

## 4.5 Energy

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This section evaluates potential impacts to energy from development facilitated by the proposed 2022 RTP/SCS.

### 4.5.1 Setting

Energy relates directly to environmental quality. Energy use can adversely affect air quality and other natural resources. The vast majority of California’s air pollution is caused by burning fossil fuels. Consumption of fossil fuels is linked to changes in global climate and depletion of stratospheric ozone. Transportation energy use is related to the fuel efficiency of cars, trucks, and public transportation; choice of different travel modes (auto, carpool, and public transit); vehicle speeds; and miles traveled by these modes. Construction and routine operation and maintenance of transportation infrastructure also consume energy. In addition, residential, commercial, and industrial land uses consume energy, typically through the use of natural gas and electricity.

#### a. Energy Supply

California’s major sources of fuel production in 2016 comprised of approximately 43.8 percent crude oil, 9.6 percent natural gas, 8.2 percent nuclear, and 1.3 percent biofuels (U.S. Energy Information Administration [EIA] 2021a). California’s 2016 major sources of electricity generation was comprised of approximately 36 percent natural gas, 25 percent renewables, 12 percent hydroelectric, 9 percent wind, and 8 percent solar (California Energy Commission [CEC] 2022a).

Natural gas production in 2016 was approximately 1,499,649 thousand cubic feet (Mcf) in the SJCOG region (California Geologic Energy Management Division [CALGEM], formerly California Department of Conservation, Division of Oil, Gas and Geothermic Resources 2017).

The SJCOG region contained 140 active oil wells (CalGEM 2017) but these did not produce any oil in 2016 (CalGEM 2017). Table 4.5-1 illustrates the oil and natural gas produced in the SJCOG region in 2016 compared to statewide statistics.

**Table 4.5-1 2016 Oil and Natural Gas Production in the SJCOG Region**

Natural Resource	California	SJCOG Total	SJCOG Proportion of Statewide Production
Crude Oil (bbl)	186,660,463	0	0%
Natural Gas (Mcf)	156,005,114	1,499,649	0.008%

Bbl = barrel

Source: CalGEM 2019.

#### b. Energy Consumption and Sources

Total energy consumption in the United States in 2016 was estimated at approximately 5,612.4 trillion British thermal units (Btu) (U.S. EIA 2021b). Natural provided approximately 40 percent of the energy used in 2016. On a per capita basis, California ranks second to lowest of the states in terms of total energy consumed per capita, or about 44 percent less than the U.S.’s average per capita consumption of 354 million Btu per person (U.S. EIA 2020).

## Electricity and Natural Gas

In 2016, California used 290,567 gigawatt hours (GWh) of electricity (CEC 2020a). Table 4.5-2 illustrates the electricity and natural gas consumption of the SJCOG region and their proportion of statewide consumption in 2016.

**Table 4.5-2 2016 Electricity and Natural Gas Consumption in the SJCOG Region**

County	2016 Electricity Consumption (GWh) <sup>1</sup>	Electricity Consumption Per Capita Consumption (kWh)	Electricity Consumption Statewide Proportion	Natural Gas Consumption 2016 (MMthm) <sup>2</sup>	Natural Gas Consumption Per Capita Consumption (thm)	Natural Gas Consumption Statewide Proportion
San Joaquin	5,466	7,465	1.9%	195.42	266.90	1.6%

<sup>1</sup>Electricity consumption is quantified in Millions of Kilowatt-Hours (GWh), while per capita electricity is quantified in Kilowatt hours (kWh)

<sup>2</sup>Natural gas consumption is quantified in Millions of Therms (MMthm), while per capita natural gas consumption is Quantified in Therms (thm).

Note: The per capita consumption for natural gas and electricity are determined by using 2016 data from the CEC for overall county wide consumption and divided by the 2016 county population provided by SJCOG (732,185).

Sources: CEC 2020a; CEC 2020b; SJCOG 2022a

As shown in Table 4.5-2, the SJCOG region accounted for approximately 1.9 percent of the State’s electricity consumption and approximately 1.6 percent of the State’s natural gas consumption in 2016. Natural gas and electricity services within the SJCOG region are provided by Pacific Gas & Electric (PG&E).

## Petroleum

Energy consumed by the transportation sector accounts for roughly 39.4 percent of California’s energy demand, amounting to approximately 2,935 trillion Btu in 2016 (U.S. EIA 2021c). California’s transportation sector 551,752,000 bbl of petroleum fuels in 2016 (U.S. EIA 2021c). Furthermore, petroleum-based fuels are used for approximately 98.2 percent of the State’s transportation activity (U.S. EIA 2021c). Most gasoline and diesel fuel sold in California for motor vehicles is refined in California to meet state-specific formulations required by the California Air Resources Board (CARB). Major petroleum refineries in California are primarily concentrated in three counties: Contra Costa, Kern, and Los Angeles (CARB 2020). Fuel consumption for the SJCOG region can be found in Table 4.5-3 below.

**Table 4.5-3 Fuel Consumption in SJCOG Region (2016)**

Fuel	2016 Annual Fuel Use (million gallons)	2016 Annual Fuel Use (million Btu)	2016 Daily Energy Use (million Btu)	2016 Daily Per Capita Energy Use (thousand Btu)
Gasoline	340	40,897,240	112,047.23	153.03
Diesel	131	17,996,911	49,306.61	67.34
<b>Total</b>	<b>471</b>	<b>58,894,151</b>	<b>161,353.84</b>	<b>220.37</b>

Btu = British Thermal Units

Notes: Per capita energy use was calculated by using 2016 fuel use data divided by SJCOG’s 2016 population statistic of 732,185. Btus were calculated by multiplying 2016 Annual Fuel Use by U.S. EIA conversion values for motor gasoline and diesel

Sources: CEC 2022b, U.S. EIA 2021d, SJCOG 2022a

Transportation metrics show that approximately 17 million vehicle miles were traveled each day within the SJCOG region in 2016. Table 4.5-4 illustrates the daily and annual VMT for the SJCOG region in 2016.

**Table 4.5-4 Daily and Annual VMT for the SJCOG Region (2016)**

Daily VMT	Annual VMT
17,015,116	6,210,517,340

Note: individual numbers may not add up to totals due to rounding.

Source: SJCOG 2022a

## Alternative Fuels

A variety of alternative fuels are used to reduce petroleum-based fuel demand. The use of these fuels is encouraged through various statewide regulations and plans, such as the Low Carbon Fuel Standard and Senate Bill (SB) 32. Conventional gasoline and diesel may be replaced, depending on the capability of the vehicle with transportation fuels including the following:

- **Hydrogen** is being explored for use in combustion engines and fuel cell electric vehicles. The interest in hydrogen as an alternative transportation fuel stems from its clean-burning qualities, its potential for domestic production, and the fuel cell vehicle’s potential for high efficiency, which is two to three times more efficient than gasoline vehicles. Currently, 47 hydrogen refueling stations are located in California, none of which are located in the SJCOG region (U.S. Department of Energy [DOE] 2022).
- **Biodiesel** is a renewable alternative fuel that can be manufactured from vegetable oils, animal fats, or recycled restaurant greases. Biodiesel is biodegradable and cleaner-burning than petroleum-based diesel fuel. Biodiesel can run in any diesel engine generally without alterations; however, fueling stations have been slow to make it available. There are currently 17 biodiesel refueling stations in California. There is one biodiesel fueling station in the SJCOG region in Lodi, California (DOE 2022).
- **Electricity** can be used to power electric and plug-in hybrid electric vehicles directly from the power grid. Electricity used to power vehicles is generally provided by the electricity grid and stored in the vehicle’s batteries. Fuel cells are being explored as a way to use electricity generated onboard the vehicle to power electric motors. There are approximately 34 public electrical charging stations in the SJCOG region (SJCOG 2022b).

### 4.5.2 Regulatory Setting

#### a. Federal Laws, Regulations, and Policies

##### **Energy Policy Conservation Act (EPCA) and Corporate Average Fuel Economy (café) Standards**

The EPCA of 1975 established nationwide fuel economy standards in order to conserve oil. Pursuant to this Act, the National Highway Traffic and Safety Administration, part of the U.S. Department of Transportation, is responsible for revising existing fuel economy standards and establishing new vehicle fuel economy standards.

The Corporate Average Fuel Economy (CAFE) program was established to determine vehicle manufacturer compliance with the government’s fuel economy standards. Compliance with CAFE

standards is determined based on each manufacturer's average fuel economy for the portion of their vehicles produced for sale in the United States.

### **National Energy Policy Act of 1992 (EPACT92)**

EPACT92 calls for programs that promote efficiency and the use of alternative fuels. EPACT92 requires certain federal, state, and local government and private fleets to purchase a percentage of light duty alternative fuel vehicles (AFVs) capable of running on alternative fuels each year. In addition, EPACT92 has financial incentives. 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 provides 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.

### **Energy Independence and Security Act of 2007 (EISA)**

EISA is designed to improve vehicle fuel economy and help reduce U.S. dependence on oil. It expands the production of renewable fuels, reducing dependence on oil, and confronting global climate change. Specifically, it:

- Increases the supply of alternative fuel sources by setting a mandatory Renewable Fuel Standard (RFS) requiring fuel producers to use at least 36 billion gallons of biofuel in 2022, which represents a nearly five-fold increase over current levels; and
- Reduces U.S. demand for oil by setting a national fuel economy standard of 35 miles per gallon by 2020 – an increase in fuel economy standards of 40 percent.

## **b. State Laws, Regulations, and Policies**

### **Warren-Alquist Act**

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

### **California Energy Plan**

CEC is responsible for preparing the California Energy Plan, which identifies emerging trends related to energy supply, demand, conservation, public health and safety, and the maintenance of a healthy economy. The current (2008) California Energy Plan calls for the State to assist in the transformation of the transportation system to improve air quality, reduce congestion, and increase the efficient use of fuel supplies with the least environmental and energy costs. To further this policy, the plan identifies a number of strategies, including assistance to public agencies and fleet operators in implementing incentive programs for zero-emission vehicles and addressing their infrastructure needs; and encouragement of urban designs that reduce vehicle miles traveled (VMT) and accommodate pedestrian and bicycle access.

## **Assembly Bill 2076: Reducing Dependence on Petroleum**

Pursuant to Assembly Bill (AB) 2076 (Chapter 936, Statutes of 2000), CEC and CARB prepared and adopted in 2003 a joint agency report, *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 VMT. Further, in response to the CEC's 2003 and 2005 *Integrated Energy Policy Reports*, the governor 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.

## **Integrated Energy Policy Report (IEPR)**

Senate Bill (SB) 1389 (Chapter 568, Statutes of 2002) required CEC to conduct assessments and forecasts of all aspects of energy industry supply, production, transportation, delivery and distribution, demand, and prices. The CEC shall use these assessments and forecasts to develop energy policies that conserve resources, protect the environment, ensure energy reliability, enhance the state's economy, and protect public health and safety.

CEC adopts an IEPR every two years and an update every other year. The 2017 IEPR provides a summary of priority energy issues currently facing the State, outlining strategies and recommendations to further the State's goal of ensuring reliable, affordable, and environmentally responsible energy sources. Energy topics covered in the report include electricity resource and supply plans; electricity and natural gas demand forecasts; natural gas outlooks; transportation energy demand forecasts; energy efficiency savings; integrated resource planning; a barriers study; climate adaptation and resilience; renewable gas; southern California energy reliability; distributed energy resources; strategic transmission investment plans; and existing power plan reliability issues.

## **Senate Bill 1078: California Renewables Portfolio Standard Program.**

SB 1078 (Chapter 516, Statutes of 2002), as expanded under SB 2, establishes a renewable portfolio standard (RPS) for electricity supply. The RPS requires that retail sellers of electricity, including investor-owned utilities and community choice aggregators, provide 20 percent of their supply from renewable sources by 2017. SB 2 expanded this law and required procurement from eligible renewable energy resources to 33 percent by 2020. In addition, electricity providers subject to the RPS must increase their renewable share by at least one percent each year. The outcomes of this legislation will impact regional transportation powered by electricity.

## **California Renewables Portfolio Standard**

Early legislation established California's renewables portfolio standard (RPS). The program sets continuously escalating renewable energy procurement requirements for the state's load-serving entities. Generation must be procured from RPS-certified facilities. SB 2 (1X) of 2011 obligated all California electricity providers to obtain at least 33 percent of their energy from renewable resources by 2020. The CPUC and CEC are jointly responsible for implementing the program.

SB 350 (Chapter 547, Statutes of 2015) requires the following by 2030: an RPS of 50 percent, and a doubling of efficiency for existing buildings. SB 100 (Chapter 312, Statutes of 2018) establishes a new RPS target of 50 percent by 2026, increases the RPS target in 2030 from 50 to 60 percent, and establishes a goal of 100 percent zero-carbon energy sources by 2045

### **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 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.

### **Assembly Bill 1493: Reduction of Greenhouse Gas Emissions**

AB 1493 (Chapter 200, Statutes of 2002), known as the “Pavley bill,” amended Health and Safety Code sections 42823 and 43018.5 requiring CARB to develop and adopt regulations that achieve maximum feasible and cost-effective reduction of GHG emissions from passenger vehicles, light-duty trucks, and other vehicles used for noncommercial personal transportation in California.

Implementation of new regulations prescribed by AB 1493 required that the State of California apply for a waiver under the federal Clean Air Act. Although EPA initially denied the waiver in 2008, EPA approved a waiver in June 2009, and in September 2009, CARB approved amendments to its initially adopted regulations to apply the Pavley standards that reduce GHG emissions to new passenger vehicles in model years 2009 through 2016. According to CARB, implementation of the Pavley regulations is expected to reduce fuel consumption while also reducing GHG emissions (CARB 2017a).

### **Assembly Bill 1007: State Alternative Fuels Plan**

AB 1007 (Chapter 371, Statutes 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 the ARB 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 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 fuels use, reduce GHG emissions, and increase in-state production of biofuels without causing a significant degradation of public health and environmental quality.

### **Bioenergy Action Plan, Executive Order #S-06-06**

Executive Order (EO) S-06-06, 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 EO 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. EO S-06-06 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 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.

## **Title 24, California Code of Regulations**

California Code of Regulations, Title 24, Part 6, is California's Energy Efficiency Standards for Residential and Non-residential Buildings. Title 24 was established by 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 nonresidential buildings. The standards are updated on an approximately three-year cycle to allow consideration and possible incorporation of new efficient technologies and methods. In 2019, CEC updated Title 24 standards with more stringent requirements effective January 1, 2020. All buildings for which an application for a building permit is submitted on or after January 1, 2017, must follow the 2016 standards. Energy efficient buildings require less electricity; therefore, increased energy efficiency reduces fossil fuel consumption and decreases GHG emissions. The CEC Impact Analysis for California's 2016 Building Energy Efficiency Standards estimates that the 2016 Standards are 28 percent more efficient than the previous 2013 standards for residential buildings and 5 percent more efficient for non-residential buildings. The building efficiency standards are enforced through the local plan check and building permit process. Local government agencies may adopt and enforce additional energy standards for new buildings as reasonably necessary due to local climatologic, geologic, or topographic conditions, provided that these standards exceed those provided in Title 24.

## **California Green Building Standards Code, California Code of Regulations Title 24, Part 11**

California's green building code, referred to as CalGreen, was developed to provide a consistent approach to green building within the State. Having taken effect in January 2019, the most recent version of the Code lays out the minimum requirements for newly constructed residential and nonresidential buildings to reduce GHG emissions through improved efficiency and process improvements. It also includes voluntary tiers to further encourage building practices that improve public health, safety, and general welfare by promoting a more sustainable design.

### **c. Local Laws, Regulations, and Policies**

#### **San Joaquin County General Plan**

The San Joaquin County General Plan was published December 2016. The General Plan includes the following goals and policies regarding energy consumption:

**LU-3.11:** The County shall encourage new residential subdivisions and new commercial, office, industrial, and public buildings to be oriented and landscaped to enhance natural lighting and solar access in order to maximize energy efficiency.

**LU-9.4:** The County shall ensure that all new or renovated County-owned buildings are energy efficient and meet, at a minimum, LEED (Leadership in Energy and Environmental Design) Silver or equivalent standards.

**TM-1.7:** The County shall develop the transportation system to reduce vehicle miles traveled, conserve energy resources, minimize air pollution, and reduce greenhouse gas emissions.

**TM-2.3:** The County shall encourage the development of uses in Urban Communities that support the use of public transit, bicycling, walking, and other alternatives to the automobile

**TM-9.1:** The County shall support the development of alternative fueling stations (e.g. electric and hydrogen) for emerging technologies.

**TM-9.2:** The County shall encourage the use of parking lots of major employers, commercial shopping centers, and trucks stops for alternative fueling stations (e.g., electric) for automobiles and goods movement trucks.

**IS-3.6:** The County shall use available clean energy and fuel sources where feasible to operate its buildings, vehicles, and maintenance/construction equipment.

**IS-3.9:** The County shall encourage contractors to use reduced emission equipment for County construction projects and contracts for services, as well as businesses which practice sustainable operations.

**PHS-6.2:** The County shall reduce community greenhouse gas emissions by 15 percent below 2005 levels by 2020, and shall strive to reduce GHG emissions by 40 percent and 80 percent below 2020 levels by 2035 and 2050, respectively.

## **City General Plans**

### *City of Escalon General Plan*

The City of Escalon’s Safety Element includes a climate adaptation and resilience goal which identifies and prepares for potential adverse effects of climate change. Implementation strategies related to this goal include requiring a review of projects for the potential for new uses of land to contribute or increase impacts associated with climate change, and incorporating measures, such as bicycle and pedestrian friendly amenities and energy-efficient design, into projects to reduce impacts related to climate change.

### *City of Lathrop General Plan*

The City of Lathrop’s General Plan identifies energy conservation opportunities through conservation and development, specifically including California Building Code Title 24 requirements in building design and encouraging further implementation of energy conservation features. Policy 4-1-3 states the Community Development Department be required to supply energy conservation awareness brochures in all public meeting places.

### *City of Lodi General Plan*

The City of Lodi General Plan required the preparation and implementation of a comprehensive Climate Action Plan. The Climate Action Plan includes enforceable control measures to reduce energy consumption and greenhouse gas emissions. Of these, policies related to transportation include implementing TDM strategies, reducing parking requirements in new development, implementation of transportation improvements identified in the City of Lodi’s Short Range Transit Plan, and encouragement of ridesharing.

### *City of Manteca General Plan*

The City of Manteca General Plan 2023 (2003) describes energy conservation measures within its Resource Conservation Element. These policies include implementing construction standards which promote energy conservation, enforcement of Title 24 energy requirements, implement Transportation System Management measures to reduce the need for car use and petroleum products, and develop alternative transportation systems.

### *City of Ripon General Plan*

The City of Ripon's General Plan ensures the City will continue to enforce energy standards that define construction standards that promote energy conservation such as insulation, air leakage, vapor barriers, space conditioning, water heating plumbing system measures and lighting. The City also promotes energy efficiency through landscape design standards that encourage tree planting.

### *City of Stockton General Plan*

The City of Stockton's Envision Stockton 2040 General Plan addresses energy in its Safety Element. An overarching goal of the Safety Element is to reduce air impacts from mobile and stationary sources of air pollution. Subsequent actions and policies include the use of low-emission construction equipment, installation of energy-star appliances, encourage employers to participate in a transportation demand management (TMD) program facilitated by SJCOG.

### *City of Tracy General Plan*

The City of Tracy General Plan (2011) includes goals and policies to improve air quality and reduce greenhouse gas emissions. The City of Tracy has policies which promote land use patterns that reduce motor vehicle trips, encourage implementing TMD programs, encourage planting trees, and promote use of renewable energy sources, when feasible.

## 4.5.3 Impact Analysis

### **a. Methodology and Significance Thresholds**

Appendix G of the State CEQA Guidelines identifies the following criteria for determining whether a project's impacts would have a significant impact to energy resources. Because the RTP/SCS is a regional plan and not a specific construction project, TCAG has chosen to expand on threshold 1, below, such that energy consumption can be evaluated at a regional level rather than project level. This is consistent with the programmatic nature of the EIR. For the purposes of this EIR, implementation of the 2022 RTP/SCS would have a significant impact if it would:

1. Result in significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation (including transportation), based on whether the project would:
  - a. Result in an increase in overall per-capita energy consumption relative to baseline conditions;
  - b. Result in an increased reliance on fossil fuels and decreased reliance on renewable energy sources
2. Conflict with or obstruct a state or local plan for renewable energy or energy efficiency.

## Use of a 2016 Baseline

For the purposes of this energy analysis, a 2016 baseline is used to match the SJCOG transportation modeling base line. This allows an accurate *apples to apples* comparison to the same baseline year. Known 2016 VMT data generated by SJCOG is used to calculate 2016 baseline direct energy use. This baseline is consistent with the baseline used in SJCOG’s Sustainable Communities Strategy, and as such is more reflective of the comparative analysis made within the SCS than if data from a different year was used.

## Direct and Indirect Energy Consumption

For this analysis, the calculation of total energy consumption follows the Input-Output methodology suggested by Caltrans (Caltrans Division of Engineering Services, Office of Transportation Laboratory, Energy and Transportation Systems, July 1983). It should be noted that the Caltrans methodology provides for the calculation of the cumulative energy consumption. Not only does the methodology include energy consumption that would be due solely to the construction of 2022 RTP/SCS projects, it also includes energy consumption that is not due to the 2022 RTP/SCS, but rather is due to socioeconomic growth (e.g., population and employment), land use policies, and the existing transportation infrastructure.

Energy consumption from transportation projects is categorized in terms of “direct” and “indirect” energy. Direct energy is the fuel that propels vehicles – it is consumed directly by the automobile, bus, or transit vehicle. Indirect energy is the energy needed to construct, operate, and maintain the roadway and rail system and manufacture and maintain the vehicles using these systems (Caltrans 1983). Indirect energy accounts for construction-related energy (e.g., the energy required to construct transportation improvements), which is anticipated to be consumed through the life of the plan as several transportation improvement projects may be undertaken concurrently, and is therefore characterized as a long-term, operational energy use. Indirect energy also accounts for the maintenance of a roadway over the life of a project, which is also considered a long-term, operational energy use.

### *Direct Energy Consumption for Transportation Projects*

Direct energy is that energy used in the daily operation of the transportation system, including the propulsion of passenger vehicles (automobiles, vans, and trucks) and transit vehicles (buses and trains). The direct energy analysis for the project is based on 2016 and 2046 vehicle miles traveled (VMT) with and without the 2022 RTP/SCS.

The 2016 daily gasoline and diesel fuel consumption data for the SJCOG region was converted to Btu (refer to Table 4.5-3) and divided by region wide daily VMT (refer to Table 4.5-4) to derive a regional Btu/VMT conversion factor of 9,483 Btu per VMT.

It should be noted that the Btu/VMT factor is forecast to continue to decrease into the future as a result of improved fuel economy. Applying the 2016-based factor to future year (2046) VMT therefore provides a reasonable worst-case evaluation of energy consumption as the energy efficiency of vehicles in 2046 is anticipated to be higher than the fuel efficiency of current vehicles.

### *Indirect Energy Consumption*

Indirect energy is the energy required to construct, operate, and maintain the transportation network, as well as to manufacture and maintain on-road vehicles and transit vehicles. Therefore, construction-related impacts associated with the 2022 RTP/SCS are included in the indirect energy

analysis. The indirect energy analysis was conducted using the Input-Output methodology developed by Caltrans (1983). This method converts VMT, lanes miles, or construction dollars into energy consumption based on data from other transportation projects in the United States. Table 4.5-5 shows the indirect energy consumption factors used in this analysis. It should be noted that indirect energy consumption due to production of fuel and transportation/transmission to the end users is not included in this analysis, as any such analysis would be speculative.

**Table 4.5-5 Indirect Energy Consumption Factors**

Mode	Factor
<b>Manufacturing</b>	
Passenger Vehicles	1,410 Btu/VMT
Transit Buses	3,470 Btu/VMT
Roadway (construction)	27,300 Btu/VMT
<b>Maintenance</b>	
Passenger Vehicles	1,400 Btu/VMT
Transit Buses	13,142 Btu/VMT
Rail	7,060 Btu/VMT

Source: Caltrans 1983

**b. Project Impacts and Mitigation Measures**

The following section discusses potential impacts and mitigation measures that may be associated with transportation projects and the land use scenario contained within the proposed 2022 RTP/SCS. Section 4.5.3.c summarizes the impacts associated with capital improvement projects in the proposed 2022 RTP/SCS. Due to the programmatic nature of the proposed 2022 RTP/SCS, a precise, project-level analysis of the specific impacts associated with individual transportation and land use projects is not possible at this time. In general, however, implementation of proposed transportation improvement projects and future projects under the land use scenario envisioned by the proposed 2022 RTP/SCS could result in the impacts as described in the following section.

**Threshold 1a:** Result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation (including transportation), based on whether the project would result in an increase in overall per-capital energy consumption relative to baseline conditions

**Impact E-1 FUTURE TRANSPORTATION IMPROVEMENT PROJECTS AND IMPLEMENTATION OF THE LAND USE SCENARIO ENVISIONED BY THE PROPOSED 2022 RTP/SCS WOULD NOT RESULT IN SIGNIFICANT ENVIRONMENTAL IMPACT DUE TO THE WASTEFUL, INEFFICIENT, OR UNNECESSARY CONSUMPTION OF ENERGY RESOURCES. IMPACTS WOULD BE LESS THAN SIGNIFICANT.**

Daily operation of the SJCOG region’s transportation system uses energy in the form of fuel consumed by propulsion of passenger vehicles (automobiles, vans, and trucks) and transit vehicles (buses and trains). Some highway and roadway improvements included in 2022 RTP/SCS would potentially increase vehicle capacity, allowing a greater number of vehicles on facilities in the SJCOG region. Increases in motor vehicle trips are primarily a combined function of population growth and employment growth. It should be noted that population growth and an increase in VMT would occur within the region regardless of whether 2022 RTP/SCS is implemented. As a result, energy

consumption as it relates to vehicles would increase beyond the 2016 baseline in any scenario. The proposed 2022 RTP/SCS would help to minimize energy consumption by improving the overall efficiency of the transportation system. In addition, many of the proposed 2022 RTP/SCS projects (e.g., bikeway and pedestrian, rail, transit, and Transportation Demand Management [TDM] projects) would improve the availability of alternative transportation modes, help reduce congestion and resultant harmful air quality emissions in the SJCOG region. Generally, the availability of these alternative modes would be expected to potentially reduce overall motor vehicular trips, VMT, and associated energy consumption.

Construction and maintenance of proposed 2022 RTP/SCS projects (including construction and maintenance of roadways and rail lines) would result in short-term consumption of energy resulting from the use of construction equipment and processes. During construction activities, energy would be needed to operate construction equipment. In addition, roadway and transit construction materials, such as asphalt, concrete, surface treatments, steel, rail ballast, as well as building materials, require energy to be produced, and would likely be used in projects that involve new construction or replacement of older materials. The CalGreen Code includes specific requirements related to recycling, construction materials, and energy efficiency standards, which would apply to construction of roadway and transit improvement projects envisioned by 2022 RTP/SCS and help to minimize waste and energy consumption. All construction and maintenance conducted pursuant to 2022 RTP/SCS, or as a result of improvements made by 2022 RTP/SCS, would be required to comply with the CalGreen Code and would thus reduce energy consumption associated with buildout of the proposed 2022 RTP/SCS.

Table 4.5-6 shows the VMT and total energy use (Btu) in the SJCOG region under 2016 conditions and conditions in 2046 with implementation of 2022 RTP/SCS.

**Table 4.5-6 Transportation Energy Use**

<b>Year</b>	<b>Daily VMT</b>	<b>Direct Energy Use (Daily MMBtu)</b>	<b>Per-Household Energy Use (Million Btu per year)<sup>1</sup></b>	<b>Per-Capita Energy Use Daily (MMBtu)</b>
2016	17,015,116	161,353.84	244.76	0.22
Proposed 2022 RTP/SCS in 2046	23,495,442	222,807.28	254.00	0.22
<b>Change % (Baseline vs. Proposed 2022 RTP/SCS)<sup>1</sup></b>	<b>38%</b>	<b>38%</b>	<b>3.77%</b>	<b>0.0%</b>

<sup>1</sup>Per-Household Energy Use was calculated using housing assumptions generated by SJCOG

Source: SJCOG 2022a, 2022c.

As shown in Table 4.5-6, countywide daily VMT, total daily energy use, and per capita energy use would increase over time as the result of regional socioeconomic (population and employment) growth. However, the proposed 2022 RTP/SCS would result in the same per capita energy usage when compared to 2016 conditions.

### **Transportation Projects**

The transportation improvements proposed under the proposed 2022 RTP/SCS would result in an efficient transit system. The proposed 2022 RTP/SCS also would result in greater availability of public transit and other alternative modes of transportation, such as bicycling, which does not consume fuel energy and also reduces traffic congestion. The reduction in overall congestion resulting from these service level improvements would reduce fuel consumption and promote fuel

efficiency beyond what is accounted for in the above analysis. As mentioned previously, improvements to State fuel efficiency standards for vehicles and State-mandated increases in the supply and use of alternative transportation fuels would further reduce fuel consumption, such as implementation of an electric vehicle charging station plan.

New transportation facilities that require energy for operation, such as signal lighting, roadway or parking lot lighting, and electronic equipment would increase energy demand. New landscaping irrigation would also increase energy demand through water pumping and treatment. However, energy consumption would not be unnecessary or wasteful, as all lighting, signage and irrigation systems would comply with applicable energy efficiency requirements within the California Building Code. Therefore, the transportation improvements projects included in the proposed 2022 RTP/SCS would not result in inefficient, unnecessary, or wasteful consumption of gasoline or diesel fuel or an increased reliance on fossil fuels.

### **Land Use Projects**

The proposed 2022 RTP/SCS emphasizes a regional land use scenario that promotes land development in existing commercial corridors. Mixed use and infill projects would help reduce VMT and energy use because they would locate people closer to existing goods and services, thereby resulting in shorter vehicle trips and/or promoting walking or biking, and they would locate people closer to existing transportation hubs, thereby encouraging the use of alternative modes of transit (e.g., buses) resulting in fewer vehicle trips. Operation of future land development projects would increase overall demand for energy beyond existing demand; however, such development would not require unusual, unnecessary, or wasteful amounts of energy. Future land use projects would be constructed using standard building practices. These projects would also be subject to the CALGreen Code and Title 24 of the California Energy Code, which set forth specific energy efficiency requirements related to design, construction methods and materials.

In summary, the proposed 2022 RTP/SCS would reduce energy consumption, thus it would not result in wasteful or inefficient energy consumption within the region relative to baseline conditions. Therefore, the proposed 2022 RTP/SCS impacts on energy usage would be less than significant.

### **Mitigation Measures**

No mitigation measures are required.

**Threshold 1b:** Result in a significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resource, during project construction or operation (including transportation), based on whether the project would result in an increased reliance on fossil fuels and decreased reliance on renewable energy sources

### **Impact E-2 THE PROPOSED 2022 RTP/SCS WOULD NOT INCREASE RELIANCE ON FOSSIL FUELS OR DECREASE RELIANCE ON RENEWABLE ENERGY SOURCES. THIS IMPACT WOULD BE LESS THAN SIGNIFICANT.**

The proposed 2022 RTP/SCS, resulting transportation projects, and implementation of the land use scenario envisioned by the proposed 2022 RTP/SCS are required to follow State regulations, such as California's Green Building Standards and SB 350, by incorporating alternative energy use. PG&E is the utility provider for the vast majority of the SJCOG region, and pursuant to CPUC regulations, utilities such as PG&E and SCE utilize a long-term planning process to plan for increased energy

demand in the future with its publication of ten-year integrated resource plans. The most recent PG&E plan, titled PG&E's 2020 Integrated Resource Plan, details planned projects between 2020 and 2030 that aim to ensure compliance with North American Electric Reliability Corporation standards, improve transmission system access for renewable generation to meet Renewable Portfolio Standard (RPS) goals and targets, improve service reliability for end users and coordinate long-term plans for PG&E's transmission system (PG&E 2020). Thus, renewable energy options would be incorporated in the proposed 2022 RTP/SCS projects as future transportation improvements and implementation of the land use scenario envisioned by proposed 2022 RTP/SCS rely on the aforementioned service providers, and each has integrated a reduction in reliance on fossil fuels as part of their standards and goals.

Furthermore, as described under Impact E-1, construction and operation of land use development envisioned under the proposed 2022 RTP/SCS would be required to comply with relevant provisions of CALGreen and Title 24 of the California Energy Code. In addition, land use and transportation projects would be required to comply with the State's Bioenergy Action Plan, Alternative Fuels Plan, among other regulatory standards to reduce GHG and encourage alternative energy use.

### **Transportation Projects**

As shown in Table 4.5-6 and discussed above, the proposed 2022 RTP/SCS would result in the same per-capita energy consumption as 2016 conditions. The proposed 2022 RTP/SCS includes projects that would support alternative energy use and potentially decrease VMT including roadway improvements that incorporate multi-use paths along existing corridors. For instance, there are multiple projects planned by the proposed 2022 RTP/SCS in Lodi, Ripon, and Stockton which would support active transportation, such as bicycle lane installation, street improvements, and crosswalk installation. These specific projects support alternative energy use by providing residents with non-motorized transportation options. Also, as mentioned above, the proposed 2022 RTP/SCS includes other transportation projects which are subject to the State's Alternative Fuels Plan, thereby encouraging alternative energy use.

### **Land Use Projects**

The proposed 2022 RTP/SCS emphasizes a regional land use scenario that promotes mixed-use and infill development in existing commercial corridors in combination with high quality transit service and improved bicycle and pedestrian infrastructure, which would result in the same per-capita energy consumption, despite induced demand that would stem from population growth. Operation of future infill projects would increase the overall demand for energy beyond existing demand, however, such development would not require unusual, unnecessary, or wasteful amounts of energy shown through the same per-capita energy use with implementation of the land use scenario envisioned in the proposed 2022 RTP/SCS. As mentioned above, land use projects would incorporate renewable energy options through reliance on a service provider that has integrated a reduction in reliance on fossil fuels as part of their standards and goals. Therefore, the proposed 2022 RTP/SCS would not increase reliance on fossil fuels or decrease reliance on renewable energy sources. Impacts would be less than significant.

### **Mitigation Measures**

No mitigation measures are required.

**Threshold 2:** Conflict with or obstruct a state or local plan for renewable energy or energy efficiency

**Impact E-3            2022 RTP/SCS WOULD NOT CONFLICT WITH OR OBSTRUCT A STATE OR LOCAL PLAN FOR RENEWABLE ENERGY OR ENERGY EFFICIENCY. THIS IMPACT WOULD BE LESS THAN SIGNIFICANT.**

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As discussed in 4.5.2, *Regulatory Setting*, several State plans, the County’s adopted General Plan, city General Plans, and local Climate Action Plans include energy conservation and energy efficiency strategies intended to enable the State and the County to achieve GHG reduction and energy conservation goals. A full discussion of the proposed 2022 RTP/SCS’s consistency with GHG reduction plans is included in Section 4.9, *Greenhouse Gas Emissions and Climate Change*.

As discussed in Impact E-1, the proposed 2022 RTP/SCS would not result in an increase in per capita energy use in the region and would not result in energy used in an unnecessary or wasteful manner. Accordingly, inconsistencies between the proposed 2022 RTP/SCS and adopted plans and policies related to energy conservation have not been identified. The discussion below further examines consistency with adopted plans and policies related to energy conservation.

SJCOG monitors regulations related to fuel efficiency standards and alternative fuel vehicles. The proposed 2022 RTP/SCS would not conflict with such regulations (e.g., Energy Policy and Conservation Act and CAFE Standards, EPCRA, Energy Independence and Security Act of 2007, AB 1493: Reduction of Greenhouse Gas Emissions, AB 1007: State Alternative Fuels Plan).

In addition, the 2019 Integrated Energy Policy Report (IEPR) includes a set of strategies to address California’s future energy needs. Key topics covered in the report include electricity resource and supply plans; electricity and natural gas demand forecasts; natural gas outlooks; transportation energy demand forecasts; energy efficiency savings; integrated resource planning; a barriers study; climate adaptation and resilience; renewable gas; distributed energy resources; strategic transmission investment plans; and existing power plan reliability issues. The proposed 2022 RTP/SCS would not conflict with these policies. Refer to Section 4.9, *Greenhouse Gas Emissions and Climate Change*, for a discussion of greenhouse gas emissions reductions related to the proposed 2022 RTP/SCS.

Locally, the proposed 2022 RTP/SCS would be consistent with the San Joaquin County General Plan that includes goals and policies that encourage energy conservation and energy efficiency. The plan encourages the use of renewable energy, energy conservation and energy efficiency techniques in all new building design, orientation, construction, and support of alternative transportation and fuels. Local General Plans include similar goals and policies. The proposed 2022 RTP/SCS would be consistent with the State and local plans, as the proposed 2022 RTP/SCS would implement strategies that are designed to enhance the connection between land use and transportation choices through projects supporting energy efficiency. Therefore, the proposed 2022 RTP/SCS would be consistent with State energy efficiency plans, the County’s adopted energy conservation and efficiency strategies contained in its General Plan and local General Plans’ efficiency policies. As described under Impact E-1, construction and operation of the proposed 2022 RTP/SCS would be required to comply with relevant provisions of CALGreen and Title 24 of the California Energy Code. Therefore, this impact would be less than significant, and no mitigation is required.

### **Mitigation Measures**

No mitigation measures are required.

### c. Specific 2022 RTP/SCS Projects That May Result in Impacts

The analysis within this section discusses the potential energy related impacts associated with the proposed 2022 RTP/SCS. The transportation projects within the proposed 2022 RTP/SCS are evaluated herein in their entirety and are intended to promote energy efficient, environmentally sound modes of travel and facilities and services rather than cause adverse impacts. However, as described above, the proposed 2022 RTP/SCS would decrease per-household and per-capita energy usage associated with transportation projects in the region. These effects have been found to be less than significant, as described above. Taken separately, even if any specific of the proposed 2022 RTP/SCS projects increases energy use, those impacts would be less than significant. For example, any project that required construction equipment or lighting improvements would increase energy usage, but based on the above, the overall impacts of the totality of the proposed 2022 RTP/SCS are less than significant. Thus, no specific projects are listed in this section related to the adverse impacts on energy in the SJCOG region.

#### 4.5.4 Cumulative Impacts

The cumulative impact analysis area for energy consists of the SJCOG region and adjoining counties. Information regarding these adjoining counties can be found in Section 3, *Environmental Setting*. Future development in this region that could impact energy use is considered in the analysis. This cumulative extent is used to evaluate potential wasteful or inefficient use of energy resulting in an increase overall per capita energy consumption or result in increased reliance on fossil fuels and decreased reliance on renewable energy sources or conflict with state or local plans for renewable energy or energy efficiency across the cumulative impact area.

Future development in the cumulative impact analysis area would result in short term consumption of energy resulting from construction equipment and use of fuel for vehicles. Operation of future developments would also require energy but would be subject to CalGreen and California Building Energy Efficiency Standards. Furthermore, pursuant to the California Public Utilities Commission, utilities such as Pacific Gas and Electric must utilize a long-term planning process to plan for increased energy demand in the area and would account for increased development and an increase in population. As such, growth in the cumulative impact analysis area and increased energy demand would be accounted for and would not result in the inefficient, unnecessary, or wasteful use of energy.

The proposed 2022 RTP/SCS would increase demand for energy resources such as natural gas, electricity, and transportation fuels. However, many of the transportation improvement projects under the 2022 RTP/SCS would conserve transportation energy by relieving congestion and contributing towards other transportation efficiencies, resulting in lower per capita transportation energy consumption in 2046 than in the 2016 baseline year. In addition, renewable energy sources steadily constitute a larger proportion of California's energy supply makeup, resulting in a trend of decreased dependency on fossil fuels and increased dependency on renewable energy sources. As a result, the 2022 RTP/SCS would not contribute to significant cumulative impacts related to wasteful or inefficient use of energy resources and services because energy would be used more efficiently on a per capita basis with the proposed 2022 RTP/SCS as compared to 2016 conditions.

In addition, adherence to existing applicable policies and regulations, such as CalGreen, California Building Energy Efficiency Standards, and the Low Carbon Fuel Standard, would ensure the incorporation of energy efficiency measures in the design and operation of future projects facilitated by the proposed 2022 RTP/SCS and other cumulative projects. As such, the proposed

2022 RTP/SCS would not contribute to a cumulative impact to the wasteful, unnecessary, or inefficient use of energy. The proposed 2022 RTP/SCS contribution to cumulative impacts related to energy consumption would not result in the inefficient use of energy resources. As such, the proposed 2022 RTP/SCS impact on wasteful, inefficient, or unnecessary energy use, or conflicts with plans for renewable energy or energy efficiency, would not be cumulatively considerable.

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