4.15 Energy and Mineral Resources

This section discusses energy and mineral resources associated with the proposed Project. This section also addresses the impact of electricity consumption and other fuels, as well as the production of oil and gas from the oil field.

4.15.1 Environmental Setting

California end users primarily consume electricity, natural gas, and petroleum-based fuels. Table 4.15-1 summarizes the state energy sources and their production and consumption in California.

Table 4.15-1 California Energy Sources and Annual Consumption

Type of Energy Source	Produced In-State	Imported, from Other States and Foreign Countries	Total Consumed
Electricity, terawatt-hours	208 (67%)	98 (32%)	306
Natural Gas, billion cubic feet/ billion cubic meters	313/9 (14%)	1,811/51 (86%)	2,201/61
Oil to refineries, million barrels/ million cubic meters	250/40 (38%)	405/64 (62%)	655/104

Source: CEC 2008

4.15.1.1 Electricity

Natural gas, hydropower, and nuclear energy fuel most electricity production in California. Coal, solar, wind power, biomass and waste, geothermal energy, and oil also fuel electricity production (CEC 2008). Electricity production fueled by natural gas accounts for more than 45 percent of all electricity produced in the state. Oil-fueled electricity production is being phased out in California. Electricity demand grew 1.2 percent on average annually between 2004 and 2008. The California Energy Commission (CEC) estimates that future electricity consumption will grow by 1.2 percent annually between 2010 and 2018 (CEC 2009).

4.15.1.2 Natural Gas

According to the California Division of Oil, Gas and Geothermal Resources (DOGGR), California is estimated to contain 3.6 trillion cubic feet (0.1 trillion cubic meters [m^3]) of proven natural gas reserves (DOGGR 2004). The CEC estimates annual average growth in demand for natural gas by end-users of approximately 0.7 percent annually between 2010 and 2018 (CEC 2009).

4.15.1.3 Transportation Fuels

Historically, California has received more crude oil from non-California sources (i.e., Alaska, foreign countries) than from within California. The quality of the average crude oil refined in California, especially crude produced in California, has historically been heavier and more sulfurous than crude from other sources. The State's complex refineries have adapted their equipment and operations to process low- to medium-quality crude oil into highway fuels (i.e., gasoline and diesel for vehicles).

Overall, California sales of gasoline, diesel, and jet fuel have trended downward recently (CEC 2009). For example, average daily gasoline sales in the first 4 months of 2009 were 2.1 percent less than during the same period in 2008, continuing a reduction in demand observed since 2004. Daily diesel fuel sales in the first 3 months of 2009 were 7.7 percent less than during the same period in 2008, continuing a declining trend since 2007. Recent demand trends for jet fuel (8.9 percent decline in 2008) are similar to diesel fuel and reflect the impact of the economic downturn and higher fuel prices (CEC 2009)

The CEC expects annual gasoline consumption to decrease between 2010 and 2030, largely because of high fuel prices, efficiency gains, competing fuel technologies, and mandated increases in alternative fuel use. The CEC estimates that gasoline consumption will decrease between 4 and 9 percent during the same timeframe, while diesel demand will increase 50% and jet fuel demand will increase by more than 60 percent (CEC 2009).

Table 4.15-2 summarizes energy consumption in California by sector and type.

Table 4.15-2 Energy Consumption in California by Sector and by Form

Sector or Sub-sector	Natural Gas	Electricity [b]	Crude Oil
Transportation	< 1%	5%	91%
Electrical Generation	43%	-	5%
Residential	22%	32%	< 1%
Commercial	10%	37%	< 1%
Industrial [a]	23%	15%	5%
- Petroleum Refining	6%	3%	0%
- Oil and Gas Extraction	4%	1%	0%

a. The Industrial Sector has many other sub-sectors; however, only the information on the two sub-sectors relevant to this EIR is provided here. Crude oil use by the industrial sector is primarily coke use.
b. Electricity use by transportation includes communication and utilities
Source: CEC 2009

Several minerals are mined in California; however, there are no meaningful quantities of known mineral resources (e.g., sand, gravel) in the Project Area (USGS 2004). Under the California Surface Mining and Reclamation Act of 1975, the site is not listed as a Mineral Resource Zone (MRZ), which includes only non-fuel mineral resources.

Southern California Edison (SCE) provides electrical power to the Project Area and Southern California Gas Company (SCGC) provides natural gas service. Based on California Public

Utilities Commission (CPUC) and California Independent System Operator (CalISO) resource adequacy requirements, the area's current electricity supplies are adequate and are anticipated to be adequate for future development. California depends on natural gas produced both in state and out of state. As the oil field produces natural gas, supplies for the field are assumed to be adequate for future development.

4.15.1.4 Energy Conservation and Alternative Energy Sources

The CEC, the California Power Authority (CPA), and the CPUC jointly adopted in 2005 the "Energy Action Plan II" (Plan) that listed joint goals for California's energy future (CEC 2005). The main goal is for California's energy to be adequate, affordable, technologically advanced, and environmentally-sound. The Plan also describes the priority sequence for actions to address increasing energy needs as (1) cost-effective energy efficiency and demand response, (2) renewable sources of power and distributed generation and (3) clean and efficient fossil-fired generation. The CEC 2007 Integrated Energy Policy Report (IEPR) adds achieving AB-32 greenhouse gases reduction goals to this list of priorities. The IEPR recommends a number of programs, including cost effective energy efficiency standards, renewable energy development, improved electricity infrastructure, and distributed power generation,

In order to provide information on other methods of generating the same level of energy production (crude oil and gas) that would be produced by the proposed Project, an analysis was conducted to determine the level of alternative energy projects or programs that would be required to offset the amount of energy production that would exist under the proposed Project. The proposed Project would allow for the production of an average of about 4,000 bpd over the life of the Project (based on the Applicant production totals). Assuming an average gasoline production of 21.6 gallons per barrel of crude (CEC 2004 data), this would equate to an average of about 87,000 gallons of gasoline per day over the life of the Project. Crude oil is used to produce more fuel types than gasoline, such as diesel fuel, jet fuel, etc. However, it was assumed in this analysis that the primary driver of the consumption of crude oil is gasoline production.

The natural gas currently produced would average about 2.0 MMSCFD over the life of the Project. Assuming that all of this natural gas would be used to produce electricity, this could produce about 9 megawatts (MW) of electricity (based on the average efficiency of power plants in California).

Average gasoline consumption in California totals about 42 million gallons per day and the use in Los Angeles County is estimated to be about 11 million gallons per day (based on the number of registered cars in Los Angeles County).

Electrical generation in California totals 62.6 gigawatts (GW) of installed electrical generating capacity. Total capacity supplied to California is about 80 GW. Details of specific energy conservation alternatives and alternative fuels are provided below for reference to what those alternatives would have to produce in relationship to the Project. No conclusion statements are provided on this analysis.

Automobile Efficiency and Fuel Type

Gasoline consumption could be reduced by the equivalent of the amount produced by the Project, by replacing an estimated 85,000 automobiles with hybrid automobiles (e.g., Toyota Prius). This would constitute approximately 0.5 percent of the cars on the road in California.

Increasing the gas mileage of the average California car by 0.25 percent would also offset the gasoline produced by the proposed Project.

The proposed Project would produce about 0.75 percent of the gasoline used in Los Angeles County. Replacement of 1.2 percent the gasoline supply in the county (as ethanol contains less energy than gasoline) with ethanol would reduce gasoline consumption by an amount equivalent to the proposed Project transportation levels.

Solar Energy

The amount of electricity that could be produced by the natural gas produced from the Project could be produced by installing close to a quarter million 200 watt photovoltaic solar panels on about 11,000 homes. Note that the solar panels would produce this level of energy for an estimated 25 years. However, the panels would only produce this amount of electricity during the daylight hours.

Solar energy currently makes up about 0.2 percent of the gross system power in the State of California (CEC 2007).

Electrical Efficiency

The amount of electricity that could be produced by the natural gas from the proposed Project could also be saved by increasing the efficiency of the end users of electricity. In California, 68 percent of electrical consumption is by non-residential consumers. State-wide, electrical consumption breaks down by sector to 32 percent residential, 37 percent commercial, 16 percent industrial, seven percent agricultural, and the rest miscellaneous users.

Lighting accounts for an estimated 25 percent of residential electrical consumption and refrigerators account for an estimated 17 percent of residential energy use. By replacing inefficient light bulbs with more efficient bulbs through a replacement program or older, inefficient refrigerators with newer, more efficient models, Los Angeles County could reduce electrical demand in excess of the amount of electricity produced by the proposed Project.

Increasing the efficiency of industrial processes, through computer controlled equipment management, and replacing pump/compressor/HVAC units with more efficient models, electrical consumption could be reduced in the industrial sector.

Air conditioners are large consumers of electricity during the hot summer months. Air conditioners' use represents approximately 30 percent of all electricity in the State during those months. Increasing the efficiency of air conditioners by replacing old air conditioners and increasing the building "envelope" efficiency through better insulation, ductwork and window type, would reduce electrical generation requirements during the hot months.

Natural Gas Use Efficiency

California consumes approximately 6.3 billion cubic feet (0.17 billion m^3) of natural gas per day. The Project's natural gas could be saved by increasing the efficiency of California's natural gas usage by about 0.03 percent.

The majority of natural gas power plants in California operate at efficiencies of 9,000 Btu/kWh to 11,000 Btu/kWh, with an average of 10,500 Btu/kWh (CEC 2007). More recent technology produces generating efficiencies at or below a 7,500 Btu/kW level, including the technology of combined cycle plants that utilize waste heat to generate additional power (CEC 2007). Only 17 percent of power plants in California produce power with efficiencies below 9,000 Btu/kWh. Calpine Corporation, which operates nearly 50 combined cycle power plants in California, indicates that their three largest combined cycle facilities operated at 7,300 Btu/kWh for all of 2003, including down times for maintenance. A substantial amount of power generating capacity could be realized by increasing the efficiency of power plants by re-tooling them or replacing older, less efficient power plants with more efficient plants. Replacing only one percent of the generating capacity of the most inefficient power plants (those with efficiencies above 11,000 Btu/kWh) with combined cycle, high efficiency plants would offset the proposed Project energy producing capabilities.

An estimated 44 percent of residential natural gas use is attributable to space heating. Increasing the efficiency of space heating through a replacement program of heating units and increasing the building "envelope" efficiency, by installing insulation, windows, duct-work, etc., would reduce space heating requirements.

Wind Turbines

The equivalent level of electricity produced by combustion of natural gas could be generated through the use of wind turbines. The rated capacity of wind generation in California was approximately 2,100 MW at the end of 2005, generated by over 11,000 turbines, for a total of about 3.6 percent of California's electrical generating capacity. Wind turbine sizes in California range from small turbines less than 20 kW to massive turbines rated at 1.8 MW. GE currently makes turbines of 3.6 MW size and is developing turbines in the five to seven MW size with blades 140 meters in diameter. The majority of wind generating capacity in California is in the Altamont Pass (Bay Area) and Tehachapi Pass (Mojave). The installation of six 1.5 MW turbines would generate the electricity that could be produced by the natural gas produced by the project.

Geothermal Energy

Geothermal energy is produced by the heat of the earth and is often associated with volcanic and seismically active regions. California has 25 known geothermal resource areas, 14 of which have temperatures of 300°F or greater. California's geothermal power plants produce about 40 percent of the world's geothermally-generated electricity. The power plants have an installed capacity of about 2,500 megawatts -- producing five percent of California's total electricity in 2005. Major geothermal locations in the State include the Geysers (north of San Francisco), the Imperial Valley area east of San Diego, and the Coso Hot Springs area near Bakersfield. It is estimated that the State has a potential of more than 4,000 megawatts of additional power from

geothermal energy, using current technologies (CEC 2007). Development of geothermal electrical power plants could offset the need for the proposed Project's natural gas to produce electricity.

Livestock Biogas Energy

Livestock generate a large amount of biological wastes that can be converted into gaseous fuel through digester systems and burned in generator engines to produce electricity and thermal heat energy. The GE Jenbacher engines provide specifications on the efficiency of biogas processes and an estimate of the amount of gas produced per livestock unit. A livestock unit is defined as about 1,200 pounds of livestock (500 kg), or the equivalent of about one cow. Based on the use of the GE Jenbacher generator sets, it would take a population of about 46,000 cows (or livestock units) to generate the equivalent amount of electrical energy that would be produced from the proposed Project. There are an estimated 1.7 million dairy cows in California, 60 percent of them on high-density feed lots, which are ideal locations for generating biogases, located primarily in Merced, Tulare, San Bernardino and Stanislaus counties. This system would also produce a substantial amount of thermal energy from the cogeneration side of the system for use in the livestock and farming processes.

4.15.2 Regulatory Setting

4.15.2.1 Federal

Code of Federal Regulations, Title 10

Title 10 of the Code of Federal Regulations (CFR) addresses energy consumption and the establishment of the Department of Energy. Title 10 addresses:

- State energy programs;
- Energy conservation programs;
- Energy efficiency of industrial and commercial products;
- Alternative fueled vehicles;
- Power plant regulations;
- Department of Energy provisions; and
- Nuclear Regulatory Commission and nuclear facilities.

Code of Federal Regulations, Title 18

Title 18 of the CFR addresses the Federal Energy Regulatory Commission (FERC), which handles issues related to natural gas and oil transportation, provisions, and tariffs.

Code of Federal Regulations, Title 30

Title 30 of the CFR establishes the Minerals Management Service (MMS), which manages energy resources in the federal outer continental shelf.

4.15.2.2 State

In addition to the California Environmental Quality Act (CEQA), several other acts and regulations govern energy production, utilization, conservation, and development of new energy sources.

The Warren-Alquist Act

California adopted the Warren-Alquist Act to encourage conservation of non-renewable energy resources. The Act created the State Energy Resources Conservation and Development Commission and has been codified in the Public Resources Code – Division 15, Energy Conservation and Development.

Financial Code – Division 15.5

Section 32000 *et seq*. State Assistance Fund for Energy, California Business and Industrial Corporation.

Government Code – Title 2

Section 14450 *et seq*. Part 5, Chapter 4 – California Transportation Research and Innovation Program

Section 15814.10 *et seq*. Part 10b, Chapter 2 – Energy Conservation in Public Buildings

Section 15814.30 *et seq*. Part 10b, Chapter 2.8 – Energy Efficiency in Public Buildings

Public Resources Code

Division 3, Chapter 6, Section 3800 et seq, – Disposition of Geothermal Revenues

The purpose of this chapter is to allocate revenues distributed to the State pursuant to Section 35 of the Mineral Lands Leasing Act of 1920, with respect to activities of the United States Bureau of Land Management, the United States Forest Service, and other federal agencies undertaken pursuant to the Geothermal Steam Act of 1970 (Chapter 23 of Title 30 of the United States Code) to reduce the dependence on fossil fuels and stimulation of the State's economy through development of geothermal resources.

Division 6, Part II, Chapter 3, Section 6801 et seq.– Oil and Gas and Mineral Leases

This section authorizes the California State Lands Commission to issue and manage leases for the exploration and production of oil and gas resources within State lands.

Division 16, Chapter 1, Section 26000 et seq. – California Alternative Energy Source and Advanced Transportation Authority Act

This section promotes the prompt and efficient development of energy sources that are renewable or more efficiently utilize and conserve scarce energy resources.

Public Utilities Code – Division 1

- Section 330 *et seq*. Part 1, Chapter 2.3 – Electrical Restructuring;
- Section 445 *et seq*. Part 1, Chapter 2.5 – Public Utilities Commission Reimbursement Fees;
- Section 701 *et seq*. Part 1, Chapter 4 – Regulation of Public Utilities;
- Section 1001 *et seq*. Part 1, Chapter 5 – Certificates of Public Convenience and Necessity; and
- Section 2801 *et seq*. Part 2, Chapter 7 – Private Energy Producers.

The California Department of Conservation

The California Department of Conservation is the primary agency with regard to mineral resource protection. Under the Public Resources Code Sections 600-690, the Department is responsible for conserving earth resources and has five program divisions that address mineral resource issues:

- California Geological Survey;
- DOGGR;
- Division of Recycling; and
- Office of Mine Reclamation.

The State Mining and Geology Board develops policy direction regarding the development and conservation of mineral resources and reclamation of mined lands.

Other state agencies with statutory authority with regard to mineral resources issues include:

- Coastal Commission (for land uses that could affect access to mineral resources within the Coastal Zone);
- State Water Resources Control Board (as pertains to mineral resource water quality-related issues); and
- Energy Commission.

4.15.2.3 Local

The City's Zoning Ordinance (Article II, Chapter 18.52, Conditional Use Permits) allows oil and gas exploration and production drilling with a Conditional Use Permit in all zone districts. On November 24, 1970, the City of Whittier adopted Resolution 4302, establishing specific regulations of oil and gas production and exploration facilities in the City.

4.15.3 Significance Criteria

The significance criteria have been adapted from the CEQA checklist provided as part of CEQA Guidelines. A significant impact would occur if the Project would:

- Decrease the availability of a known energy or mineral resource that would be of value to the region and the residents of the State;
- Conflict with the adopted California energy conservation plans;
- Use non-renewable energy resources in a wasteful or inefficient manner;
- Substantially increase demand upon existing power or natural gas utilities; or
- Necessitate new systems or supplies or substantial alterations to the existing power and natural gas utilities.

4.15.4 Project Impacts and Mitigation Measures

This section characterizes the energy consumption impacts generated by the potential Whittier Main Oil Field development. The proposed Project would not conflict with the adopted California energy conservation plans or use non-renewable energy resources wastefully or inefficiently.

Impact #	Impact Description	Phase	Residual Impact
ER.1	New electrical equipment at the potential project facilities would increase electricity consumption, thereby increasing energy demand.	Drilling, Operations	Less Than Significant

At peak production, field facilities related to the potential future oil field development would require approximately 3,700 kilowatts (kW) of power with an average load of 2,500 kW. SCE would provide electrical power requirements through the existing power service structure. Electrical power would be routed underground inside conduits from the electrical meters provided by SCE (see Figure 2-6). New transformer requirements are not anticipated other than those provided with the temporary drilling rigs.

This increase in electricity use is small relative to the approximately 69,000 gigawatt hours (GWh) per year consumed in Los Angeles County in 2007 or the approximately 306,000 GWh per year consumed within the State of California in 2008 (CEC 2008). This increase would not require upgrades to the current electrical facilities. According to SCE, the proposed Project load is within the SCE parameters for the service area's projected load growth (SCE 2009). Therefore, the proposed future oil field development would not substantially increase demand and would have less than significant impacts on electrical energy resources.

The development would also produce natural gas; therefore, impacts to natural gas demand are not anticipated.

Mitigation Measures

No mitigation measures are necessary since the impacts on electrical generation would be less than significant.

Residual Impacts

The impacts of future development on electrical generation would be less than significant.

Impact #	Impact Description	Phase	Residual Impact
ER.2	Increased fossil fuel consumption and production (diesel, gasoline, and natural gas) at the potential project facilities could thereby decrease availability.	Drilling, Construction, Operations	Less Than Significant

Crude oil is a raw material used to manufacture petroleum-based products, such as diesel and gasoline. The natural gasoline portion of crude oil ranges from five to seven percent. When reformulation processes are involved, the gasoline fraction could increase up to 70 percent and the diesel fuel fraction could increase from seven to 20 percent (CEC 2000). As a result, 77 to 90 percent of the future oil field production could be used to produce fuels such as gasoline or diesel.

The oil field development treat oil and gas from field wells and then send the treated petroleum materials to the refineries where diesel fuel would be produced along with other oil products. The oil field development would consume only a fraction of the oil produced from the field wells. Specifically, 1,200 gallons per day of diesel fuel would be consumed during drilling operations while up to 420,000 gallons (10,000 bbl) of crude oil would be produced each day, resulting in approximately 90,000 gallons of diesel fuel (in addition to gasoline, jet fuel, etc.). Therefore, the future development would be a net producer of petroleum-based fuels.

The future oil field development would produce and treat natural gas and use a portion of it to fuel the process (e.g., heaters). The oil field development would produce an estimated 6 million standard cubic feet per day (mmscfd) of natural gas, and a small portion of this gas (approximately 6 percent) would be consumed for facility operations. Therefore, the potential oil field development would result in a net increase in natural gas available the area.

The proposed Project would not use any other mineral resources nor would it occupy an area that contains known meaningful quantities of mineral resources (aside from oil and gas).

Mitigation Measures

No mitigation measures are required since the impacts on fossil fuel would be less than significant.

Residual Impacts

The impact of future development on increased fossil fuel use would be less than significant.

4.15.5 Other Issue Area Mitigation Measure Impacts

Mitigation measures proposed for other issues areas could increase impacts to energy and mineral resources if they are implemented. This section discusses those potential mitigation measure impacts.

Some mitigation measures could increase construction requirements associated with the Project, which could increase construction-related fuel use, including fuel modification requirements for fire protection (FP-1e), installing sound walls (N-2a), increased structural construction requirements (GR-1a to GR-1g, GR-2,GR-5a to, and GR-5c), modifications to some intersections related to traffic (T-1a and T-1b), and restoration of habitat areas (BIO-1a, BIO-2a). However, none of these mitigation measures would increase energy use levels, and therefore they would not create any additional impacts, and additional analysis or mitigation is not required.

4.15.6 Cumulative Impacts and Mitigation Measures

The cumulative projects discussed in Section 3.0, Cumulative Project Description, would construct and use additional housing units, retail establishments, a church expansion, a hospital expansion, hotel rooms, and an oil development project. None of these projects would contribute to unacceptable strains on the energy supply in the area. Therefore, there would be no significant cumulative impacts.

4.15.7 Mitigation Monitoring Plan

No mitigation measures are proposed.