# APPENDIX 4

# Energy Impact Analysis

# ENERGY IMPACT ASSESSMENT

FOR THE PROPOSED

# FRESNO CITY COLLEGE PARKING & FACILITIES EXPANSION PROJECT

## STATE CENTER COMMUNITY COLLEGE DISTRICT

## FRESNO, CA

JULY 2019

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## LIST OF COMMON TERMS & ACRONYMS

| | |
|---|---|
| AFV | Alternative Fuel Vehicles |
| CalEEMod | California Emissions Estimator Model |
| CARB | California Air Resource Board |
| CEQA | California Environmental Quality ACt |
| CHP | Combined Heat and Power |
| DSG | Department of General Services |
| EMFAC | Emissions Factor |
| EO | Executive Order |
| EPA | Environmental Protection Agency |
| GHG | Greenhouse Gas |
| kBTU | Kilo British Thermal Units |
| kW | Kilowatt |
| kWh | Kilowatt Hour |
| LEED | Leadership in Energy and Environmental Design |
| MW | Megawatt |
| PG&E | Pacific Gas and Electric |
| PV | Photovoltaic |
| SCAQMD | South Coast Air Quality Management District |
| SJVAPCD | San Joaquin Valley Air Pollution Control District |
| USDOT | U.S. Department of Transportation |
| VMT | Vehicle Mile Travelled |

# INTRODUCTION

This report provides an analysis of potential energy impacts associated with the proposed Fresno City College Parking and Facilities Expansion Project. This report also provides a summary of existing conditions in the project area and the applicable regulatory framework pertaining to energy.

## PROPOSED PROJECT SUMMARY

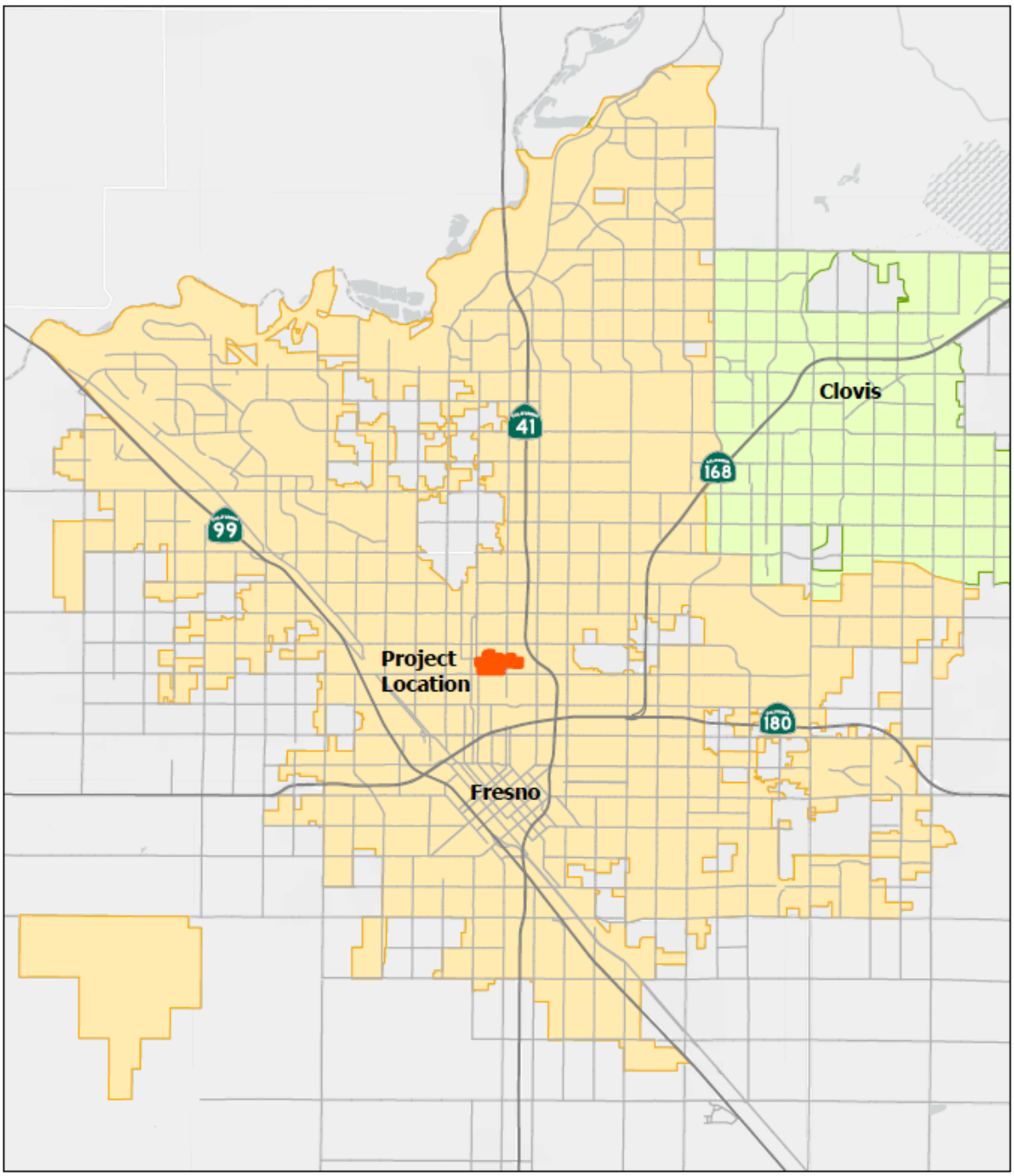
The proposed project includes expansion of various onsite parking and facilities at Fresno City College. The project location is depicted in Figures 1 and 2. The following facilities and activities are planned as part of the project. Development of the facilities would occur over the next five years.

- Construction of a parking structure on the south side of Cambridge Avenue west of Blackstone Avenue located north of the existing district office building. The proposed parking structure would have capacity for up to 1,000 parking spaces, include up to five levels of parking, and include ingress/egress points at Weldon Avenue and potentially Cambridge Avenue.
- Construction of a three-story Science Building (approximately 95,000 square feet) located near the southwest corner of Blackstone and Weldon Avenues. The new Science Building is proposed to include 6 biology labs, 3 anatomy and physiology labs, 5 chemistry labs, 2 physics labs, 2 engineering labs, a computer lab, 3 general educational classrooms, 4 Design Science (Middle College) classrooms, welcome center, tutorial space, and 34 faculty offices. Surface parking would also be added adjacent to the building. Existing Maintenance & Operations facilities located in this area would be removed and relocated to a different area of the campus (see below).
- Replacement of the existing one-story, 5,255 square-foot Child Development Center with a new one-story, 16,480 square-foot Child Development Center at its current location.
- Construction of a one-story, 10,000 square-foot Maintenance & Operations building plus a parking and storage area on the west side of San Pablo Avenue northwest of the existing Health Sciences Building.
- Repurposing of the existing District administration building located on the north side of Weldon Avenue to accommodate the SCCCD Police Department.

# ENERGY FUNDAMENTALS

Energy use is typically associated with transportation, construction, and the operation of land uses. Transportation energy use is generally categorized by direct and indirect energy. Direct energy relates to energy consumption by vehicle propulsion. Indirect energy relates to the long-term indirect energy consumption of equipment, such as maintenance activities. Energy is also consumed by construction and routine operation and maintenance of land use. Construction energy relates to a direct one-time energy expenditure primarily associated with the consumption of fuel use to operate construction equipment. Energy-related to land use is normally associated with direct energy consumption for heating, ventilation, and air conditioning of buildings.

## Figure 1. Project Location




**Regional Location** **Figure 1**

Fresno City College Parking and Facilities Expansion Project
State Center Community College District

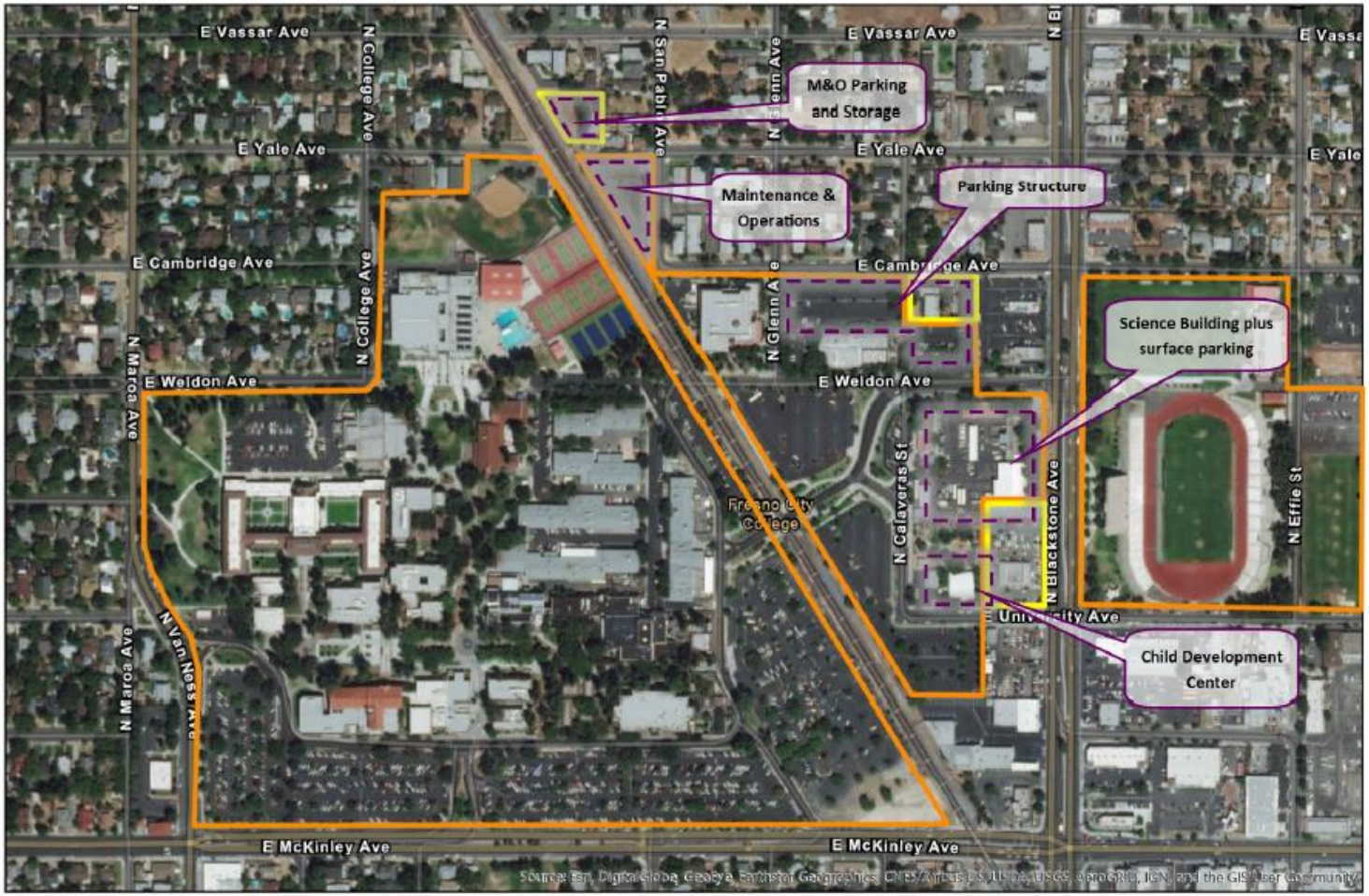
ODELL Planning & Research, Inc.
Environmental Planning • School Facility Planning • Demographics

0 1 2 4 Miles

N

Source: OPR 2019

## Figure 2. Project Site Boundaries and Proposed Facilities




**Project Site** **Figure 2**

Fresno City College Parking and Facilities Expansion Project
State Center Community College District

ODELL Planning & Research, Inc.
Environmental Planning • School Facility Planning • Demographics

Existing Campus
Expansion Areas
Proposed Facilities Locations

0 125 250 500 Feet

N

Source: OPR 2019

# EXISTING SETTING

## PHYSICAL SETTING

The project is located in the City of Fresno. The City is served primarily by Pacific Gas & Electric (PG&E). The climate in the project area is semi-arid, with an annual normal precipitation of approximately 11 inches. Temperatures in the project area range from an average minimum of approximately 38 degrees Fahrenheit (°F), in January, to an average maximum of 98°F, in July (WRCC 2018).

State Center Community College District is dedicated to the responsible management of natural resources to continue efficient operations on campus. Electricity, natural gas, water, and other resources are managed using sustainability as a driving force in campus planning and operations. In 2018, the District embarked on solar installation projects at Fresno City College, Reedley College, Clovis Community College, and Madera Community College Center. The installed systems provide approximately 11,668,000 kilowatt hours (kWh). The systems are designed to produce a maximum of 83 percent of the campuses' energy needs (SCCCD 2018).

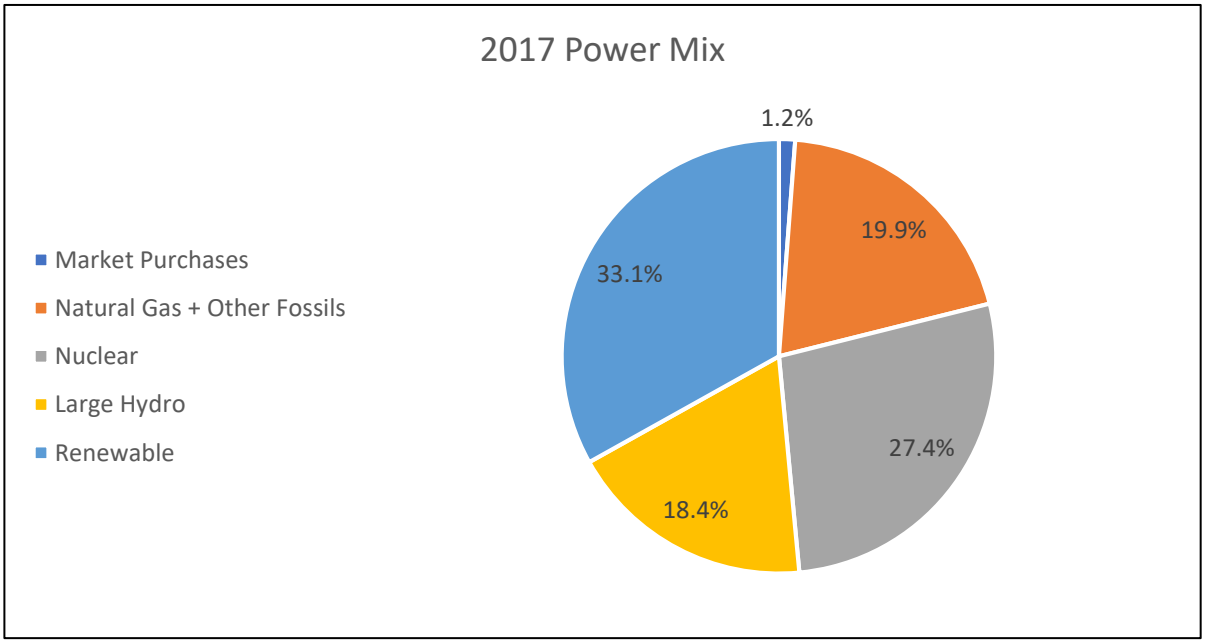
## ENERGY RESOURCES

Energy sources for the City of Fresno are served primarily by Pacific Gas & Electric (PG&E). Energy resources consist largely of natural gas, nuclear, fossil fuels, hydropower, solar, and wind. The primary use of energy sources is for electricity to operate campus facilities.

### ELECTRICITY

Electric services at Fresno City College are purchased from regulated electric utility, Pacific Gas and Electric Company (PG&E). The breakdown of PG&E's power mix is shown in Figure 3. As shown, roughly 78.8 percent of PG&E's 2018 total electric power mix came from greenhouse gas (GHG)-free sources that include nuclear, large hydro and renewable energy sources (PG&E 2018).

**Figure 3. PG&E 2017 Power Mix**




Source: PG&E 2019

### NATURAL GAS

PG&E's natural gas system encompasses approximately 70,000 square miles in Northern and Central California. Approximately 90 percent of the natural gas supply for PG&E is from out-of-state imports. In 2017, natural gas throughput provided by PG&E totaled 800,923 million cubic feet (MMcf). Natural gas throughput has decreased over by past few years. In comparison to year 2015 throughput, natural gas throughput has decreased by 103,599 MMcf, an approximate 11.5 percent reduction (PG&E 2019).

## REGULATORY FRAMEWORK

### FEDERAL

#### REGULATIONS FOR GREENHOUSE GAS EMISSIONS FROM PASSENGER CARS AND TRUCKS AND CORPORATE AVERAGE FUEL ECONOMY STANDARDS

In October 2012, the U.S. Environmental Protection Agency (EPA) and the National Highway Traffic Safety Administration (NHSTA), on behalf of the Department of Transportation, issued final rules to further reduce GHG emissions and improve corporate average fuel economy (CAFE) standards for light-duty vehicles for model years 2017 and beyond. NHTSA's CAFE standards have been enacted under the Energy Policy and Conservation Act since 1978. This national program requires automobile manufacturers to build a single light-duty national fleet that meets all requirements under both federal programs and the standards of California and other states. This program would increase fuel economy to the equivalent of 54.5 miles per gallon (mpg) limiting vehicle emissions to 163 grams of carbon dioxide (CO2) per mile for the fleet of cars and light-duty trucks by the model year 2025.

In January 2017, EPA Administrator Gina McCarthy signed a Final Determination to maintain the current GHG emissions standards for the model year 2022-2025 vehicles. However, on March 15, 2017, EPA Administrator Scott Pruitt and Department of Transportation Secretary Elaine Chao announced that EPA intends to reconsider the Final Determination. On April 2, 2018, EPA Administrator Scott Pruitt officially withdrew the January 2017 Final Determination, citing information that suggests that these current standards may be too stringent due to changes in key assumptions since the January 2017 Determination. According to the EPA, these key assumptions include gasoline prices and overly optimistic consumer acceptance of advanced technology vehicles. The April 2nd notice is not EPA's final agency action. The EPA intends to initiate rulemaking to adopt new standards. Until that rulemaking has been completed, the current standards remain in effect. (EPA 2017, EPA 2018).

#### ENERGY POLICY AND CONSERVATION ACT

The Energy Policy and Conservation Act of 1975 sought to ensure that all vehicles sold in the U.S. would meet certain fuel economy goals. Through this Act, Congress established the first fuel economy standards for on-road motor vehicles in the U.S. Pursuant to the Act, the National Highway Traffic and Safety Administration, which is part of the U.S. Department of Transportation (USDOT), is responsible for establishing additional vehicle standards and for revising existing standards. Since 1990, the fuel economy standard for new passenger cars has been 27.5 miles per gallon (mpg). Since 1996, the fuel economy standard for new light trucks (gross vehicle weight of 8,500 pounds or less) has been 20.7 mpg. 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 determined based on each manufacturer's average fuel economy for the portion of its vehicles produced for sale in the U.S. The CAFE program, administered by EPA, was created to determine vehicle manufacturers' compliance with the fuel economy standards. EPA calculates a CAFE value for each manufacturer based on city and highway fuel economy test results and vehicle sales. Based on the information generated under the CAFE program, the USDOT is authorized to assess penalties for noncompliance.

#### ENERGY POLICY ACT OF 1992

The Energy Policy Act of 1992 (EPAct) was passed to reduce the country's dependence on foreign petroleum and improve air quality. EPAct includes several parts intended to build an inventory of alternative fuel

vehicles (AFVs) in large, centrally fueled fleets in metropolitan areas. EPAct requires certain federal, state, and local government and private fleets to purchase a percentage of light-duty AFVs capable of running on alternative fuels each year. In addition, financial incentives are included in EPAct. Federal tax deductions will be allowed for businesses and individuals to cover the incremental cost of AFVs. States are also required by the act to consider a variety of incentive programs to help promote AFVs.

#### ENERGY POLICY ACT OF 2005

The Energy Policy Act of 2005 was signed into law on August 8, 2005. Generally, the act provides for renewed and expanded tax credits for electricity generated by qualified energy sources, such as landfill gas; provides bond financing, tax incentives, grants, and loan guarantees for clean renewable energy and rural community electrification; and establishes a federal purchase requirement for renewable energy.

### STATE

#### WARREN-ALQUIST ACT

The 1975 Warren-Alquist Act established the California Energy Resources Conservation and Development Commission, now known as the California Energy Commission (CEC). The Act established a state policy to reduce wasteful, uneconomical, and unnecessary uses of energy by employing a range of measures. The California Public Utilities Commission (CPUC) regulates privately-owned utilities in the energy, rail, telecommunications, and water fields.

#### ASSEMBLY BILL 2076: REDUCING DEPENDENCE ON PETROLEUM

Pursuant to Assembly Bill (AB) 2076 (Chapter 936, Statutes of 2000), CEC and the California Air Resources Board (CARB) prepared and adopted a joint agency report in 2003, *Reducing California's Petroleum Dependence*. Included in this report are recommendations to increase the use of alternative fuels to 20 percent of on-road transportation fuel use by 2020 and 30 percent by 2030, significantly increase the efficiency of motor vehicles, and reduce per capita vehicle miles traveled (VMT) (CEC and CARB 2003). Further, in response to the CEC's 2003 and 2005 *Integrated Energy Policy Reports*, Governor Davis directed CEC to take the lead in developing a long-term plan to increase alternative fuel use. A performance-based goal of AB 2076 was to reduce petroleum demand to 15 percent below 2003 demand by 2020.

#### SENATE BILL 1078: CALIFORNIA RENEWABLES PORTFOLIO STANDARD PROGRAM

Senate Bill 1078 (Public Utilities Code Sections 387, 390.1, 399.25 and Article 16) addresses electricity supply and requires that retail sellers of electricity, including investor-owned utilities and community choice aggregators, provide a minimum 20 percent of their supply from renewable sources by 2017. This Senate Bill will affect statewide GHG emissions associated with electricity generation. In 2008, Governor Schwarzenegger signed Executive Order S-14-08, which set the Renewables Portfolio Standard target to 33 percent by 2020. It directed state government agencies and retail sellers of electricity to take all appropriate actions to implement this target. Executive Order S-14-08 was later superseded by Executive Order S-21-09 on September 15, 2009. Executive Order S-21-09 directed the ARB to adopt regulations requiring 33 percent of electricity sold in the State come from renewable energy by 2020. Statute SB X1-2 superseded this Executive Order in 2011, which obligated all California electricity providers, including investor-owned utilities and publicly owned utilities, to obtain at least 33 percent of their energy from renewable electrical generation facilities by 2020.

#### SENATE BILL 350: CLEAN ENERGY AND POLLUTION REDUCTION ACT OF 2015

The Clean Energy and Pollution Reduction Act of 2015 (SB 350) requires the amount of electricity generated and sold to retail customers per year from eligible renewable energy resources to be increased to 50 percent by December 31, 2030. This act also requires doubling of the energy efficiency savings in electricity and natural gas for retail customers through energy efficiency and conservation by December 31, 2030.

### ENERGY ACTION PLAN

The first Energy Action Plan (EAP) emerged in 2003 from a crisis atmosphere in California's energy markets. The State's three major energy policy agencies (CEC, CPUC, and the Consumer Power and Conservation Financing Authority [established under deregulation and now defunct]) came together to develop one high-level, coherent approach to meeting California's electricity and natural gas needs. It was the first time that energy policy agencies formally collaborated to define a common vision and set of strategies to address California's future energy needs and emphasize the importance of the impacts of energy policy on the California environment.

In the October 2005 *Energy Action Plan II*, CEC and CPUC updated their energy policy vision by adding some important dimensions to the policy areas included in the original EAP, such as the emerging importance of climate change, transportation-related energy issues, and research and development activities. The CEC recently adopted an update to the EAP II in February 2008 that supplements the earlier EAPs and examines the State's ongoing actions in the context of global climate change.

### ASSEMBLY BILL 1007: STATE ALTERNATIVE FUELS PLAN

AB 1007 (Chapter 371, Statues of 2005) required CEC to prepare a state plan to increase the use of alternative fuels in California. CEC prepared the State Alternative Fuels Plan (SAF Plan) in partnership with CARB and in consultation with other state, federal, and local agencies. The SAF Plan presents strategies and actions California must take to increase the use of alternative non-petroleum fuels in a manner that minimizes the costs to California and maximizes the economic benefits of in-state production. The SAF Plan assessed various alternative fuels and developed fuel portfolios to meet California's goals to reduce petroleum consumption, increase alternative fuel use, reduce greenhouse gas (GHG) emissions, and increase in-state production of biofuels without causing significant degradation of public health and environmental quality.

### EXECUTIVE ORDER S-06-06

Executive Order (EO) S-06-06, signed on April 25, 2006, establishes targets for the use and production of biofuels and biopower, and directs state agencies to work together to advance biomass programs in California while providing environmental protection and mitigation. The Executive Order establishes the following target to increase the production and use of bioenergy, including ethanol and biodiesel fuels made from renewable resources: produce a minimum of 20 percent of its biofuels within California by 2010, 40 percent by 2020, and 75 percent by 2050. The Executive Order also calls for the State to meet a target for use of biomass electricity. The 2011 Bioenergy Action Plan identifies those barriers and recommends actions to address them so that the State can meet its clean energy, waste reduction, and climate protection goals. The 2012 Bioenergy Action Plan updates the 2011 plan and provides a more detailed action plan to achieve the following goals:

- increase environmentally- and economically-sustainable energy production from organic waste;
- encourage the development of diverse bioenergy technologies that increase local electricity generation, combined heat and power facilities, renewable natural gas, and renewable liquid fuels for transportation and fuel cell applications;
- create jobs and stimulate economic development, especially in rural regions of the state; and
- reduce fire danger, improve air and water quality, and reduce waste.

As of 2016, 2.7 percent of the total electrical system power in California was derived from biomass (CEC 2017).

### CALIFORNIA BUILDING CODE

The California Building Code (CBC) contains standards that regulate the method of use, properties, performance, or types of materials used in the construction, alteration, improvement, repair, or rehabilitation of a building or other improvement to real property. The California Building Code is adopted every three years by the Building Standards Commission (BSC). In the interim, the BSC also adopts annual updates to make necessary mid-term corrections. The CBC standards apply statewide; however, a local jurisdiction may

amend a CBC standard if it makes a finding that the amendment is reasonably necessary due to local climatic, geological, or topographical conditions.

### GREEN BUILDING STANDARDS

In essence, green buildings standards are indistinguishable from any other building standards, are contained in the California Building Code, and regulate the construction of new buildings and improvements. Whereas the focus of traditional building standards has been protecting public health and safety, the focus of green building standards is to improve environmental performance.

The green buildings standards were most recently updated in May 2018. Referred to as the *2019 Building Energy Efficiency Standards*, these most recent updates focus on four key areas: smart residential photovoltaic systems, updated thermal envelope standards (preventing heat transfer from the interior to the exterior and vice versa), residential and nonresidential ventilation requirements, and non-residential lighting requirements. Under the newly adopted standards, nonresidential buildings will use about 30 percent less energy due mainly to lighting upgrades (CEC 2018).

### ASSEMBLY BILL 32, CLIMATE CHANGE SCOPING PLAN AND UPDATE

In October 2008, ARB published its *Climate Change Proposed Scoping Plan*, which is the State's plan to achieve GHG reductions in California required by AB 32. This initial Scoping Plan contained the main strategies to be implemented in order to achieve the target emission levels identified in AB 32. The Scoping Plan included ARB-recommended GHG reductions for each emissions sector of the state's GHG inventory. The largest proposed GHG reduction recommendations were associated with improving emissions standards for light-duty vehicles, implementing the Low Carbon Fuel Standard program, implementation of energy efficiency measures in buildings and appliances, and the widespread development of combined heat and power systems, and developing a renewable portfolio standard for electricity production.

The initial Scoping Plan was first approved by ARB on December 11, 2008, and is updated every five years. The first update of the Scoping Plan was approved by the ARB on May 22, 2014, which looked past 2020 to set mid-term goals (2030-2035) on the road to reach the 2050 goals. The most recent update released by ARB is the *2017 Climate Change Scoping Plan*, which was released in November 2017. The measures identified in the *2017 Climate Change Scoping Plan* have the co-benefit of increasing energy efficiency and reducing California's dependency on fossil fuels.

### SENATE BILL 375

SB 375 requires Metropolitan Planning Organizations (MPOs) to adopt a sustainable communities strategy (SCS) or alternative planning strategy (APS) that will address land use allocation in that MPOs regional transportation plan. ARB, in consultation with MPOs, establishes regional reduction targets for GHGs emitted by passenger cars and light trucks for the years 2020 and 2035. These reduction targets will be updated every eight years but can be updated every four years if advancements in emissions technologies affect the reduction strategies to achieve the targets. ARB is also charged with reviewing each MPO's SCS or APS for consistency with its assigned targets. If MPOs do not meet the GHG reduction targets, funding for transportation projects may be withheld.

### EXECUTIVE ORDER B-48-18: ZERO EMISSION VEHICLES

In January 2018, Governor Brown signed Executive Order B-48-18 which required all State entities to work with the private sector to put at least 5-million zero-emission vehicles on the road by 2030, as well as install 200 hydrogen fueling stations and 250,000 zero-emissions chargers by 2025. In addition, State entities are also required to continue to partner with local and regional governments to streamline the installation of zero-emission vehicle infrastructure. Additionally, all State entities are to support and recommend policies and actions to expand infrastructure in homes, through the Low-Carbon Fuel Standard.

### SENATE BILL 32 AND ASSEMBLY BILL 197 OF 2016

SB 32 was signed by Governor Brown on September 8, 2016. SB 32 effectively extends California's GHG emission-reduction goals from year 2020 to year 2030. This new emission-reduction target of 40 percent below 1990 levels by 2030 is intended to promote further GHG-reductions in support of the State's ultimate goal of reducing GHG emissions by 80 percent below 1990 levels by 2050. SB 32 also directs the ARB to update the Climate Change Scoping Plan to address this interim 2030 emission-reduction target. Achievement of these goals will have the co-benefit of increasing energy efficiency and reducing California's dependency on fossil fuels.

### ADVANCED CLEAN CARS PROGRAM

In January 2012, CARB approved the Advanced Clean Cars program which combines the control of GHG emissions and criteria air pollutants, as well as requirements for greater numbers of zero-emission vehicles, into a single package of standards for vehicle model years 2017 through 2025. The new rules strengthen the GHG standard for 2017 models and beyond. This will be achieved through existing technologies, the use of stronger and lighter materials, and more efficient drivetrains and engines. The program's zero-emission vehicle regulation requires a battery, fuel cell, and/or plug-in hybrid electric vehicles to account for up to 15 percent of California's new vehicle sales by 2025. The program also includes a clean fuels outlet regulation designed to support the commercialization of zero-emission hydrogen fuel cell vehicles planned by vehicle manufacturers by 2015 by requiring increased numbers of hydrogen fueling stations throughout the state. The number of stations will grow as vehicle manufacturers sell more fuel cell vehicles. By 2025, when the rules will be fully implemented, the statewide fleet of new cars and light trucks will emit 34 percent fewer global warming gases and 75 percent fewer smog-forming emissions than the statewide fleet in 2016 (CARB 2016).

## IMPACT ANALYSIS

### THRESHOLDS OF SIGNIFICANCE

Based on Appendix F and G of the State CEQA Guidelines, the proposed project would result in a potentially significant impact on energy use if it would:

1. Result in the wasteful, inefficient, or unnecessary consumption of energy resources during project construction or operation; or
2. Conflict with or obstruct a state or local plan for renewable energy or energy efficiency.

The CEQA Guidelines, Appendix F, requires environmental analyses to include a discussion of potential energy impacts associated with a proposed project. Where necessary, CEQA requires that mitigation measures be incorporated to reduce the inefficient, wasteful or unnecessary consumption of energy. The State CEQA Guidelines, however, do not establish criteria that define inefficient, wasteful or unnecessary consumption. Compliance with the State's building standards for energy efficiency would result in decreased energy consumption for proposed buildings. However, compliance with building codes may not adequately address all potential energy impacts associated with project construction and operation. As a result, this analysis includes an evaluation of electricity and natural gas usage requirements associated with future development, as well as, energy requirements associated with the use of on-road and off-road vehicles. The degree to which the proposed project would comply with existing energy standards, as well as, applicable regulatory requirements and policies related to energy conservation was also taken into consideration for the evaluation of project-related energy impacts.

### METHODOLOGY

#### CONSTRUCTION

Regarding energy use (e.g., fuel use) during construction, it is assumed that only diesel fuel would be used in construction equipment. On-road vehicles for hauling materials and worker commute trips assumed a mix of diesel and gasoline fuel use. Construction schedules, equipment numbers, horsepower ratings, and load factors were used to calculate construction-related fuel use, based on default assumptions contained in the

California Emissions Estimator Model (CalEEMod). Diesel fuel use was estimated based on a factor of 0.05 gallons of diesel fuel per horsepower-hour derived from the South Coast Air Quality Management District's (SCAQMD) *CEQA Air Quality Handbook* (SCAQMD 1993).

OPERATIONS

The long-term operation of proposed the land uses would require electricity and natural gas usage for lighting, space and water heating, appliances, lab equipment, water conveyance, and landscaping maintenance equipment. Indirect energy use would include wastewater treatment and solid waste removal. Project operation would include the consumption of diesel and gasoline fuel from on-road vehicles.

Building energy use was estimated using CalEEMod, version 2016.3.2. Energy use included electricity and natural gas use, including electricity associated with the use, conveyance, and treatment of water. To be conservative, estimated energy use was based on year 2020 operational conditions. With continued improvements in building energy efficiencies, energy use in future years would be less.

Transportation fuel-use estimates were calculated by applying average fuel usage rates per vehicle mile to vehicle miles traveled (VMT) data associated with the proposed project. Annual VMT was estimated using CalEEMod, version 2016.3.2. Total VMT for the proposed land uses was adjusted to account for existing vehicle trips that would be relocated to the proposed land uses with project implementation. Average fuel usage rates by vehicle class, fuel type (e.g., diesel, gasoline, electric, and natural gas), and calendar year were obtained from Fresno County's emissions inventory derived from ARB's Emissions Factors (EMFAC) 2017 version 1.0.2 (ARB 2017b).

## PROJECT IMPACTS AND MITIGATION MEASURES

| **Impact E-1:** | ***Would the project result in the wasteful, inefficient, or unnecessary consumption of energy resources during project construction or operation?*** |
|---|---|

Implementation of the proposed project would increase electricity, diesel, gasoline, and natural gas consumption associated with construction activities, as well as long-term operational activities. Energy consumption associated with short-term construction and long-term operational activities are discussed in greater detail, as follows:

**Construction-Related Energy Consumption**

Energy consumption would occur during construction of the proposed facilities, including fuel use associated with the on-site operation of off-road equipment and vehicles traveling to and from the construction site. Table 1 summarizes the levels of energy consumption associated with project construction. As depicted, operation of off-road construction equipment would use an estimated total of 46,670 gallons of diesel fuel. On-road vehicles would use approximately 19,743 gallons of gasoline and 6,953 gallons of diesel fuel. In total, fuel use would equate to approximately 9,744 million British thermal units per year (MMBU) over the life of the construction project. Construction equipment use and associated energy consumption would be typical of that commonly associated with the construction of new land uses. As a result, project construction would not be anticipated to require the use of construction equipment that would be less energy efficient than those commonly used for the construction of similar facilities. Idling of on-site equipment during construction would be limited to no more than five minutes in accordance with San Joaquin Valley Air Pollution Control District (SJVAPCD) requirements. Furthermore, on-site construction equipment may include alternatively-fueled vehicles (e.g., natural gas) where feasible. Energy use associated with construction of the proposed facilities would be temporary and would not be anticipated to result in the need for additional capacity, nor would construction be anticipated to result in increased peak-period demands for electricity. As a result, the construction of proposed facilities and improvements would not result in an inefficient, wasteful, or unnecessary consumption of energy. As a result, impacts are considered **less than significant**.

## Table 1. Construction Energy Consumption

| Source | Total Fuel Use (gallons) | Total MMBTU |
|---|---|---|
| Off-Road Equipment Use (Diesel) | 46,670 | 6,412 |
| On-Road Vehicles (Gasoline) | 19,743 | 2,378 |
| On-Road Vehicles (Diesel) | 6,953 | 955 |
| | Total: | 9,744 |
| *Fuel use was calculated based, in part, on default construction schedules, equipment use, and vehicle trips identified for the construction of similar land uses contained in the CalEEMod output files prepared for the air quality analysis conducted for this project. Refer to Appendix A for modeling assumptions and results.* | | |

**Operational Mobile-Source Energy Consumption**

Operational mobile-source energy consumption would be primarily associated with commute trips to and from the campus. Energy use associated with commute trips are discussed in greater detail, as follows:

Table 2 summarizes the total fuel use at build-out of the proposed land uses. As noted in Table 2, the proposed land uses would consume an estimated 701 gallons/year of diesel fuel and an estimated 135,093 gallons/year of gasoline. However, a large majority of the estimated fuel use (roughly 90 percent) would be associated with existing vehicle trips, which would be relocated with project implementation. As a result, the proposed project would not result in increased fuel usage that would be considered unnecessary, inefficient, or wasteful. This impact would be considered less-than-significant.

## Table 2. Operational Fuel Consumption

| Source | Total Fuel Use (gallons) | Total MMBTU |
|---|---|---|
| **Proposed Land Uses** | | |
| On-Road Vehicles (Diesel) | 701 | 96 |
| On-Road Vehicles (Gasoline) | 135,093 | 16,269 |
| **Existing Vehicle Trips to be Relocated** | | |
| On-Road Vehicles (Diesel) | 636 | 87 |
| On-Road Vehicles (Gasoline) | 122,632 | 14,768 |
| | Net Increase: | 1,510 |
| *Fuel use was calculated based, in part, on VMT data for the proposed land uses derived from CalEEMod. Refer to Appendix A for modeling assumptions and results.* | | |

**Operational Building-Use Energy Consumption**

The proposed project would result in increased electricity and natural gas consumption associated with the long-term operation of the proposed land uses. It is important to note that the proposed buildings would be required to comply with Title 24 standards for energy-efficiency, which would include increased building insulation and energy-efficiency requirements, including the use of energy-efficient lighting, energy-efficient appliances, and use of low-flow water fixtures.

Estimated electricity and natural gas consumption associated with proposed facilities to be constructed as part of the proposed project are summarized in Table 3. As depicted, new facilities at build-out would result in the consumption of approximately 1,886,154 kilowatt hours per year (kWh/Yr) of electricity and approximately 622,513 kilo British thermal units per year (kBTU/Yr) of natural gas. In total, the proposed facilities would use consume a total of approximately 7,058 MMBTU/year. The proposed project would comply with the most current building energy-efficient standards (i.e., Title 24), which would result in increased building energy efficiency and energy conservation. However, detailed project-specific information regarding future on-site energy-conservation measures have not yet been identified. For this reason, implementation of the proposed project could result in wasteful, inefficient, and unnecessary consumption of energy. As a result, this impact would be considered **potentially significant**.

## Table 3. Operational Electricity & Natural Gas Consumption

| Source | Energy Use | MMBTU/Year |
|---|---|---|
| Electricity Consumption | 1,852,122 kWh/year | 6,319 |
| Water Use, Treatment & Conveyance | 34,032 kWh/Year | 116 |
| Natural Gas Use | 622,513 kBTU/Year | 623 |
| | Total: | 7,058 |
| *Fuel use was calculated based, in part, on default construction schedules, equipment use, and vehicle trips identified for the construction of similar land uses contained in the CalEEMod output files prepared for the air quality analysis conducted for this project. Refer to Appendix A for modeling assumptions and results.* | | |

**Mitigation Measures**

**E-1:** The following measures shall be implemented to reduce or offset energy use associated with the development of future land uses. These measures shall be shown on grading and building plans:

- Meet or exceed Cal Green Tier 2 standards for providing EV charging infrastructure.
- Meet or exceed Cal Green Tier 2 standards for using shading, trees, plants, cool roofs, etc. to reduce the "heat island" effect.
- New buildings shall be designed to achieve a minimum 5-percent improvement beyond 2016 Title 24 building energy-efficiency standards with a goal of achieving net-zero energy use.
- Utilize high efficiency lights in parking lots, streets, and other public areas.
- Incorporate measures and building design features that reduce energy use, water use, and waste generation (e.g., light-colored roofing materials, installation of automatic lighting controls, planting of trees to provide shade).
- Install energy-efficient appliances and building components sufficient to achieve overall reductions in interior energy use beyond those required at the time of development by CalGreen standards.
- New buildings and parking structures shall be designed to accommodate rooftop solar photovoltaic systems.
- Plant drought tolerate landscaping and incorporate water-efficient irrigation systems where necessary.
- Plant drought-tolerant, native shade trees along southern exposures of buildings to reduce energy used to cool buildings in summer.

**Significance After Mitigation**

Mitigation Measure E-1 includes measures that would result in decreased energy consumption and increase reliance on renewable energy sources. With the implementation of Mitigation Measures E-1, implementation of the proposed project would not result in wasteful, inefficient, or unnecessary consumption of energy. This impact would be considered **less than significant**.

| **Impact 2:** | ***Would the project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?*** |
|---|---|

As discussed earlier in this report, the proposed land uses would consume an estimated 701 gallons/year of diesel fuel and an estimated 135,093 gallons/year of gasoline. However, a large majority of the estimated fuel use (roughly 90 percent) would be associated with existing vehicle trips, which would be relocated with project implementation. As a result, the proposed project would not result in increased fuel usage that would be anticipated to conflict with applicable plans, policies, or regulations adopted for the purpose of reducing future fuel consumption rates.

The State of California's Energy Efficiency Strategic Plan establishes a goal for the development of building with net zero energy consumption. This plan includes goals pertaining to the construction of new residential, commercial, and governmental buildings. Adherence to current and future Title 24 energy requirements would help to reduce the project's building-use energy consumption. Additional measures would, nonetheless, likely be required to achieve a goal of meeting net-zero energy usage. However, the specific

measures to be implemented have not yet been clearly defined. For these reasons, this impact would be considered **potentially significant.**

**Mitigation Measures**

Implement Mitigation Measure E-1

**Significance After Mitigation**

Mitigation measures have been included to reduce overall operational energy consumption, including those associated with long-term operational building energy use. With mitigation, operational energy consumption would be substantially reduced, beyond those required by Title 24 building energy-efficiency requirements. With mitigation, this impact would be considered **less than significant**

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# APPENDIX A

## Energy Modeling

# Energy Use Summary

**Construction Energy Use**

| | Gallons | Annual MMBTU |
|---|---|---|
| Off-Road Equipment Fuel (Diesel) | 46,670 | 6,411.54 |
| On-Road Vehicle Fuel (Gasoline) | 19,743 | 2,377.58 |
| On-Road Vehicle Fuel (Diesel) | 6,953 | 955.27 |
| | **Total:** | 9,744.38 |

**Operational Fuel Use**

| | Gallons | Annual MMBTU |
|---|---|---|
| Mobile Fuel (Diesel) | 701 | 96.29 |
| Mobile Fuel (Gasoline) | 135,093 | 16,269.07 |
| Less Existing Trips to be Relocated: | | |
| Mobile Fuel (Diesel) | -636 | -87.41 |
| Mobile Fuel (Gasoline) | -122,632 | -14,768.40 |
| | **Total:** | 1,509.55 |

**Operational Electricity & Natural Gas Use**

| | Annual Energy | Annual MMBTU |
|---|---|---|
| Electricity (kWh/yr, MMBTU) | 1,852,122 | 6,319.44 |
| Water Use, Treatment & Conveyance (kWh/Yr, MMBTU) | 34,032 | 116 |
| Natural Gas (kBTU/yr, MMBTU) | 622,513 | 623 |

## Construction Equipment Fuel Use

**OFF-ROAD EQUIPMENT FUEL USE**

| Primary Construction Activity | Activity Duration (Days) | Equipment Type | Size (hp) | Number of Pieces | Hours of Daily Use/Piece of Equipment | Total Days of Use | Load Factor | Fuel Usage Rate (g/bhph) | Total Fuel Diesel (Gallons) |
|---|---|---|---|---|---|---|---|---|---|
| Demolition | 5 | Excavators | 158 | 3 | 8 | 5 | 0.38 | 0.05 | 360 |
| | | Concrete Saws | 81 | 1 | 8 | 5 | 0.73 | 0.05 | 118 |
| | | Rubber Tired Dozer | 247 | 2 | 8 | 5 | 0.40 | 0.05 | 395 |
| Site Preparation | 10 | Tractor/Loader/Backhoe | 97 | 4 | 8 | 10 | 0.37 | 0.05 | 574 |
| | | Rubber Tired Dozer | 247 | 3 | 8 | 10 | 0.40 | 0.05 | 1186 |
| Grading | 30 | Excavators | 158 | 2 | 8 | 30 | 0.38 | 0.05 | 1441 |
| | | Rubber Tired Dozer | 247 | 1 | 8 | 30 | 0.40 | 0.05 | 1186 |
| | | Grader | 187 | 1 | 8 | 30 | 0.41 | 0.05 | 920 |
| | | Tractor/Loader/Backhoe | 97 | 2 | 8 | 30 | 0.37 | 0.05 | 861 |
| | | Scraper | 367 | 2 | 8 | 30 | 0.48 | 0.05 | 4228 |
| Building Construction | 275 | Cranes | 231 | 1 | 7 | 275 | 0.29 | 0.05 | 6448 |
| | | Forklifts | 89 | 3 | 8 | 275 | 0.20 | 0.05 | 5874 |
| | | Generators | 84 | 1 | 8 | 275 | 0.74 | 0.05 | 6838 |
| | | Tractor/Loader/Backhoe | 97 | 3 | 8 | 275 | 0.37 | 0.05 | 11844 |
| | | Welders | 46 | 1 | 8 | 275 | 0.45 | 0.05 | 2277 |
| Paving | 20 | Paver | 130 | 2 | 8 | 20 | 0.42 | 0.05 | 874 |
| | | Roller | 80 | 2 | 8 | 20 | 0.38 | 0.05 | 486 |
| | | Paving Equipment | 132 | 2 | 8 | 20 | 0.36 | 0.05 | 760 |
| Arch. Coating | 20 | Air Compressors | 78 | 1 | 6 | 20 | 0.48 | 0.05 | 225 |

*Equipment usage assumptions based on information provided by the project applicant and default assumptions contained in CalEEMod.*

| | |
|---|---|
| **Total Diesel Fuel Use (Gallons):** | 46670 |
| **Number of Construction Years:** | 5 |
| **Average Diesel Fuel Use/Year:** | 9334 |
| **BTU/Gallon:** | 137381 |
| **MMBTU:** | 6412 |

## Construction Fuel Use - On-Road Vehicles

| Activity | Demo | Site Prep | Grading | Bldg | Pav | Arch | Total | LDA | LDT1 | LDT2 | MDV | HDV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Days | 20 | 10 | 30 | 275 | 20 | 20 | | | | | | |
| Worker Trips | 15 | 18 | 20 | 219 | 15 | 44 | | | | | | |
| Miles/Trip | 10.8 | 10.8 | 10.8 | 10.8 | 10.8 | 10.8 | | | | | | |
| Total VMT | 3240 | 1944 | 6480 | 650430 | 3240 | 9504 | 674838 | 224946 | 224946 | 224946 | 0 | 0 |
| Vendor Trips | 0 | 0 | 0 | 85 | 0 | 0 | | | | | | |
| Miles/Trip | 7.3 | 7.3 | 7.3 | 7.3 | 7.3 | 7.3 | | | | | | |
| Total VMT | 0 | 0 | 0 | 170637.5 | 0 | 0 | 170637.5 | 0 | 0 | 0 | 170637.5 | 0 |
| Haul Trips | 197 | 0 | 0 | 0 | 0 | 0 | | | | | | |
| Miles/Trip | **20** | 0 | 0 | 0 | 0 | 0 | | | | | | |
| Total VMT | 3940 | 0 | 0 | 0 | 0 | 0 | 3940 | 0 | 0 | 0 | 0 | 3940 |

| | Annual VMT | Gallons/Mile* | Gallons | BTU/gallon** | BTU | MMBTU |
|---|---|---|---|---|---|---|
| **HDT** | 3940 | 0.12622179 | 497 | 137381 | 68321475 | 68.32 |
| **LDA** | 224946 | 0.02027207 | 4560 | 120429 | 549170906 | 549.17 |
| **LDT1** | 224946 | 0.03979754 | 8952 | 120429 | 1078116246 | 1078.12 |
| **LDT2** | 224946 | 0.02769632 | 6230 | 120429 | 750293897 | 750.29 |
| **MDV** | 170638 | 0.03783512 | 6456 | 137381 | 886944189 | 886.94 |

**Gallons per mile based on year 2020 conditions for Fresno County. Derived from Emfac2017 (v1.0.2) Emissions Inventory.*

***Energy coefficient derived from US EIA.*

https://www.eia.gov/energyexplained/index.php?page=about_energy_units

| EMFAC2017 Fuel Rate Calculation | Fuel Consumption (1000 Gallons/Day)* | | VMT (Miles/Day)** | | |
|---|---|---|---|---|---|
| | Diesel | Gasoline | Diesel | Gasoline | TOTAL |
| All Other Buses | 1.035087109 | 4.059355022 | 9067.159499 | 18709.87342 | |
| LDA | 2.064454585 | 451.520014 | 101837.3682 | 13494046.7 | |
| LDT1 | 0.018547146 | 52.55881216 | 466.037494 | 1331217.898 | |
| LDT2 | 0.572855768 | 203.2515112 | 20683.46194 | 4681993.762 | |
| MDV | 3.101507646 | 226.9135402 | 81974.29992 | 4262160.146 | |
| T6 instate construction heavy | 4.277772946 | | 33890.92234 | | |
| **Total** | 3.690944609 | 711.3896923 | 132054.0271 | 19525968.23 | 19658022.26 |
| **LDA-Miles/Gallon** | 49.32894573 | 29.88582185 | | | |
| **LDA-Gallons/Mile** | 0.020272073 | 0.033460683 | | | |
| **LDT1-Miles/Gallon** | 25.1271808 | 25.32815799 | | | |
| **LDT1-Gallons/Mile** | 0.039797541 | 0.03948175 | | | |
| **LDT2-Miles/Gallon** | 36.10588055 | 23.0354684 | | | |
| **LDT2-Gallons/Mile** | 0.027696319 | 0.043411316 | | | |
| **MDV-Miles/Gallon** | 26.43046843 | 18.78319003 | | | |
| **MDV-Gallons/Mile** | 0.037835122 | 0.053239093 | | | |
| **HDT-Miles/Gallon** | 7.922562223 | 0 | | | |
| **HDT-Gallons/Mile** | 0.126221792 | 0 | | | |

**Fuel consumptions derived from EMFAC2017 (v1.0.2) for year 2020 conditons.*

***VMT derived from EMFAC2017 (v1.0.2) for year 2020 conditons.*

*Fuel consumption and VMT based on the Fresno County.*

## Operational Fuel Use - Proposed Project (Includes Existing Trips to be Relocated)

| LAND USE | Total Annual VMT |
|---|---|
| Fresno City College Expansion | 3,733,050 |

| | VMT | Gallons/Mile* | Gallons | BTU/gallon** | BTU | MMBTU |
|---|---|---|---|---|---|---|
| **Diesel** | 25077 | 0.02795026 | 701 | 137381 | 96291552 | 96.29 |
| **Gasoline** | 3707973 | 0.03643300 | 135093 | 120429 | 16269066439 | 16269.07 |

**Gallons per mile based on year 2020 conditions for Fresno County. Derived from Emfac2017 (v1.0.2) Emissions Inventory.*

**Energy coefficient derived from US EIA.

https://www.eia.gov/energyexplained/index.php?page=about_energy_units

| EMFAC2017 Fuel Rate Calculation | Fuel Consumption (1000 Gallons/Day)* | | VMT (Miles/Day)** | | |
|---|---|---|---|---|---|
| | Diesel | Gasoline | Diesel | Gasoline | |
| All Other Buses | 1.035087109 | 4.059355022 | 9067.159499 | 18709.87342 | |
| LDA | 2.064454585 | 451.520014 | 101837.3682 | 13494046.7 | |
| LDT1 | 0.018547146 | 52.55881216 | 466.037494 | 1331217.898 | |
| LDT2 | 0.572855768 | 203.2515112 | 20683.46194 | 4681993.762 | |
| LHD1 | 21.79765028 | 44.6408661 | 382134.3592 | 367003.075 | |
| LHD2 | 8.350491501 | 8.684127765 | 130432.0739 | 62158.88221 | |
| MCY | | 3.990727039 | | 150977.0295 | |
| MDV | 3.101507646 | 226.9135402 | 81974.29992 | 4262160.146 | |
| MH | 0.661775292 | 3.342716053 | 6352.205322 | 15632.70507 | |
| Motor Coach | 1.239135957 | | 7621.885979 | | |
| PTO | 2.975331043 | | 14402.73947 | | |
| SBUS | 4.44703586 | 0.538425642 | 35143.85454 | 4865.278368 | |
| T6 Ag | 0.120575138 | | 1092.863353 | | |
| T6 CAIRP heavy | 2.673218584 | 11.11684725 | 28844.52565 | 51820.80268 | |
| T6 CAIRP small | 0.394522623 | | 4015.605218 | | |
| T6 instate construction heavy | 4.277772946 | | 33890.92234 | | |
| T6 instate construction small | 13.74525557 | | 109477.4062 | | |
| T6 instate heavy | 25.69059637 | | 244545.1136 | | |
| T6 instate small | 21.57257248 | | 198893.1813 | | |
| T6 OOS heavy | 1.53043116 | | 16521.01454 | | |
| T6 OOS small | 0.229057734 | | 2330.505268 | | |
| T6 Public | 1.182932642 | | 8156.331563 | | |
| T6 utility | 0.212587659 | | 1837.683515 | | |
| T7 Ag | 0.151227179 | 0.118056141 | 867.0599856 | 457.2598871 | |
| T7 CAIRP | 70.33496316 | | 462378.7093 | | |
| T7 CAIRP construction | 4.30480009 | | 24344.14392 | | |
| T7 NNOOS | 83.28774964 | | 563669.9618 | | |
| T7 NOOS | 28.27506353 | | 181665.3166 | | |
| T7 other port | 1.543748104 | | 8303.834768 | | |
| T7 POAK | 5.976211186 | | 30839.48615 | | |
| T7 POLA | 6.146541723 | | 31576.31877 | | |
| T7 Public | 2.758996532 | | 14804.31096 | | |
| T7 Single | 11.9221223 | | 72535.07482 | | |
| T7 single construction | 11.55096684 | | 60393.34344 | | |
| T7 SWCV | 7.456095929 | | 17884.08625 | | |
| T7 tractor | 95.01953481 | | 670072.7923 | | |
| T7 tractor construction | 9.571636773 | | 49819.19125 | | |
| T7 utility | 0.127626528 | | 715.9644261 | | |
| UBUS | 0.208894076 | 1.498711856 | 1677.499239 | 6668.753156 | |
| | | | | | |
| **Total** | 3.690944609 | 711.3896923 | 132054.0271 | 19525968.23 | 19658022.26 |
| **Percent of Total** | | | 0.67% | 99.33% | |
| **Miles/Gallon** | 35.7778404 | 27.44764008 | | | |
| **Gallons/Mile** | 0.027950262 | 0.036433005 | | | |

*Fuel consumptions derived from EMFAC2017 (v1.0.2) for year 2020 conditons.

**VMT derived from EMFAC2017 (v1.0.2) for year 2020 conditons.

Fuel consumption and VMT based on the Fresno County.

## Operational Fuel Use - Proposed Project (Existing Trips to be Relocated)

| LAND USE | Total Annual VMT |
|---|---|
| Fresno City College Expansion | 3,388,712 |

| | VMT | Gallons/Mile* | Gallons | BTU/gallon** | BTU | MMBTU |
|---|---|---|---|---|---|---|
| **Diesel** | 22764 | 0.02795026 | 636 | 137381 | 87409581 | 87.41 |
| **Gasoline** | 3365948 | 0.03643300 | 122632 | 120429 | 14768401353 | 14768.40 |

**Gallons per mile based on year 2020 conditions for Fresno County. Derived from Emfac2017 (v1.0.2) Emissions Inventory.*

**Energy coefficient derived from US EIA.

https://www.eia.gov/energyexplained/index.php?page=about_energy_units

| EMFAC2017 Fuel Rate Calculation | Fuel Consumption (1000 Gallons/Day)* | | VMT (Miles/Day)** | | |
|---|---|---|---|---|---|
| | Diesel | Gasoline | Diesel | Gasoline | |
| All Other Buses | 1.035087109 | 4.059355022 | 9067.159499 | 18709.87342 | |
| LDA | 2.064454585 | 451.520014 | 101837.3682 | 13494046.7 | |
| LDT1 | 0.018547146 | 52.55881216 | 466.037494 | 1331217.898 | |
| LDT2 | 0.572855768 | 203.2515112 | 20683.46194 | 4681993.762 | |
| LHD1 | 21.79765028 | 44.6408661 | 382134.3592 | 367003.075 | |
| LHD2 | 8.350491501 | 8.684127765 | 130432.0739 | 62158.88221 | |
| MCY | | 3.990727039 | | 150977.0295 | |
| MDV | 3.101507646 | 226.9135402 | 81974.29992 | 4262160.146 | |
| MH | 0.661775292 | 3.342716053 | 6352.205322 | 15632.70507 | |
| Motor Coach | 1.239135957 | | 7621.885979 | | |
| PTO | 2.975331043 | | 14402.73947 | | |
| SBUS | 4.44703586 | 0.538425642 | 35143.85454 | 4865.278368 | |
| T6 Ag | 0.120575138 | | 1092.863353 | | |
| T6 CAIRP heavy | 2.673218584 | 11.11684725 | 28844.52565 | 51820.80268 | |
| T6 CAIRP small | 0.394522623 | | 4015.605218 | | |
| T6 instate construction heavy | 4.277772946 | | 33890.92234 | | |
| T6 instate construction small | 13.74525557 | | 109477.4062 | | |
| T6 instate heavy | 25.69059637 | | 244545.1136 | | |
| T6 instate small | 21.57257248 | | 198893.1813 | | |
| T6 OOS heavy | 1.53043116 | | 16521.01454 | | |
| T6 OOS small | 0.229057734 | | 2330.505268 | | |
| T6 Public | 1.182932642 | | 8156.331563 | | |
| T6 utility | 0.212587659 | | 1837.683515 | | |
| T7 Ag | 0.151227179 | 0.118056141 | 867.0599856 | 457.2598871 | |
| T7 CAIRP | 70.33496316 | | 462378.7093 | | |
| T7 CAIRP construction | 4.30480009 | | 24344.14392 | | |
| T7 NNOOS | 83.28774964 | | 563669.9618 | | |
| T7 NOOS | 28.27506353 | | 181665.3166 | | |
| T7 other port | 1.543748104 | | 8303.834768 | | |
| T7 POAK | 5.976211186 | | 30839.48615 | | |
| T7 POLA | 6.146541723 | | 31576.31877 | | |
| T7 Public | 2.758996532 | | 14804.31096 | | |
| T7 Single | 11.9221223 | | 72535.07482 | | |
| T7 single construction | 11.55096684 | | 60393.34344 | | |
| T7 SWCV | 7.456095929 | | 17884.08625 | | |
| T7 tractor | 95.01953481 | | 670072.7923 | | |
| T7 tractor construction | 9.571636773 | | 49819.19125 | | |
| T7 utility | 0.127626528 | | 715.9644261 | | |
| UBUS | 0.208894076 | 1.498711856 | 1677.499239 | 6668.753156 | |
| | | | | | |
| | | | | | |
| **Total** | 3.690944609 | 711.3896923 | 132054.0271 | 19525968.23 | 19658022.26 |
| **Percent of Total** | | | 0.67% | 99.33% | |
| **Miles/Gallon** | 35.7778404 | 27.44764008 | | | |
| **Gallons/Mile** | 0.027950262 | 0.036433005 | | | |

*Fuel consumptions derived from EMFAC2017 (v1.0.2) for year 2020 conditons.

**VMT derived from EMFAC2017 (v1.0.2) for year 2020 conditons.

Fuel consumption and VMT based on the Fresno County.

## Water Energy Use

| | WATER USE* | ELECTRIC INTENSITY FACTORS (kWh/Mgal) | | ANNUAL ELECTRIC USE (kWh/Yr) | | |
|---|---|---|---|---|---|---|
| | MGAL/YR | INDOOR | OUTDOOR | INDOOR | OUTDOOR | TOTAL |
| ANNUAL INDOOR WATER USE | 5.16 | 3500 | | 18044 | | 34,032 |
| ANNUAL OUTDOOR WATER USE | 4.57 | | 3500 | | 15988 | |

*Based on estimated water use derived from CalEEMod.

**Energy coefficient derived from US EIA.

https://www.eia.gov/energyexplained/index.php?page=about_energy_units

**BTU/kWh****: 3412

**BTU:** 116116246

**MMBTU:** 116.12

## Operational Electricity & Natural Gas Use

| | kWh/yr | MWh/Yr | BTU/kWh* | BTU | MMBTU |
|---|---|---|---|---|---|
| Electricity | 1852122 | 1852 | 3412 | 6319440264 | 6319.44 |

*Energy coefficient derived from US EIA.
https://www.eia.gov/energyexplained/index.php?page=about_energy_units

| | kBTU/yr | | | BTU | MMBTU |
|---|---|---|---|---|---|
| Natural Gas | 622513 | | | 622513000 | 622.51 |

*Energy coefficient derived from US EIA.
https://www.eia.gov/energyexplained/index.php?page=about_energy_units