RE-Powering America's Land:
Siting Renewable Energy on Potentially Contaminated Land and Mine Sites

The Casper Wind Project Uses a Collaborative Public Participation Process to Successfully Site Renewable Energy on Contaminated Land in Wyoming

During an effort to remediate a former refinery, Chevron designated a different area of its property for the 16.5-megawatt (MW) Casper Wind facility, creating a productive use for otherwise idle land. Though the project initially faced opposition in the community, Chevron worked collaboratively through a public engagement process to respond to environmental and aesthetic concerns and successfully complete the wind power-generating facility.

EPA's *RE-Powering America's Land* Initiative

Through its *RE-Powering America's Land: Siting Renewable Energy on Potentially Contaminated Land and Mine Sites* initiative, the U.S. Environmental Protection Agency (EPA) identified more than 11,000 EPA-tracked sites and nearly 15 million acres that have potential for developing solar, wind, biomass and geothermal facilities. Using potentially contaminated land and mine sites to develop renewable energy facilities can:

- Reduce development pressure on greenfields
- Provide access to exisiting infrastructure, such as transmission lines and roads
- Result in faster permitting and zoning times
- Create jobs
- Reduce blight and revitalize communities

In short, siting renewable energy on potentially contaminated sites contributes to sustainable communities.

Casper Wind's 11 turbines

What is RCRA Corrective Action?

The Resource Conservation and Recovery Act (RCRA) Corrective Action Program is run by EPA and 43 states and territories. It is designed to investigate and guide the cleanup of contaminated air, ground water, surface water or soil from hazardous waste management of spills or releases into the environment. Releases of hazardous waste and hazardous constituents are a result of past and present activities at RCRA-regulated facilities.

Ongoing Remediation of Refinery Site Limits Reuse Options

Casper, Wyoming, has a long history with the oil and gas industry; it has supported petroleum refineries since 1895, with various refinery operations having been established and closed over the years. The former Texaco Refinery was constructed on the North Platte River near Casper in the early 1920s and was operational until 1982. It processed crude oil from local wells into gasoline, diesel fuel, asphalt and petroleum coke, and at the time of closure, had a capacity of 21,000 barrels per day. Decommissioning of the facility by Chevron began in 1995 and cleanup of petroleum-contaminated soil and ground water has been ongoing since. Chevron assumed responsibility for the refinery's cleanup in 1998, when the company merged with Texaco. The site cleanup has been managed since by Chevron Environmental Management Company (CEMC). In addition to the refinery that occupies the southern portion of the site—the property includes 880 acres of industrial-zoned land extending 3.5 miles north of the North Platte River. The property is divided into its northern and southern portions by the River itself.

"Chevron's Casper, Wyoming, site not only provided an excellent opportunity and location for the company's first wholly owned wind facility, but the Casper Wind Farm also brings the former refinery site back into energy production with renewable energy."

—Greg Vesey
President, Chevron Global Power Company

Under the Resource Conservation and Recovery Act (RCRA) Corrective Action Program, the entire property is subject to site-wide corrective action to clean up petroleum-contaminated soil, ground water and surface water and protect the North Platte River from release of contaminants. CEMC is working on the site's cleanup with the Wyoming Department of Environmental Quality (WDEQ), the lead regulatory agency for the corrective action under its Voluntary Remediation Program (VRP). Much of the site's contamination is confined to the southern portion, on which refinery operations took place. The 880-acre northern portion was used for evaporation ponds that held treated refinery wastewater. An investigation of sediment in the ponds on the northern portion of the property in 2006 showed levels of polynuclear aromatic hydrocarbons (PAHs); however, it was determined that the ponds did not pose a threat to human health or ecology, and no

Key Project Stakeholders

- **Site owner:** Chevron Environmental Management Company (CEMC)
- **Developer:** Chevron Global Power
- **Financing:** Chevron Global Power
- **Local government:** Natrona County, Wyoming
- **State agencies:** Wyoming Department of Environmental Quality (WDEQ)
- **EPA:** RCRA, Region 8
- **Other federal agencies:** U.S. Fish and Wildlife Service
- **Utility:** Rocky Mountain Power

A 1.5 MW wind turbine being installed

What are Renewable Energy Credits (RECs)?

RECs are tradable certificates representing electricity generated from renewable resources. Renewable energy projects create two products with value: 1) the electricity generated, which can be sold to utilities and consumers; and 2) RECs, which often represent the avoided emission of greenhouse gases (GHGs), and can be sold, traded or bartered. Utilities and other parties may purchase RECs from renewable power generators to comply with state requirements or voluntary green power standards. Though the market for RECs is still developing, the sale of RECs can potentially help finance renewable energy projects.

cleanup was necessary. WDEQ designated the property as a "Use Control Area" (UCA) with institutional controls established to restrict the property's future use.

Based on human health and ecological risk assessments, the WDEQ agreed in June 2007 to develop a separate VRP remedy agreement for the site's northern portion in order to facilitate its reuse. Making use of a separate VRP remedy agreement allowed for remediation and reuse of this less-contaminated portion of the property in ways that ensured the safety of human health and the environment. Selected non-contaminated areas of the property's northern portion were identified as appropriate for industrial use (including facilities for treating impacted ground water), while other areas along the North Platte River were deemed safe for recreational use.

The Property's Northern Portion is Evaluated for its Wind Power Potential

Chevron Global Power Company (CGP) develops, generates and sells power and associated services and currently operates over a dozen power generation facilities worldwide. CGP saw promise in the property's northern portion for a small-scale, commercial wind project because of its excellent wind energy potential.

The Casper site was CGP's first wind power project. Chevron began assessing the area for its wind power potential in 2006 using three metrological towers erected around the site. The site's average potential for wind energy production of 500-600 watts per square meter of land at a height of 50 meters puts the site in the top 10% of locations in the United States for wind speed and reliability. The company identified the optimal location for 13 planned 1.5 MW turbines, including connecting power lines and a substation, based on wind speed, constancy and proximity to existing power lines (from the site's industrial past).

Many sites with excellent wind potential are located in remote areas far from existing infrastructure, and the high cost of building electrical transmission infrastructure can be prohibitive for new wind projects. The Casper site's existing electrical transmission infrastructure gave the project built-in capacity for installing the wind turbines and connecting them to the electrical grid. Chevron cited this property's location as a significant driver for wind power development, as it enabled the company to avoid the substantial cost of constructing roads and power lines.

Financing for the Project is Provided by Chevron Global Power and by a PPA with PacifiCorp

Chevron secured a long-term a power purchase agreement (PPA) with the local utility, Rocky Mountain Power for the electricity it would generate. PPA agreements between utilities and developers are contracts to purchase the electricity and Renewable Energy Credits (RECs) generated at the site. PPAs significantly reduce the risk associated with renewable energy projects by creating a long-term market for the electricity generated.

As is the case with many renewable energy developers, Chevron's financial feasibility data inputs are considered proprietary information and cannot be disclosed publicly. For most projects, the search for investors and lenders can be a time-consuming element of the renewable energy development process, as investors have their own financing criteria to consider in addition to those of the developer. In this case, financing was expedited because Chevron Global Power was able to carry the full financial risk of the Casper Wind project and independently evaluate the project based on its own criteria for return on investment. The project qualified for the federal Renewable Energy Production Tax Credit, which provides a 2.1¢ per kilowatt-hours (kWh) tax credit for electricity generated, generally for 10 years after the date the facility is placed in service. In lieu of the Production tax credit,

[1] *Wind Energy Resource Atlas of the United States* Pub. No. DOE/CH 10093-4. National Renewable Energy Laboratories, U.S. DOE, 1986. www.nrel.gov/gis/wind

the facility also qualified for an Investment Tax Credit, or a grant in place of either tax credit, under the American Recovery and Reinvestment Act of 2009.

Chevron Addresses Environmental Concerns in the Permitting and Approval Process

The project required approval from WDEQ to disturb soil by excavating tower foundations at the site. In addition, a conditional use permit from the Natrona County Planning and Zoning Commission was required to begin construction and develop the land as a wind farm. The site's UCA status prohibited Chevron from disturbing the soil, but in 2007, WDEQ provided a determination that soil on the northern portion of the property was not contaminated, permitting Chevron to excavate for improving roads and erecting turbines and electrical feeder lines. Permission from County authorities was more difficult to obtain, as this was the first proposed wind farm in Natrona County and there was some opposition from nearby residents based on aesthetic and health concerns.

> *"We've seen here in Casper that community involvement early is necessary and beneficial."*
>
> —Bill Reese
> Project Manager, Chevron Global Power

Timeline of Key Project Steps

- **1982:** Texaco Casper Works Refinery closes
- **1986:** Refinery is decommissioned and environmental remediation begins
- **1998:** CEMC assumes liability for cleanup following Chevron-Texaco merger
- **2006:** CEMC proposes wind power development on the North North Property
- **2006:** An ecological risk assessment for the North Property shows no evidence of contamination in the area being considered for wind power
- **2006:** Chevron installs meteorological towers to evaluate the site's suitability for wind power; begins meeting with local government and community members
- **2007:** WDEQ allows separate VRP remedy agreement for less contaminated North Property, allowing reuse subject to institutional controls
- **March 2008:** USFWS evaluates potential avian mortality from wind turbines
- **December 2008:** Natrona County grants permission for redevelopment of former refinery property as industrial/commercial site
- **February 2009:** Natrona County grants a conditional use permit allowing the installation of 11 wind turbines
- **June 2009:** Construction of the Casper Winds Facility begins
- **December 2009:** Casper Winds begins generating electricity

The portion of Chevron's property considered for wind power development is adjacent to Brookhurst and Sandy Lakes, neighborhoods zoned for rural residential and urban agricultural use. While the entire refinery site had always been industrial land and an energy transmission corridor, the part of the site adjacent to Sandy Lakes was undeveloped. While several neighbors were supportive of the project, others were concerned about the visual impact of the towers and the noise they would generate. Some residents with property adjacent to the site questioned the safety of the towers and voiced concerns that buffer zones around each turbine would prevent them from being able to develop their land.

The public's environmental concerns included the project's effect on vegetation, birds and wildlife habitat, in addition to the potential for releasing contaminants and dust from excavation. Ponds on the property provide a source of water to aquatic birds in an otherwise arid landscape. Concern over potential bird and bat mortality led to an avian and bat study by a Chevron Global Power subcontractor. A three year wildlife study was conducted prior to construction. The studies determined that potential impacts on birds and wildlife from the project would be minimal because of the wide spacing between the turbines. To reduce the potential effect on birds, CEMC adjusted the locations of the turbines, eliminating two of the 13 proposed turbines nearest to the ponds. Scaling back the project was not required, but the concession to this environmental issue increased the project's feasibility in the planning and permitting process.

Addressing public concern over the project's impact was essential to the viability of the project. Before funding was approved by Chevron and building permits were issued, CGP began seeking community input. Chevron Global Power Company began holding public meetings in 2006 to open dialogue with the community and gather input on environmental, social and community issues associated with the proposed wind farm. Chevron involved representatives from the local government and WDEQ, and presented wind and environmental impact studies. Over a three-year period, 25 public meetings were held to discuss and resolve these aspects of the project.

The project had the support of local officials, including the mayor of nearby Evansville, who saw Casper Winds as a win for the community in providing clean energy and an increased tax base. Two additional proponents of the project included the Casper Area Chamber of Commerce and Casper College, which created a renewable energy program that could provide a skilled workforce for the Casper Wind Farm and other wind power projects in the state.

[2] Chevron Environmental Management Company Former Texaco Casper Refinery Draft Remedy Agreement. WDEQ, 2009

Natrona County Clarifies Zoning for Wind Power and Approves the Project

The Casper Wind project was the first proposed commercial wind project in Natrona County; there were no existing county zoning regulations regarding wind turbines. Responding to the community's concern over the Casper Wind project, the county adopted regulations for wind energy in September 2008. According to the amended zoning rules, developers must apply for a conditional use permit and meet the regulation's siting guidelines. Under the regulations, each turbine is required to have a buffer zone with a radius 10 percent wider than the tower height (e.g., a 440-foot radius for Casper Wind's 400-foot towers) and be located at least a quarter mile from any structure. The regulations also require an interior buffer around the edge of the property. While the amended zoning rules did not substantially change the design of the project, Chevron modified the placement of the tower to conform to the buffer requirement and mitigate potential impacts on birds.

Technical Specifications

- **RE technology installed:** GE Energy 1.5 MW SLE Model Wind Turbines on 60m towers
- **Maximum generating capacity:** 1.5 MW per turbine (16.5 MW total)
- **Expected system life:** 20-25 years
- **Reduction in GHG emissions:** 40,827 tons of carbon dioxide annually
- **Jobs leveraged:** Approximately 20 construction jobs, 1.5 permanent jobs

In February 2009, the Natrona County Board of Commissioners granted Chevron's request to permit the installation. The Board's decision took the objections of neighbors into account, but granted the conditional use permit, reasoning that the land had been an energy corridor and that the project now conformed to the new county regulations on wind farms. The Casper Wind project as planned had met all the zoning requirements, but complaints from nearby landowners revealed a need for more comprehensive zoning regulations. Anticipating a growing need for clarity in its wind power zoning to help avoid disputes between landowners and developers in the future, the county amended the regulations it had adopted in response to the Casper Wind Power project. The revised regulations give the Board of Commissioners more control over granting conditional use permits and enable the public to better participate in the permitting process. The regulations establish a half-mile buffer between wind turbines and established municipalities, require the developer to provide studies on noise from turbines, and provide for decommissioning projects and land reclamation.

Construction Begins on Casper Wind Project

The project broke ground in June 2009, when Chevron began building and improving access roads and constructing tie-in lines to an existing substation. In the fall of 2009, eleven GE 1.5 MW turbines were installed on the property's northern portion. Other structures on the site include one permanent meteorological tower and an operations and maintenance building. The wind farm began commercial operations in December 2009. According to Chevron, the 16.5 MW-capacity wind farm generates enough electricity to meet the annual need of approximately 4,000 homes. During construction, Chevron used approximately 20 local contractor companies. After completion, a Casper native became the operations and maintenance manager of the site, a full-time position created by the Casper Wind Farm. The project also created one full time and one part-time operations and maintenance position.

Casper Wind Benefits Chevron and the Community

The Casper Wind project took three years to go from planning to operation: the monitoring towers were installed in 2006, environmental site preparation was completed in 2007, and 25 public meetings were held from 2007 through 2009. Though the project initially faced some opposition on environmental and aesthetic grounds, the developers' transparency and engagement with local authorities and the public were key contributors to its eventual success.

Contacts For More Information

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This formerly idle and environmentally degraded land is now a symbol of environmental stewardship that benefits Chevron, the community and the environment. While cleanup options are still being explored for the southern portion of the property where refinery operations took place, Chevron was able to return the property's northern portion to productive and sustainable use, diversify the company's energy assets with renewable wind energy, and enhance their capacity for developing wind power projects at other Chevron facilities. Natrona County benefits from expansion of its power grid with an emissions-free energy source, new jobs and an expanded tax base due to the increased property value of the developed site. While development of the county's first wind power project caused contention among some neighbors, the county used the experience to clarify its regulations for managing future renewable energy development. The completed project highlights the value of collaboration between business, government and community stakeholders for successful renewable energy development.