compiled from sources at the Geothermal Energy Association (2006).
 ‡ Southern Methodist University, Western United States Geothermal Database, available at <http://www.smu.edu/geothermal>.
 § The Department of Energy, available at <http://www1.eere.energy.gov/geothermal/geomap.html>.
 ¶ Data on file at Western Resource Advocates.



Part VII: List of experts



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Part VIII: References



ENDNOTES

¹ Western Governors' Association Resolution 07-01, "Protecting Wildlife Migration Corridors and Crucial Wildlife Habitat in the West," at: <http://www.westgov.org/wga/initiatives/corridors/index.htm>

² Report of the Western Governors' Association Transmission Task Force, pp. 8-9, at: <http://www.westgov.org/wga/initiatives/cdeac/>

³ Western Governors' Association Clean and Diversified Energy Committee report at: <http://www.westgov.org/wga/initiatives/cdeac/>

⁴ The Independent, "Texas wind farms choked off from grid due to insufficient power lines," at: <http://www.independent.co.uk/news/business/news/texas-wind-farms-choked-off-from-grid-due-to-insufficient-power-lines-838979.html>

⁵ Western Governors' Association Resolution 07-01, "Protecting Wildlife Migration Corridors and Crucial Wildlife Habitat in the West" at: <http://www.westgov.org/wga><http://www.westgov.org/wga/initiatives/corridors/index.htm>

⁶ Western Resource Advocates, Comments to U.S. Department of Energy on Energy Policy Act of 2005.

⁷ Western Governors' Association, Energy Efficiency Task Force Report, October 2005 at: <http://www.westgov.org/wga/initiatives/cdeac/Energy%20Efficiency.htm>

⁸ Ibid.

⁹ Southwest Energy Efficiency Project at: <http://www.sweep.org>

¹⁰ Wind energy FAQ, American Wind Energy Association, available at: http://www.awea.org/faq/wwt_basics.html

¹¹ American Wind Energy Association fact sheet: "2007 – A Record Year," available at: http://www.awea.org/Market_Report_Jan08.pdf

¹² U.S. Department of Energy, 20% Wind Energy by 2030: Increasing Wind Energy's Contribution to U.S. Electricity Supply, available at: <http://www.20percentwind.org/20p.aspx?page=Report>

¹³ Ibid.

¹⁴ Mark Mehos, National Renewable Energy Laboratory and Brandon Owens, Platts Research & Consulting, "Siting Utility-Scale Concentrating Solar Power Projects," 2005, pp 3-4 at: <http://www.nrel.gov/docs/fy05osti/37086.pdf>

¹⁵ Testimony of Alex Marker, Solar Energy Industries Association board chairman, to the US Helsinki Commission at: <http://seia.org/MarkerCommissionStatement050308.pdf>

¹⁶ The Denver Post, "San Luis solar plant throws switch," at: http://www.denverpost.com/search/ci_6856305

¹⁷ PG&E press release at: http://www.pge.com/news/news_releases/q3_2007/070725a.html

¹⁸ Abegnoa Solar press release at: <http://www.solucar.es/sites/solar/en/noticia6.jsp>

¹⁹ New Mexico State Water Plan at: http://www.ose.state.nm.us/publications_state_water_plans.html

