5.12 ENERGY

5.12.1 OVERVIEW AND SUMMARY

This section describes the environmental and regulatory setting for energy demand for implementation of the proposed Master Plan Update and identifies relevant local agency plans and policies developed in efforts to reduce energy consumption. Sources of energy from the proposed Master Plan Update are identified and discussed and potential electricity demands are estimated. Energy impacts from the proposed Master Plan Update would be less than significant (Class III).

5.12.2 DATA SOURCES AND METHODOLOGY

The data sources used to evaluate the energy impacts associated with construction and operation under the proposed System Master Plan Update include sources from California Energy Commission (CEC). Energy demand calculations were based on the Greenhouse Gas technical analysis.

5.12.3 APPLICABLE REGULATIONS

5.12.3.1 State Regulations

Renewables Portfolio Standard

In 2002, Senate Bill 1078 (SB 1078, Sher) established California's Renewables Portfolio Standard (RPS), which requires investor-owned utilities such as Pacific Gas and Electric (PG&E) to increase energy production from renewable sources by one percent per year up to a minimum of 20 percent of total energy generation by 2017. SB 107 (Simitian), signed by the Governor on September 26, 2008, accelerated the RPS timeframe by requiring investor-owned utilities to meet the 20 percent target by 2010.

On September 15, 2009, the Governor issued Executive Order S-21-0911 requiring CARB, under its AB 32 authority, to adopt regulations to meet a 33 percent RPS target by 2020. The CARB regulations would use a phased-in or tiered requirement to increase the amount of electricity from eligible renewable sources over an eight-year period beginning in 2012. CARB adopted the regulation in September 2010. In March 2011, the Legislature passed SB X1-2, which was signed into law by the Governor. SB X1-2 requires utilities to procure renewable energy products equal to 33 percent of retail sales by December 31, 2020 and also established interim targets: 20 percent by December 31, 2013 and 25 percent by December 31, 2016. SB X1-2 also includes publicly owned utilities in California.

5.12.3.2 Local Regulations

City of Solvang Municipal Code

The City's municipal code provides rules for development throughout the City. Section 10-1.01 of the City's Building Code adopts by reference construction codes from the California Building Code.

The provisions of California building code shall apply to the construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, maintenance, removal and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures. The Master Plan would include construction and operation of water supply distribution, storage and pumping facilities.

General Plan

The City's General Plan Conservation and Open Space Element[1] sets forth the following policies that relate to energy supply.

Objective 6.0 Reduce the City's demands upon conventional, non-renewable sources of energy.

Goal 3.1 To protect and conserve the City's natural and cultural resources.

Objective 2.0 Maintain and protect adequate domestic water supplies for all residents and uses, both present and future, within the City.

Policy 2.a The City shall require all new developments to incorporate water conservation measures into project design to the greatest extent practical. Such measures may include, but are not limited to, the use of plumbing fixtures which reduce water usage (in accordance with Title 24 of the California Administrative Code or its successor) and landscaping which maximizes the use of drought-tolerant plant species and drip irrigation systems.

Policy 2.b The City shall use reclaimed water for irrigation of public landscaped areas to the greatest feasible extent.

1 City of Solvang, *Solvang General Plan, Conservation and Open Space Element,* (1988).

Policy 6.a The City shall require new development to incorporate alternative energy systems.

5.12.4 EXISTING CONDITIONS

5.14.4.1 Water - Energy Relationship

Energy is used for water distribution primarily for pumping water and maintaining sufficient pipe pressure to ensure that flows can be made at scheduled rates while maintaining sufficient pressure for fire service.

Water treatment processes also use large quantities of energy. In water treatment, energy requirements depend primarily on the characteristics of the raw water, plant size, treatment process, and the distance and elevation of the treatment plant in relation to water sources and water distribution systems. Electric loads at water treatment plants consist primarily of pump motors but also include air blowers, injection equipment, controls, lighting, and, in some cases, ultraviolet light disinfection and ozonation.

Water treatment has historically been a comparatively modest user of energy, relying primarily upon settlement and passive filtration to remove particles from water, and chemical treatment (chlorination or chloramination) for disinfection. As new water quality regulations are implemented, energy-intensive technologies such as membranes, UV, and ozonation will require large quantities of energy.

In the mid-1990s, EPRI and HDR Engineering, Inc. conducted an audit of the energy savings potential for water facilities in California.[2] At that time, they estimated that more than 880 million kWhs could be saved by implementing several measures: load shifting, variable frequency drives, high-efficiency motors and pumps, equipment modifications, and process optimization with and without Supervisory Control and Data Acquisition (SCADA) systems. Actual energy demand is highly variable by water utility.

Once treated to potable standards, the water must be distributed to customers, generally through a network of storage tanks, pipes, and pumps. During distribution, water must be kept moving and under pressure to minimize corrosion and biological contamination.[3] Storage tanks and water mainlines must be flushed periodically to prevent oxidation and control biofilms. Even the farthest reaches of the network must be kept under adequate pressure and constantly flushed since low pressure and low flow allow microbes to flourish.

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2 California Energy Commission, California's Water-Energy Relationship, November 2005.

3 Ibid, p. 37.

Supply and conveyance can be the most energy-intensive portion of the water delivery chain. If the water source is groundwater, pumping requirements for supply of freshwater from aquifers vary with depth: 540 kWh per million gallons from a depth of 120 feet, 2000 kWh per million gallons from 400 feet.[4] These energy needs will increase in areas where groundwater levels are declining. Energy requirements to pump water from surface waters can be negligible if users are located close to the source. But if water must be pumped long distances, then the energy requirement is much higher.

Groundwater, if not brackish, can require minimal energy for purification. Energy requirements for distribution and collection vary depending on system size, topography, and age. Older systems often require more energy because of older infrastructure and less efficient equipment.

5.12.4.2 Existing City Water System Energy Use

PG&E is the primary provider of electric service to the City of Solvang. In 2009, PG&E's mix of generation methods for electric power delivered to retail customers consisted of about 35 percent natural gas, 20 percent nuclear, 14 percent eligible renewable, 13 percent large hydroelectric, 1 percent coal, 15 percent unspecified, and 1 percent other fossil fuels.[5] According to the CEC, PG&E is projected to deliver approximately 99,109 gigawatt-hours (GWh) to its customers during 2012. By 2022, PG&E's demand is expected to increase to approximately 115,293 GWh, and PG&E is prepared to meet this demand.[6]

The existing water system infrastructure in the City requires electricity to power equipment and pumps in order to distribute water from wells to customers. PG&E constructs electrical infrastructure in the project area, including substations and transmission lines, to meet customer demands. PG&E would plan any construction of electrical infrastructure in accordance with development demands anticipated by the City.[7]

5.12.5 THRESHOLDS OF SIGNIFICANCE

In order to assist in determining whether a project would have a significant effect on the environment, the *California Environmental Quality Act (CEQA) Guidelines* identify criteria for conditions that may be deemed to constitute a substantial or potentially substantial adverse change in physical conditions. Appendix F,

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4 US. Department of Energy, Energy Demands on Water Resources, Report to Congress on the Independency of Energy and Water, December 2006.

5 Pacific Gas and Electric Company, "PG&E's 2009 Power Mix Delivered to Retail Customers," http://www.pge.com/myhome/edusafety/systemworks/electric/energymix/

6 California Energy Commission. Preliminary California Energy Demand Forecast 2011-2022. Draft Staff Report. Publication #CEC-200-2011-006-SD. May 2011. Table A-4.

7 California Public Utilities Commission. "Rules July 2007," http://docs.cpuc.ca.gov/published/RULES_PRAC_PROC/70731.htm#P323_46666. Rule 3.1. 2008.

Energy Conservation, requires only that "EIRs include a discussion of the potential energy impacts of proposed projects, with particular emphasis on avoiding or reducing inefficient, wasteful, and unnecessary consumption of energy." Based on Appendix F suggestions, the proposed project would have a significant impact on energy if it would:

- Result in a substantial increase, of more than 10 percent, in net electricity consumption.

In addition to the significance criteria discussed above, the significance criteria listed below is based on Appendix G of the *State CEQA Guidelines*. The project would have a significant impact on utilities and service systems related to energy if the proposed project would:

- Require or result in the construction of new electrical power generation facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.

5.12.6 ENVIRONMENTAL IMPACTS

The environmental impact analysis presented below is based on determinations made in the Notice of Preparation (NOP) for issues that were determined to be potentially significant with mitigation incorporated, or for issues identified by reviewing agencies, organizations, or individuals commenting on the NOP that made a reasonable argument that the issue was potentially significant (see Responses to NOP, **Appendix 1.0**).

5.12.6.1 Result in a substantial increase, of more than 10 percent, in net electricity consumption.

Impacts

Construction

Master Plan Update

Projects constructed under the proposed Master Plan Update would require fossil fuels to power construction equipment and vehicles. Electricity would not be relied upon heavily for construction activities. If the generators used for construction ran on electricity, the electricity demand would be about 742 kilowatt-hours each day. Assuming construction activities occur five days a week for five years, the overall electricity demand for this phased would be approximately 0.89 megawatt-hours (see **Table 5.12-1, Estimated Construction Energy Demand).** Note that this calculation is an overestimate of actual construction demands for electricity because the construction timeline is likely to be shorter (several hundred feet of pipeline constructed in one day), and the diesel generators may be used instead of electrical generators.

Table 5.12-1
Estimated Construction Energy Demand

Construction Activity	Energy Demand (MWh)
Infrastructure	0.89
Well Drilling and Installation	0.033
Water Treatment Plant	0.067
Total	**0.99**

Source: Impact Sciences, Inc. Emissions calculations are provided in ***Appendix 5.5****.*

PG&E is projected to deliver approximately 99,109 GWh to its customers during 2012. Therefore, construction of the Master Plan Update's components would consume less than 0.001 percent of total electricity PG&E would deliver in 2012. Impacts would be less than significant.

Proposed Wells and Water Treatment Facilities

Construction of the wells would require operation of construction equipment, trucks, and a drilling rig. After well development is complete, each well pump would be tested for 24 hours, for one to two days. A portable diesel engine and generator would power the well pumps. Overall, well drilling, completion, development, and testing would require about 5 days at each well site. Construction and testing activities for new wells under the proposed project would demand a total of approximately 0.033 megawatt-hours.

Construction activities for the proposed water treatment facilities would involve grading, building construction, and installation of utility connections and treatment modules. Construction activities would require the use of a generator that could be electric and would be completed in a nine-month period. Construction of the proposed water treatment facilities would result in a demand of 0.067 megawatt-hours.

PG&E is projected to deliver approximately 99,109 GWh to its customers during 2012. Therefore, construction of the wells and water treatment facilities would consume less than 0.001 percent of total electricity PG&E would deliver in 2012. Impacts would be less than significant.

State Water Right Permit

The proposed revisions to the City's water right Permit 15878 would allow for an extension in the Existing Reach of Diversion to include an area approximately 1.5 miles downstream of Alisal bridge (Extended Reach of Diversion) as shown in **Figure 2.0-4** that would enable well installation. There would be no energy related impacts with extending the Existing Reach of Diversion.

Operation

Master Plan Update

The Master Plan Update recommends that the City update its infrastructure including the installation of up to six new wells and construction of a new water treatment plant. In general, infrastructure to be updated as part of the proposed Master Plan Update would include waterlines, valves and water storage facilities, and would mostly replace existing infrastructure. While operation of the water system requires electricity to distribute water to customers, the proposed distribution and storage facilities, would not in themselves consume electricity. Impacts to electricity under the Master Plan Update would be less than significant.

The electricity demands for the proposed wells and water treatment are described below.

Proposed Wells and Water Treatment Facilities

The Master Plan Update provides for the development of new wells (up to six) that, in combination with the City's existing two operating wells, would provide the City with a total of eight potentially active wells. The proposed wells would be capable of providing an average of 300 gallons per minute (gpm) or 0.67 cubic feet per second (cfs) each, for a total of 1,980 acre-feet per year (afy) with a maximum extraction of up to 5 cubic feet per seconf (cfs). Additionally, the proposed new wells would be designed to produce up to 400 gpm (0.89 cfs) each on a long-term continuous basis. The energy (electricity) needed for an electrical well pump varies considerably, but is conservatively estimated at a maximum of 210 megawatt-hours (MWh) per year for each of the six wells operating at 400 gpd for 24 hours a day, for a total of 1,260 MWh per year.[8]

The proposed water treatment plant would have an initial capacity of 2 million gallons per day (MGD) or 3.09 cfs and would be designed to allow for the addition of a third parallel treatment train of 1 MGD capacity to bring the total treatment plant capacity to 3 MGD (4.64 cfs) in the future, if necessary. The energy (electricity) needed for the water treatment plant is estimated at 330 MWh per year, assuming a capacity of 3 MGD.[9] The total electricity consumption for operating the new well pumps and water treatment plant would be approximately 1,590 MWh per year, or 1.59 GWh per year.

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8 Goleta Water District, *Facility Plan, Corona Del Mar Water Treatment Plant, GWD Project No. 00.3309*, (2004) 11-3. A typical well might use as much as 2,000 kilowatt-hours (kWh) per million gallons of water produced and pumped up to system pressure at hydraulic grade level equal to 230 feet. Half of the kWh value was assumed for the project assuming a 50 percent lower hydraulic grade level.

9 Goleta Water District, *Facility Plan, Corona Del Mar Water Treatment Plant, GWD Project No. 00.3309*, (2004) 11-2. This is based on an average of 300 kWh per million gallons.

PG&E is projected to deliver approximately 115,293 GWh to its customers per year by 2022. Therefore, the new wells and water treatment plant would consume less than 0.001 percent of total electricity PG&E would deliver in 2022. Impacts would be less than significant.

The proposed wells and water treatment plant would be sized to meet future water demands from growth (buildout) under the City's General Plan. Additionally, future development in the City would be required to incorporate water conservation measures as required by the Municipal Ordinance and recommended in the General Plan Policy 2.a.

Impacts would be less than significant.

State Water Right Permit

The proposed revisions to the City's water right Permit 15878 would allow for an extension in the Existing Reach of Diversion to include an area approximately 1.5 miles downstream of Alisal bridge (Extended Reach of Diversion) as shown in **Figure 2.0-4** that would enable well installation. There would be no energy related impacts with extending the Existing Reach of Diversion.

Mitigation Measures

No mitigation is required.

Residual Impacts

Impacts would be less than significant (Class III).

5.12.6.2 Require or result in the construction of electrical power generation facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.

Impacts

Construction

The proposed Master Plan Update would result in the construction of new water distribution and storage facilities, wells and a water treatment facility for the City's water distribution system. As part of the proposed project, new wells would be constructed and operated, and electrical conduit would be installed along with the water lines to deliver power to each well. Installation of electrical cables is also a component of the proposed water treatment plant construction.

The potential construction impacts that would result from implementation of the proposed Master Plan Update have been analyzed throughout this EIR in **Section 5.0**, **Considerations and Discussions of Environmental Impacts**. Mitigation measures have been proposed to reduce potentially significant environmental impacts that could occur as result of construction. With implementation of the proposed mitigation measures, potential construction impacts to the environmental would be reduced to less than significant impacts. This would be considered Class II or Class III, impacts depending on the specific issues.

Operation

The Master Plan Update recommends that the City upgrade its infrastructure, install new wells, and construct a new water treatment plant, which would demand electricity. As explained above, the total electricity consumption for operating the new well pumps and water treatment plant would be approximately 1,590 MWh per year, or 1.59 GWh per year. This would represent an incremental increase in the demand for gas and electrical power which may contribute to the need for constructing new electrical facilities.

PG&E infrastructure exists throughout the City's service area, and to the extent any are required, improvements and extensions needed to accommodate the project demands would be determined in consultation with PG&E prior to installation. In general, construction of electricity infrastructure and upgrades would take place within existing have impacts that are substantially similar to current conditions. The location and extent of any electrical infrastructure improvements is not known at this time, but though would generally be located in the project area. Construction of electricity infrastructure improvements in the City would have similar impacts to the proposed Master Plan Update, and potential construction impacts are described in **Section 5.0** of this EIR. Implementation of the proposed project would result in less than significant impacts.

Mitigation Measures

No mitigation is required.

Residual Impacts

Impacts would be less than significant (Class III).

5.12.7 CUMULATIVE ANALYSIS

5.12.7.1 Cumulative Impacts

Although the City is nearly at its projected buildout, future growth in the City of Solvang is anticipated to result in increased demand on energy sources and energy production by PG&E. The City would implement policies and building codes that require energy efficient developments in the future. However, the demand for energy would increase as the City grows, which will likely lead to impacts on energy resources.

Potential cumulative impacts related to the proposed project and past, present, and probable future projects were analyzed in each of the environmental topical sections in this EIR. Please refer to each section regarding a determination of the potential cumulative impacts discussion.

5.12.7.2 Cumulative Mitigation Measures

No mitigation is necessary.

5.12.7.3 Residual Cumulative Impacts

Impacts would be less than significant (Class III).