

11 GREENHOUSE GASES

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This chapter describes the environmental and regulatory setting for greenhouse gases, identifies the greenhouse gas emissions from the construction and operation of the Montezuma II Wind Energy Project, evaluates their impacts, and considers mitigation measures to address the impacts found to be significant.

The calculations for quantification of greenhouse gas impacts in this section reference the “Revised Air Quality Study for the Proposed Montezuma II Wind Project” prepared by ICF International (ICF International Air Quality Study), CARB guidelines for evaluating greenhouse gases under CEQA, and Solano County data on wind performance. The ICF International Air Quality Study used URBEMIS to quantify emissions. Point Impact has updated the study where appropriate to reflect changes in the project since October 2010.

11.1 GREENHOUSE GAS SETTING

Greenhouse gases (carbon dioxide, nitrous oxides, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride) are compounds that absorb radiation and contribute to the heating of the atmosphere. Different greenhouse gases have different potentials to contribute to warming. Calculations of greenhouse gases often express emissions in terms of carbon dioxide equivalent (CO₂e), a metric that is the product of the amount of each compound and a factor representing that compound’s warming potential relative to the warming potential of carbon dioxide. Most members of the scientific community agree that the accumulation of greenhouse gases in the atmosphere contributes to a wide range of climate change effects, including sea level rise, fluctuations in rainfall, incidence of flooding, ocean acidification, and changes in species habitat ranges. Climate has the potential to result in serious economic and public health consequences. Local, state, and national governments, as well as international organizations, have adopted and are considering adopting laws, regulations and policies to reduce emission of greenhouse gases and adapt to the impacts of climate change. Section 11.3, Greenhouse Gases Regulatory Setting, describes national, California, and Solano County regulatory efforts to address greenhouse gases and climate change.

The State of California has adopted Assembly Bill 32 (AB 32), the California Global Warming Solutions Act of 2006, requires the reduction of greenhouse gas emissions in California in order to reduce potential climate change impacts, reduce dependence on oil, diversify energy sources, save energy, create new jobs, and enhance public health. The California Air Resources Board (CARB) estimates that sources within the state emitted just over 460 million metric tons carbon dioxide equivalent (MMT CO₂e) in 2010. The state aims to reduce emissions to 1990 levels, or 427 MMT CO₂e by 2020 (CARB 2010a). In 2008, greenhouse gas emissions from electrical generation for California markets amounted to 116 MMT CO₂e, or about one quarter of the total California greenhouse gas emissions. Pursuant to this goal, the state adopted renewable portfolio standards requiring utilities to obtain 20 percent of electricity from renewable sources by 2020. In 2008 and 2009, Governor Schwarzenegger issued executive orders calling upon CARB in cooperation with the California Public Utilities Commission (CPUC) to implement standards requiring that utilities acquire 33 percent of electricity from renewable sources by 2020. CARB and the CPUC have not yet adopted regulations implementing this order (Executive Orders S-21-09 and S-14-08) and the legislature is also considering a bill implementing the 33 percent standard.

In 2008, natural gas combustion generated over 45 percent of electricity consumed in California, with coal generation accounting for about 18 percent, nuclear for about 15 percent, large hydro for 11 percent, and renewable energy generation accounting for over 10 percent of electricity consumed in California (CAISO 2009). In-state wind energy facilities produced approximately 5,700 gigawatt hours (GWhr) in 2009, supplying almost 2 percent of the more than 300,000 GWhrs consumed (CAISO 2009). Wind energy does not produce power from the combustion of carbon fuels, and the generating equipment itself does not emit any greenhouse gases. A typical wind facility, however, results in some greenhouse gas emissions during construction, from vehicles during maintenance, and may have a back-up generator that supplies power to the substation in the event of a grid loss.

Power generation from wind facilities typically displaces incremental power provided to respond to load changes (marginal power). In California, natural gas conventional combustion turbines or combined cycle plants typically provide incremental power. These natural gas plants, typically peaking plants or combined cycle plants, are able to change their energy output quickly and with relatively small efficiency losses, especially when compared to coal-fired power plants, which are very inefficient at low capacity and slow to shut down or power up. Because wind energy is an intermittent resource, integrating wind generation into the grid may require marginal power plants to fluctuate and result in small increases in greenhouse gases emissions. The extent of these inefficiencies and their impact on greenhouse gas emissions depends on a variety of factors, such as the grid composition, the load profile, and the time of day that a wind facility generates power (CAISO 2010). CARB estimates that renewable wind generation in California would displace an average of 830 lbs CO₂e emissions per MWhr supplied in 2020 (CARB 2010b).

The Montezuma II project area currently contains approximately 200 100 kW turbines that are part of the enXco V project. Operation of these turbines, which is part of the baseline site conditions, results in emissions of greenhouse gases and displacement of greenhouse gases from marginal grid generation. According to URBEMIS calculations in the ICF International Air Quality Study, operation of the existing enXco V turbines results in about 2,547 MT CO₂e emissions per year from maintenance worker commutes. Point Impact used production data furnished to the County by the project operator to estimate that the approximately 190 existing turbines in the project area produce approximately 34,000 MWhrs per year and, based on the marginal power emission factor above, displace almost 15,000 MT CO₂e annually. The existing enXco V project therefore results in net annual greenhouse gas reductions of approximately 10,000 MT CO₂e.

11.2 GREENHOUSE GAS REGULATORY SETTING

Federal, state, and local laws, agencies, and plans regulating public utilities and services apply to the proposed project.

11.2.1 Federal

The Clean Air Act (CAA) establishes the United States Environmental Protection Agency's (EPA's) responsibilities to protect and improve the nation's air quality. The EPA issued the Final Greenhouse Gas Tailoring rule on May 13, 2010, amending its regulations implementing the CAA to include greenhouse gas emissions and requiring subject facilities to report greenhouse gas emissions for the purpose of gathering greenhouse gas information to address greenhouse gas emissions and climate change under the CAA. The purpose of the tailoring rule is to gradually phase in reporting

of greenhouse gases, starting with large stationary sources in January 2, 2011. As of January, sources that report air emissions under Title V and emit more than 75,000 MT CO₂e per year are subject to reporting of greenhouse gas emissions. Subject facilities may include electricity generating facilities, fossil fuel suppliers, and other large emitters (EPA 2010).

11.2.2 State

California has adopted legislation, climate action plans, and regulations to address climate change and the emission of greenhouse gases.

Greenhouse Gas Legislation, Orders, Plans, and Guidelines

A summary of relevant greenhouse gas legislation in California is presented below:

AB 4420 (1988). This bill directed the California Energy Commission (CEC), in consultation with CARB and other agencies, to study and report on how global warming trends may affect California's energy supply and demand, economy, environment, agriculture, and water supplies.

AB 1493 (2002). This bill requires CARB to develop and adopt regulations that achieve the maximum feasible and cost-effective reduction of greenhouse gases from motor vehicles.

AB 32 (2006). This bill requires statewide greenhouse gas emissions be reduced to 1990 levels by 2020. Reductions to be accomplished via enforceable statewide cap on greenhouse gases are to be phased in starting in 2012. The bill directs CARB to develop and implement regulations to reduce statewide emissions from stationary sources and specifies that regulations adopted in response to AB 1493 be used to address greenhouse gas emissions from vehicles. Requires CARB adopt a quantified cap on greenhouse gas emissions representing 1990 emissions levels. The bill includes guidance to institute emissions reductions in an economically efficient manner and conditions to ensure that businesses and consumers are not unfairly affected by the reductions. This is the first statewide program in the country to mandate an economy-wide emissions cap that includes enforceable penalties.

Senate Bill (SB) 1368 (2007). This bill, a companion bill to AB 32, requires the California Public Utilities Commission (CPUC) to establish greenhouse gas emission performance standards for investor- and publicly-owned electrical generation facilities. This bill also requires that all electricity provided to California, including imported, be generated by plants conforming to standards set by CPUC and CEC.

SB 97 (2007). This bill directed the Governor's Office of Planning and Research to develop proposed CEQA Guidelines by July 1, 2009, and adopt guidelines by January 1, 2010.

SB 375 (2008). This bill requires coordination between transportation planning and land use planning. The bill directs CARB to develop regional greenhouse gas emission reduction targets to be achieved from automobile and light truck sectors by 2020 and 2035. CARB is to work with California's 18 metropolitan planning organizations to align their regional transportation, housing and land use plans and prepare a "sustainable communities strategy" to reduce vehicle miles traveled in their respective communities.

Executive Order S-14-08. This order from the Governor's office establishes a target for all retail sellers of electricity to provide 33 percent of their power from renewable sources by the year 2020. The California Air Resources Board is working with the Public Utilities Commission, the California Energy Commission, and the California Independent System Operator to develop regulations that implement this target.

Climate Change Scoping Plan

The Climate Change Scoping Plan, approved by CARB in 2008 to fulfill AB 32, is the state's roadmap to reach greenhouse gas emissions reduction goals. The plan outlines a number of key strategies to reduce greenhouse gas emissions. The measures in the Scoping Plan will be in effect by 2012 and include a number of discrete early action measures to reduce greenhouse gas emissions.

CEQA Guidelines

Pursuant to SB 97, the State adopted new CEQA Guidelines concerning greenhouse gas emissions on March 18, 2010. Generally, the new guidelines amended the CEQA Guidelines for impact analysis on the topic of greenhouse gas emissions, specifying in several instances, for example, that determinations on greenhouse gas emissions must be supported by substantial evidence, as with other CEQA determinations. The new guidelines do not propose a particular threshold of significance to be applied in determining whether a project's contribution to global climate change is significant. Rather, they provide guidance on determining the significance of impacts resulting from a project's greenhouse gas emissions as well as appropriate mitigation measures (i.e., Sections 15064.4 and 15126.4). The new guidelines require estimation and analysis of greenhouse gas emissions from proposed projects and indicate that lead agencies have discretion to determine which type of methodology to use to evaluate greenhouse gas emissions, given that such methodologies are evolving (i.e., Section 15064.4). The CARB procedures for evaluating greenhouse gas reductions from renewable generation under CEQA currently recommend that applicants quantify reductions by multiplying estimated generation by a marginal power emissions factor and subtracting project greenhouse gas emissions from this amount.

CARB Regulations

CARB is in the process of adopting regulations implementing AB 32 and has adopted regulations for mandatory reporting of greenhouse gases from electric generating facilities, cap and trade regulations for major emitters, and is considering a 33 percent renewable electricity standard. Wind generating projects are exempt from mandatory CARB reporting and cap and trade requirements associated with implementation of AB 32.

Air Quality Management District Regulations

The Project would be located in a part of Solano County that is divided into two different air basins. The majority of Project would be located within the Sacramento Valley Air Basin under the jurisdiction the Yolo-Solano Air Quality Management District (YSAQMD). A smaller section of the Project i.e., near Collinsville Road, would be located within the San Francisco Bay Area Air Basin under the jurisdiction of the Bay Area Air Quality Management District (BAAQMD).

Yolo-Solano Air Quality Management District

The YSAQMD does not have specific thresholds associated with greenhouse gases in its CEQA guidance handbook. YSAQMD recommends a qualitative discussion of greenhouse gases in air quality analyses for sizeable projects.

Bay Area Air Quality Management District

On June 2, 2010, BAAQMD approved an update to its CEQA air quality guidelines (BAAQMD 2010a and 2010b). The update identifies appropriate greenhouse gas significance thresholds, analytical methodologies, and mitigation measures to ensure new land use development meets its fair share of the emission reductions needed to address the cumulative environmental impact from greenhouse gas emissions. The new BAAQMD CEQA Guidelines identify a threshold of significance of 1,100 metric tons per year (MT/yr) of carbon dioxide (CO₂)-equivalent (CO₂e) for land-use development projects. The guidance does not have greenhouse gas significance threshold for construction, but BAAQMD recommends that greenhouse gas emissions from construction be quantified and disclosed; a determination on the significance of these greenhouse gas emissions be made in relation to meeting AB 32 greenhouse gas emissions reduction goals; and best management practices be incorporated to reduce greenhouse gas emissions during construction, as feasible and applicable.

11.2.3 Local

Local regulations and plans include measures to quantify and reduce greenhouse gas emissions from industrial facilities, commercial processes, motor vehicles, and other sources.

Solano County General Plan

In addition to the air quality rules and regulations established by YSAQMD and BAAQMD, Solano County has addressed climate change in its General Plan. As part of the Public Health and Safety Chapter of its General Plan, Program HS.I-73 calls for the County to develop and adopt a climate action plan. The Climate Action Plan is to have two primary objectives: (1) reduce total greenhouse gas emissions in the County to 20 percent below 1990 levels by 2020; and (2) create adaptation strategies to address the impacts of climate change on the County such as sea level rise, increased risk of flooding, diminished water supplies, and impacts on public health and the local agricultural-based economy. Further, the General Plan Public Health and Safety Chapter lists several “Climate Change Related Policies and Programs” with regard to Renewable Energy, including Regulation RS.1.58, which calls for protection of the viability of renewable energy generation within the County by protecting high-value wind energy sites and facilitating development of renewable energy by providing a streamlined permitting process for such projects.

11.3 SIGNIFICANCE CRITERIA FOR GREENHOUSE GAS IMPACTS

The criteria listed below were considered in the evaluation of potential impacts due to climate change and greenhouse gas emissions related to construction and operation. The Montezuma II Wind Energy Project may be considered to have an impact if it would:

- Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.
- Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases.

These criteria are consistent with amendments to the CEQA Guidelines, to address greenhouse gas emissions, effective March 18, 2010. Applicable sections of the amendments stipulate a lead agency make a “good-faith effort, based to the extent possible on scientific and factual data, to describe, calculate or estimate the amount of greenhouse gas emissions resulting from a project.” The agency may use a quantitative or qualitative analysis. The guidelines list factors to be considered in assessing the significance of the impact from greenhouse gas emissions including increases or reductions in greenhouse gases caused by the Project, the applicable thresholds, and the project’s compliance with local, regional, or statewide greenhouse gas emissions reduction plans. A statement of overriding considerations may consider the region-wide or statewide environmental benefits.

11.4 GREENHOUSE GAS IMPACT ANALYSIS AND MITIGATION

The Project has the potential to result in short-term emissions of greenhouse gases during construction and long-term emissions due to ongoing operation and maintenance of the proposed turbines and other facilities. The project, however, would displace generation from power plants that emit greenhouse gases and would support the state, county, and local policies regarding climate change. By generating renewable energy within the County, operation of the Project would help achieve the objective of reducing long-term greenhouse gas emissions.

Impact GHG-1: Greenhouse Gas Emissions

Construction Greenhouse Gas Emissions

The proposed Project would result in greenhouse gas emissions during construction and operation. During construction, combustion of fossil fuels in construction equipment and vehicles would generate greenhouse gases. According to the ICF International Air Quality Study, construction of the Project would result in approximately 858 MT of CO₂e emissions. ICF International considered fuel combustion from heavy-duty equipment, worker vehicles, and electricity consumption and used URBEMIS to calculate emissions. Adherence to Best Management Practices recommended by the BAAQMD would likely lead to a reduction in greenhouse gas emissions during construction.

Operational Greenhouse Gas Emissions

During operation, maintenance vehicles and equipment would emit greenhouse gases. According to the ICF International Air Quality Study, emissions from vehicles, back-up generator, refrigeration and air conditioning units, and electricity consumption during operation of the proposed project would generate an estimated maximum of 5,412 MT of CO₂e per year, exceeding the BAAQMD threshold of significance of 1,100 MT of CO₂e per year. In addition, fugitive emissions of SF₆ would result from the proposed operation of the new electrical substation. The substation would be equipped with 15 circuit breakers with SF₆ storage capacity of 60 pounds each. Given an estimated conservative annual leak rate of 2.5 percent, annual SF₆ emissions would be approximately 22.5 pounds per year. With an SF₆ global warming potential of 23,900, fugitive SF₆ emissions would be

equivalent to approximately 244 MT of CO₂e per year. The total annual emissions of the proposed project would therefore be 5,656 MT of CO₂e.

The Project, however, would result in a net greenhouse gas benefit because operation of the Project would displace greenhouse gas emissions from marginal power generation. CARB estimates that each MWhr of wind generation displaces about 830 lbs CO₂e from natural gas peaking plants. To calculate potential greenhouse gas benefits, Point Impact first multiplied the rated capacity by a capacity factor and hours in a year to estimate the average annual production. The proposed project would have a capacity factor as high as 37 percent. Point Impact estimated that with performance at 33 to 37 percent capacity, the Project would produce between about 225,000 and 250,000 MWhrs per year. Point Impact then multiplied the estimated annual production by the marginal power emissions factor of 830 lbs CO₂e per MWhr to find the displaced emissions from generation, and compared the displaced emissions to the baseline conditions (including existing enXco V turbines).

Based on the above assumptions, the proposed project has the potential to displace an estimated 85,108 to 95,424 MT of CO₂e per year. After accounting for operational emissions, the Project would result in a net displacement of 79,452 to 89,768 MT of CO₂e per year. Based on production data furnished to Solano County by the project operator, Point Impact estimates that the enXco V turbines in the Project area currently produce almost 34,000 MWhr per year and result in an annual net displacement of approximately 10,195 MT CO₂e. Assuming that the enXco V turbines in the Project area would operate until permit expiration in 2015 if the Montezuma II project were not built, the baseline emissions benefits from the enXco V would amount to about 47,576 MT CO₂e. When compared to this baseline benefit and accounting for emissions from construction, the proposed Project would result in a net reduction of at least 2.3 million MT of CO₂e over its proposed 30-year lifetime.

Accounting for the greenhouse gas benefit, the Project would not conflict with and, in fact, would support the County's General Plan policies regarding climate change. Specifically, operation of the Project could help achieve the objective of reducing long-term greenhouse gas emissions by facilitating renewable energy generation within the County.

Accordingly, the Project's construction-based and operational emissions of greenhouse gases would result in no impact.

Level of Significance: Less than Significant

Table 11.4-1
NET IMPACT ON GREENHOUSE GAS EMISSIONS FROM PROPOSED PROJECT

Project	Activity	MT CO ₂ e	
Existing enXco V Project ¹	Operational Emissions ²	2,547	
Annual Emissions	Displaced Emissions from Generation ³	12,742	
	Emissions Benefit	10,195	
Proposed Project Annual Emissions	Construction Emissions ²	858	
	Operational Emissions ²	5,656	
Proposed Project Annual Emissions Compared to Existing Project ¹	Displaced Emissions from Generation ³	33 percent CF⁵ 37 percent CF⁵	
		85,108	95,424
		Emissions Benefit	79,452
Proposed Project Compared to Existing Project ¹	Existing Project Emissions Benefit 2011-2015	47,576	
	Proposed Project Lifetime Emissions Benefit	2,382,692	2,692,174
	Proposed Project Lifetime Emissions Benefit Compared to Baseline⁴	2,335,115	2,644,598

1 Approximately 200 enXco V turbines in the Montezuma II project area, assumed operational until May 2011 with proposed project or until December 2015 without the proposed project

2 From ICF International Revised Air Quality Study for the Proposed Montezuma II Wind Project

3 Estimated annual generation multiplied by CARB emissions factor for marginal electricity (830 lbs CO₂e/MWh)

4 Emissions benefits of the proposed project over 30 year life minus construction emissions and avoided emissions benefits from enXco V during the almost 5 year period from May 2011 to December 2015 that enXco V would be operational in the no project scenario

5 Capacity Factor (CF) used to estimate production and associated emissions reductions

11.5 REFERENCES

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