# 5.18 ENERGY CONSUMPTION

Public Resources Code Section 21100(b)(3) and State *CEQA Guidelines* §15126.4 require EIRs to describe, where relevant, the wasteful, inefficient, and unnecessary consumption of energy caused by a project. In 1975, largely in response to the oil crisis of the 1970s, the California legislature adopted Assembly Bill (AB) 1575, which created the California Energy Commission (CEC). The statutory mission of the CEC is to forecast future energy needs, license thermal power plants of 50 megawatts or larger, develop energy technologies and renewable energy resources, plan for and direct state responses to energy emergencies, and—perhaps most importantly—promote energy efficiency through the adoption and enforcement of appliance and building energy efficiency standards. AB 1575 also amended Public Resources Code Section 21100(b)(3) to require EIRs to consider the wasteful, inefficient, and unnecessary consumption of energy caused by a project. Thereafter, the State Resources Agency created Appendix F of the State *CEQA Guidelines*.

State *CEQA Guidelines* Appendix F is an advisory document that assists EIR preparers in determining whether a project will result in the inefficient, wasteful, and unnecessary consumption of energy. For the reasons set forth below, this EIR concludes that the proposed project would not result in this type of energy consumption and therefore would not create a significant impact on energy resources.

## 5.18.1 ENVIRONMENTAL SETTING

Energy consumption is analyzed in this EIR due to the potential direct and indirect environmental impacts associated with the project. Such impacts include the depletion of nonrenewable resources (e.g., oil, natural gas, coal, etc.) and emissions of pollutants during both the construction and long-term operational phases.

### ENERGY USAGE

Energy usage is typically quantified using the British Thermal Unit (Btu). In general, the approximate amount of energy contained in a gallon of gasoline, a cubic foot of natural gas, and a kilowatt hour (kWh) of electricity are 120,476 Btu's, 1,037 Btu's, and 3,412 Btu's, respectively.[1]

Total energy usage in California was 7,676 trillion Btu's in 2015 (the most recent year for which this specific data is available). Of California's total energy usage in 2015, the consumption breakdown by sector was 1,357 trillion Btu for residential uses (17.7 percent), 1,465 trillion Btu for commercial uses (19.1 percent), 1,837 trillion Btu for industrial uses (24 percent), and 3,017 trillion Btu for transportation (39.3 percent).[2]

Given the nature of the proposed project (i.e., a Planned Development in Shasta County), the remainder of this discussion will focus on the three most relevant sources of energy: electricity, natural gas, and gasoline for vehicle trips associated with residential uses.

[1] EIA (U.S. Energy Information Administration). *Energy Units & Calculations Explained.* [Online]: https://www.eia.gov/energyexplained/index.cfm?page=about_energy_conversion_calculator. Accessed September 5, 2017.
[2] EIA (U.S. Energy Information Administration). *California Profile Overview.* [Online:] http://www.eia.gov/state/?sid=CA#tabs-2. Accessed September 5, 2017.

### ELECTRICITY

Electricity usage in California differs substantially by land use, type of uses in a building, type of construction materials used in a building, and the efficiency of all electricity consuming devices within a building. The average annual usage of electricity is roughly 6,500 kWh/residence.[3]

In 2016, total system power for California was 290,567 gigawatt-hours (GWh), about 1.6 percent lower than 2015.[4] In 2016, California's in-state electricity production remained virtually unchanged from 2015 levels at 198,227 GWh, a difference of approximately one percent compared to the year before. Slight growth in annual electricity consumption in 2016 reflects slow economic growth in California, particularly in Southern California.[5]

### NATURAL GAS

Natural gas usage in California varies substantially by the type of land use, construction materials used in a building, and the efficiency of all gas-consuming devices within a building. Natural gas is being used to power vehicles. In 2014, California used a total of nearly 2.3 million cubic feet of natural gas.[6] The natural gas was used to produce electricity (36 percent), in industrial uses (35 percent), in commercial uses (10 percent), in residential uses (18 percent), and in vehicles (1 percent).[7]

### GASOLINE FOR MOTOR VEHICLES

The primary factors linked to increasing gasoline consumption are: (1) population growth; (2) declining per-mile cost of gasoline; (3) land use patterns increasing the distance between jobs and housing; and (4) a shift in consumer preferences to larger, less fuel-efficient motor vehicles. The fuel economy standard for new passenger cars in 2014 was 34.2 miles per gallon (mpg), and 26.2 mpg for new light trucks (gross vehicle weight of 8,500 pounds or less).[8] Heavy-duty vehicles (i.e., vehicles and trucks over 8,500 pounds gross vehicle weight) are not currently subject to fuel economy standards. Compliance with Federal fuel economy standards is not determined for each individual vehicle model. Rather, compliance is determined based on each manufacturer's average fuel economy for the portion of their vehicles produced for sale in the United States.

## 5.18.2 REGULATORY SETTING

The following is a description of State and local environmental laws and policies that are relevant to the California Environmental Quality Act (CEQA) review process.

[3] EIA (U.S. Energy Information Administration). *Household Energy Use in California*. [Online]: http://www.eia.gov/consumption/residential/reports/2009/state_briefs/pdf/ca.pdf. Accessed September 5, 2017.
[4] CEC (California Energy Commission). *Total System Electric Generation*. [Online]: http://www.energy.ca.gov/almanac/electricity_data/total_system_power.html. Accessed September 5, 2017.
[5] CEC (California Energy Commission). 2014. *California Energy Demand Update Forecast*, 2017-2027. December. [Online]: http://docketpublic.energy.ca.gov/PublicDocuments/16-IEPR-05/TN214635_20161205T142341_California_Energy_Demand_Updated_Forecast.pdf . Accessed September 5, 2017.
[6] EIA (U.S. Energy Information Administration). *Natural Gas Delivered to Consumers in California (Including Vehicle Fuel)*. [Online]: https://www.eia.gov/dnav/ng/hist/n3060ca2m.htm. Accessed June 20, 2017.
[7] EIA (U.S. Energy Information Administration). *California Natural Gas Summary*. [Online]: https://www.eia.gov/dnav/ng/ng_sum_lsum_dcu_sCA_m.htm. Accessed June 20, 2017.
[8] DOT (U.S. Department of Transportation). 2014. *Summary of Fuel Economy Performance*, December 15.

## STATE

### California's Energy Efficiency Standards for Residential and Nonresidential Buildings (Title 24).

Title 24, California's energy efficiency standards for residential and non-residential buildings, was established by the California Energy Commission (CEC) in 1978 in response to a legislative mandate to create uniform building codes to reduce California's energy consumption, and provide energy efficiency standards for residential and non-residential buildings. California's energy efficiency standards are updated on an approximate three-year cycle. On January 1, 2017, the 2016 Title 24 standards became effective with more stringent requirements. The 2016 standards are expected to substantially reduce the growth in electricity and natural gas use. Additional savings result from the application of the standards on building alterations. For example, requirements for cool roofs, lighting, and air distribution ducts are expected to save additional electricity. These savings are cumulative, doubling as years go by.

### California Green Building Standards

The California Green Building Standards Code (California Code of Regulations, Title 24, Part 11), commonly referred to as the CALGreen Code, is a statewide mandatory construction code that was developed and adopted by the California Building Standards Commission and the California Department of Housing and Community Development. The CALGreen standards require new residential and commercial buildings to comply with mandatory measures under the topics of planning and design, energy efficiency, water efficiency and conservation, material conservation and resource efficiency, and environmental quality. CALGreen also provides voluntary tiers and measures that local governments may adopt which encourage or require additional measures in the five green building topics. The most recent update to the CALGreen Code was adopted in 2016 and went into effect January 1, 2017.

### Recent CEQA Litigation

In California, Clean Energy Committee v. City of Woodland (2014) 225 Cal.App.4th 173 ("CCEC"), the Court observed that State *CEQA Guidelines* Appendix F lists environmental impacts and mitigation measures that an EIR may include. Potential impacts requiring EIR discussion include:

- *The project's energy requirements and its energy use efficiencies by amount and fuel type for each stage of the project including construction, operation, maintenance, and/or removal. If appropriate, the energy intensiveness of materials may be discussed.*
- *The effects of the project on local and regional energy supplies and on requirements for additional capacity.*
- *The effects of the project on peak and base period demands for electricity and other forms of energy.*
- *The degree to which the project complies with existing energy standards.*
- *The effects of the project on energy resources.*
- *The project's projected transportation energy use requirements and its overall use of efficient transportation alternatives.*

### LOCAL

#### Shasta County General Plan

The Shasta County *General Plan* includes several objectives and policies related to energy. The objectives and policies that would apply to the proposed project are provided below.

- *E-2*. Increase utilization of renewable energy resources by encouraging development of solar, hydroelectric, biomass, waste-to-energy, and cogeneration sources.

- *E-b*. Encourage development patterns which reduce the number of miles driven in personal vehicles through consideration of higher density and mixed land uses, transit- and pedestrian-oriented developments, and increased jobs-to-housing balance. At the community level, the County shall adopt land use plans which reduce the need to travel outside the community for basic commercial services.

- *E-c.* The County should develop energy thresholds and standards which assist applicants for development projects in designing conservation features into their proposals. Energy threshold standards could also be used to assist in the evaluation of potential energy consumption impacts which may be environmentally significant.

- *E-g.* Revision or development of landscaping and tree protection standards should provide consideration to improving building energy efficiency and shading of streets and parking areas during the hot summer season.

- *E-h.* Subdivision design review should include standards for street and building orientation which allow appropriate solar access as well as landscape shading for cooling and heating in urban and town centers.

## 5.18.3 STANDARDS OF SIGNIFICANCE

### SIGNIFICANCE CRITERIA

In accordance with State *CEQA Guidelines*, the effects of a project are evaluated to determine whether they would result in a significant adverse impact on the environment. An EIR is required to focus on these effects and offer mitigation measures to reduce or avoid any significant impacts that are identified. The criteria used to determine the significance of impacts may vary depending on the nature of the project. According to Appendix F of the State *CEQA Guidelines*, the proposed project would have a significant impact related to energy, if it would:

- *Develop land uses and patterns that cause wasteful, inefficient, and unnecessary consumption of energy or construct new or retrofitted buildings that would have excessive energy requirements for daily operation.* Refer to Impact 5.18-1 and Impact 5.18-2, below.

Based on these standards, the effects of the proposed project have been categorized as either a "*less than significant"* impact or a "*potentially significant"* impact. Mitigation measures are recommended for potentially significant impacts. If a potentially significant impact cannot be reduced to a less than

significant level through the application of mitigation, it is categorized as a "*significant and unavoidable"* impact.

## 5.18.4 POTENTIAL IMPACTS AND MITIGATION MEASURES

### METHODOLOGY

The impact analysis focuses on the three sources of energy that are relevant to the proposed project: electricity, natural gas, and transportation fuel for vehicle trips associated with new development as well as the fuel necessary for project construction. The analysis of electricity/natural gas usage is based on California Emissions Estimator Model (CalEEMod) greenhouse gas (GHG) emissions modeling, which quantifies energy use for occupancy. The results of the CalEEMod modeling are included in Appendix 15.3, AIR QUALITY/GREENHOUSE GAS EMISSIONS DATA. Modeling was based primarily on the default settings in the computer program for Shasta County. The amount of operational fuel use was estimated using the California Air Resources Board's Emissions Factor 2014 (EMFAC2014) computer program, which provides projections for typical daily fuel usage in Shasta County. The amount of construction-related fuel use was estimated using ratios provided in the Climate Registry General Reporting Protocol for the Voluntary Reporting Program, Version 2.1. The results of EMFAC2014 modeling and construction fuel estimates are included in Appendix 15.3.

Energy consumption impacts are analyzed below according to topic. Mitigation measures directly correspond with an identified impact.

| IMPACT 5.18-1 | *Project implementation would not use fuel or energy in a wasteful manner.* |
|---|---|

**Significance: Less Than Significant Impact.**

**Impact Analysis:**

***Short-Term Construction***

In 1994, the U.S. Environmental Protection Agency (EPA) adopted the first set of emission standards (Tier 1) for all new off-road diesel engines greater than 37 kilowatts (kW). The Tier 1 standards were phased in for different engine sizes between 1996 and 2000, reducing $NO_X$ emissions from these engines by 30 percent. The EPA Tier 2 and Tier 3 standards for off-road diesel engines are projected to further reduce emissions by 60 percent for $NO_X$ and 40 percent for particulate matter from Tier 1 emission levels. Tier 4 standards were established in 2004 and reduce $NO_x$, $PM_{10}$, and $PM_{2.5}$ emissions by 90 percent and were phased in between 2008 and 2014. These emissions standards require highly efficient combustion systems that maximize fuel efficiency and reduce unnecessary consumption.

Depending on market conditions, the project is expected to be constructed in phases generally over a period of 10 years. Construction would consist of site preparation, grading, paving, building construction, and architectural coating. Table 5.18-1, CONSTRUCTION FUEL CONSUMPTION, provides an estimate of construction fuel consumption for the project based on information provided by the CalEEMod air quality computer model.

**Table 5.18-1**
**CONSTRUCTION FUEL CONSUMPTION**

| Equipment | Quantity | Horsepower | Load Factor | Fuel Consumption Rate[1] (gallons per hour) | Duration[2] (total hours) | Total Fuel Consumption[3,4] (gallons) |
|---|---|---|---|---|---|---|
| **Site Preparation** | | | | | | |
| Rubber Tired Dozers | 3 | 255 | 0.40 | 4.08 | 80 | 326 |
| Tractors/Loaders/Backhoes | 4 | 97 | 0.37 | 1.44 | 80 | 115 |
| **Grading** | | | | | | |
| Excavators | 2 | 162 | 0.38 | 2.46 | 240 | 591 |
| Graders | 1 | 174 | 0.41 | 2.85 | 240 | 685 |
| Rubber Tired Dozers | 1 | 255 | 0.40 | 4.08 | 240 | 979 |
| Scrapers | 2 | 361 | 0.48 | 6.93 | 240 | 1,663 |
| Tractors/Loaders/Backhoes | 2 | 97 | 0.37 | 1.44 | 240 | 345 |
| **Paving** | | | | | | |
| Pavers | 2 | 125 | 0.42 | 2.10 | 2,400 | 5,040 |
| Paving Equipment | 2 | 130 | 0.36 | 1.87 | 2,400 | 4,493 |
| Rollers | 2 | 80 | 0.38 | 1.22 | 2,400 | 2,918 |
| **Building Construction** | | | | | | |
| Cranes | 1 | 226 | 0.29 | 2.62 | 2,100 | 5,505 |
| Forklifts | 3 | 89 | 0.20 | 0.71 | 2,400 | 1,709 |
| Generator Sets | 1 | 84 | 0.74 | 2.49 | 2,400 | 5,967 |
| Tractors/Loaders/Backhoes | 3 | 97 | 0.37 | 1.44 | 2,100 | 3,015 |
| Welders | 1 | 46 | 0.45 | 0.83 | 2,400 | 1,987 |
| **Architectural Coating** | | | | | | |
| Air Compressors | 1 | 78 | 0.48 | 1.50 | 1,800 | 2696 |
| | | | | | ***TOTAL[4]*** | ***38,035*** |

Notes:
1 . Derived using the following equation:
*Fuel Consumption Rate = Horsepower x Load Factor x Fuel Consumption Factor*
*Where: Fuel Consumption Factor for a diesel engine is 0.04 gallons per horsepower per hour (gal/hp/hr) and a gasoline engine is 0.06 gal/hp/hr.*
2. Total hours of duration derived from CalEEMod modeling results.
3. Total Fuel Consumption calculated using the following equation: *Total Fuel Consumption = Duration in Hours x Fuel Consumption Rate*
4. Values may be slightly off due to rounding.
Source: Refer to Appendix 15.3, AIR QUALITY/GREENHOUSE GAS EMISSIONS DATA, for CalEEMod assumptions used in this analysis.

Project construction would occur over six phases, with Phase 1 utilizing the most construction equipment. Table 5.18-1 depicts the "worst-case" construction phase with regards to the highest amount of fuel utilized during construction. As shown in Table 5.18-1, Phase 1 construction would consume a total of approximately 38,035 gallons of fuel. The remaining five phases would each consume less than Phase 1. There are no unusual project characteristics that would necessitate the use of construction equipment that would be less energy-efficient than at comparable construction sites in the region or State. It is noted that the project would be required to comply with **MM 5.3-1**, which requires all construction equipment to be at least Tier 3 certified (refer to Section 5.3, AIR QUALITY). As noted above, these engines use highly efficient combustion engines to minimize unnecessary fuel consumption. Therefore, it is expected that construction fuel consumption associated with the proposed project would not be any more inefficient, wasteful, or unnecessary than other similar development projects of this nature. A *less than significant* impact would occur in this regard.

### *Long-Term Operation*

*Transportation Energy Demand.* Pursuant to the Federal Energy Policy and Conservation Act of 1975, the National Highway Traffic and Safety Administration (NHTSA) is responsible for establishing additional vehicle standards and for revising existing standards. Compliance with Federal fuel economy standards is

not determined for each individual vehicle model. Rather, compliance is determined based on each manufacturer's average fuel economy for the portion of their vehicles produced for sale in the United States. Table 5.18-2, PROJECT OPERATIONAL FUEL CONSUMPTION, provides an estimate of the daily fuel consumed by vehicles traveling to and from the proposed project site.

**Table 5.18-2**
**PROJECT OPERATIONAL FUEL CONSUMPTION**

| Vehicle Type | Percent of Vehicle Trips[1] | Daily Trips[2] | Daily Vehicle Miles Traveled[3] | Average Fuel Economy (miles per gallon)[4] | Total Daily Fuel Consumption (gallons)[5] |
|---|---|---|---|---|---|
| Passenger Cars | 60 | 1,064 | 8,159 | 21.6 | 378 |
| Light/Medium Trucks | 16 | 284 | 2,176 | 17.2 | 127 |
| Heavy Trucks/Other | 24 | 426 | 3,264 | 6.1 | 535 |
| ***TOTAL[6]*** | ***100*** | ***1,774[7]*** | ***13,599[8]*** | -- | ***1,039*** |

Notes:
1. Percent of Vehicle Trip distribution based on trip characteristics within the CalEEMod model.
2. Daily Trips calculated by multiplying the total daily trips by percent vehicle trips (i.e., Daily Trips x percent of Vehicle Trips).
3. Daily Vehicle Miles Traveled (VMT) calculated by multiplying percent vehicle trips by total VMT (i.e., VMT x percent of Vehicle Trips).
4. Average fuel economy derived from the Department of Transportation.
5. Total Daily Fuel Consumption calculated by dividing the daily VMT by the average fuel economy (i.e., VMT/Average Fuel Economy).
6. Values may be slightly off due to rounding.
7. Based upon data within the *Tierra Robles Traffic Technical Memorandum*, prepared by Omni-Means, dated August 17, 2017; refer to Appendix 15.9, TRAFFIC IMPACT STUDY.
8. Daily vehicle miles traveled is based upon data within the CalEEMod model; refer to Appendix 15.3, AIR QUALITY/GREENHOUSE GAS EMISSIONS DATA.

Source: Refer to Appendix 15.3, AIR QUALITY/GREENHOUSE GAS EMISSIONS DATA, for CalEEMod assumptions used in this analysis.

As indicated in Table 5.18-2, operation of the proposed project is estimated to consume approximately 1,039 gallons of fuel daily. However, the project would not result in any unusual characteristics that would result in excessive long-term operational fuel consumption. The project would be required to comply with **MM 5.3-3**, which requires the project's streets to be designed to maximize pedestrian access to transit stops to avoid single-occupant vehicle trips and promote transit to minimize transportation fuel consumption. As such, fuel consumption associated with vehicle trips generated by the project would not be considered inefficient, wasteful, or unnecessary in comparison to other similar developments in the region. A *less than significant* impact would occur in this regard.

*Building Energy Demand.* The proposed project would be expected to demand 1,259 megawatt hours (MWh) of electricity and 4.3 million kiloBritish Thermal Units (kBTU) of natural gas per year.[9] The project would involve operations typical of residential uses, requiring electricity for typical lighting, climate control, and day-to-day activities. In addition, the project would include the operation of a community wastewater treatment facility that would require energy consumption. Although the wastewater treatment facility would require additional energy consumption, the project's grey water diverter system would help reduce the total energy consumption at the wastewater treatment facility. The grey water diverter system would allow diversion of flow from washing machines, showers, and bath tubs to a manual diverter valve. Typical operations would direct flow to provide subsurface irrigation for appropriate drought tolerant trees and shrubs within the individual yard, reducing domestic water demand. During periods of rainfall the flow would be directed to the onsite septic tank. Furthermore, the treatment

[9] It is noted that the project's 1,259 megawatt hours (MWh) of electricity and 4.3 million kBTU of natural gas annual consumption includes the operation of the community wastewater treatment facility.

system would also be designed to meet the reuse requirements for discharge of Title 22 Disinfected Secondary Effluent.

In addition, as stated in Section 5.3, AIR QUALITY, the proposed project would incorporate several energy efficiency measures, including energy-efficient lighting and air conditioning units (refer to **MM 5.3-3**). Further, the project would include passive solar design in all residential units, and would be required to comply with Shasta County *General Plan* polices discussed in Section 5.18.2, above. Following compliance with all applicable mitigation measures and Shasta County *General Pan* policies, as well as inclusion of energy efficient design (such as passive solar panels), the project would not be considered inefficient, wasteful, or unnecessary in comparison to other similar developments in the region.

*Energy Efficiency Measures.* Title 24, California's Energy Efficiency Standards for Residential and Non-residential Buildings, was established by the CEC in 1978 in response to a legislative mandate to create uniform building codes to reduce California's energy consumption, and provide energy efficiency standards for residential and non-residential buildings. In 2016, the CEC updated Title 24 standards with more stringent requirements. The 2016 Standards are incorporated within the California Building Code and are expected to substantially reduce the growth in electricity and natural gas use.[10] Additional savings result from the application of the Standards on building alterations. For example, requirements for cool roofs, lighting, and air distribution ducts are expected to save additional electricity. These savings are cumulative, doubling as years go by.

Additionally, implementation of the project's design features (i.e., high efficiency lighting and air conditioning units, passive solar design, grey water diverter systems, etc.) would further reduce energy consumption. The project would be required to adhere to all federal, State, and local requirements for energy efficiency, including the Title 24 standards, as well as the project's design features. The proposed project would not result in the inefficient, wasteful, or unnecessary consumption of building energy. A *less than significant* impact would occur in this regard.

**Mitigation Measures:** No mitigation measures are required.

**Level of Significance After Mitigation:** No mitigation measures are required. Impacts would be *less than significant*.

## 5.18.5 CUMULATIVE SETTING, IMPACTS, AND MITIGATION MEASURES

| | |
|---|---|
| **IMPACT 5.18-2** | ***The proposed project, in combination with cumulative development within Shasta County, would not use fuel or energy in a wasteful manner.*** |

**Significance: Less Than Significant Impact.**

**Cumulative Setting:** The cumulative setting for energy use includes Shasta County and the incorporated cities of Redding, Anderson, and Shasta Lake.

[10] The 2016 standards went into effect on January 1, 2017.

**Impact Analysis:** The anticipated project impacts, in conjunction with cumulative development in the site vicinity, would increase urbanization and result in increased energy consumption. Potential land use impacts are site-specific and require evaluation on a case-by-case basis. Each cumulative project would require separate discretionary approval and CEQA assessment, which would address potential energy consumption impacts and identify all feasible mitigation measures to mitigate against the wasteful use of energy.

As noted above, the proposed project would not result in significant energy consumption impacts. The proposed project would not be considered inefficient, wasteful, or unnecessary with regard to energy. Thus, the proposed project and identified cumulative projects are not anticipated to result in a significant cumulative impact.

**Mitigation Measures:** No mitigation measures are required.

**Level of Significance After Mitigation:** No mitigation measures are required. Cumulative impacts related to energy consumption would be *less than significant*.