4.6 Energy

Appendix F of the CEQA Guidelines, which require that EIRs include a discussion of the potential energy impacts of projects, with particular emphasis on considering if the proposed Plan would result in inefficient, wasteful and unnecessary consumption of energy.

This section discusses the energy impacts of implementing transportation projects in the proposed Plan, as well as the energy-related consequences of land use projects that are consistent with the proposed Plan. For an analysis of greenhouse gas (GHG) production and proposed Plan impacts on climate change, please see Section 4.8, *Greenhouse Gas Emissions/Climate Change*.

4.6.1 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 usage of natural gas and electricity.

a. Energy Supply

California's major sources of energy production in 2015 comprised approximately 48.9 percent crude oil, 31.6 percent renewable sources, 11.3 percent natural gas and 8.2 percent nuclear (U.S. Energy Information Administration [EIA] 2017e). Other sources of energy produced in California include nuclear electric power, natural gas and biofuel (EIA 2015). Natural gas production in 2015 was approximately 1,022,578 thousand cubic feet (Mcf) in Monterey County (California Department of Conservation, Division of Oil, Gas and Geothermal Resources [DOGGR] 2017a) and 18,791 Mcf in San Benito County (DOGGR 2017b). There is no natural gas production in Santa Cruz County. 2015 is used as the year to cross examine energy production and consumption across the AMBAG region and the state of California as it is the most recent year for available information for all areas and resources and 2015 represents the baseline year for this EIR.

Monterey County contains 1,511 active oil wells (DOGGR 2017c), which produced 8,092,348 barrels (bbl) of oil in 2015 (DOGGR 2017a), while San Benito County contains 53 active oil wells (DOGGR 2017d), which produced 14,813 bbl of oil in 2015 (DOGGR 2017b). Santa Cruz County contains no active oil wells. Table 23 illustrates the oil and natural gas produced in the Plan Area Counties in 2015 compared to statewide statistics.

Table 23 2015 Oil and Natural Gas Production by County

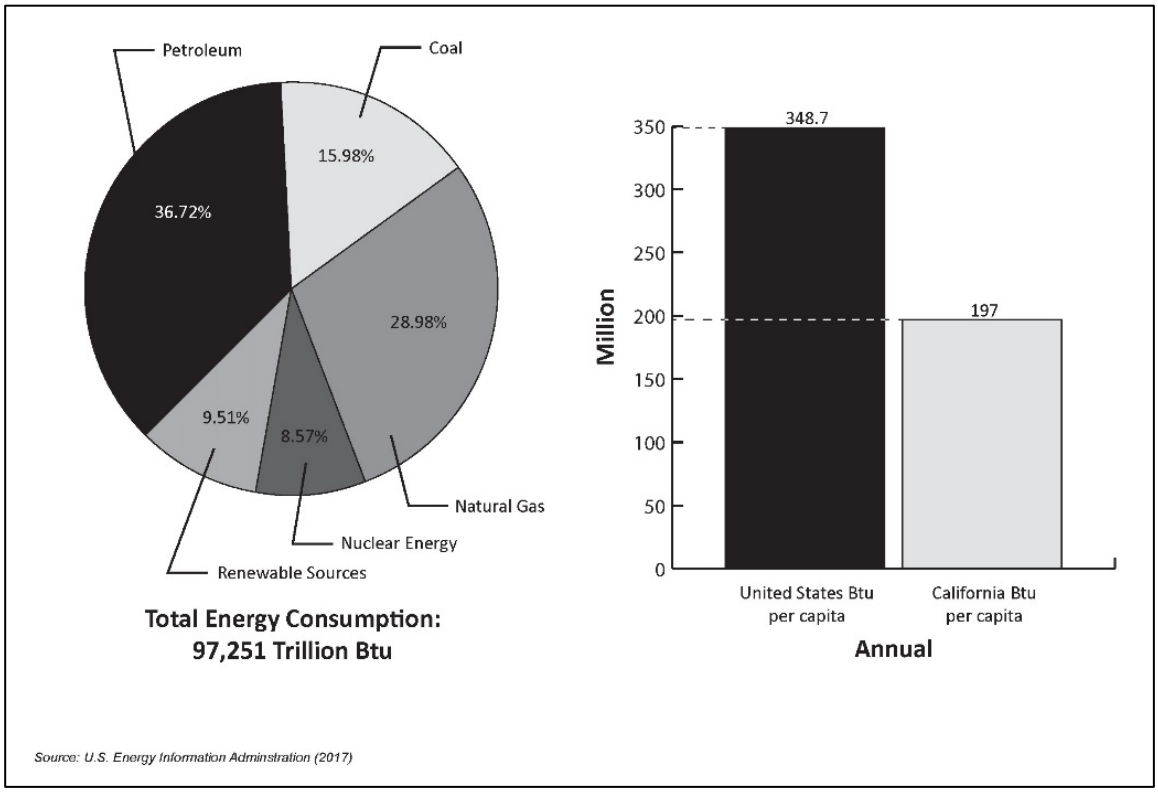
Natural Resource	California	Monterey County	San Benito County	Santa Cruz County	AMBAG Total	AMBAG Proportion of Statewide Production
Crude Oil (bbl)	201,284,000	8,092,348	14,813	0	8,107,161	4.02%
Natural Gas (Mcf)	200,000,000	1,022,578	18,791	0	1,041,369	0.52%

Sources: California Department of Conservation, Division of Oil, Gas and Geothermal Resources (DOGGR) Well Search. 2017; United States Energy Information Administration (EIA). 2017. Petroleum & Other Liquids: Crude Oil Production; United States Energy Information Administration (EIA). 2017. Table C1. Energy Consumption Overview: Estimated by Energy Source and End-Use Sector, 2015.

b. Energy Consumption and Sources

Total energy consumption in the U.S. in 2015 was estimated at approximately 97,251 trillion Btu (EIA 2017c). As shown in Figure 24, petroleum provided approximately 36.72 percent of the energy used in 2015 in the U.S. (EIA 2017c). In the same year, coal provided approximately 15.98 percent of energy consumed, natural gas provided approximately 28.98 percent, nuclear energy provided approximately 8.57 percent and total renewable sources supplied the rest at approximately 9.51 percent (EIA 2017c). On a per capita basis, California is ranked third lowest of the states in terms of energy use (197 million Btu per person), or about 43.5 percent less than the U.S.'s average per capita consumption of 348.7 million Btu per person (EIA 2017d).

Figure 24 2015 U.S. Energy Consumption by Resource



Electricity and Natural Gas

In 2015, California produced 69 percent of the electricity it used in 2015. The remainder was imported from outside the state. In 2015, California used 282,896.3 gigawatt hours (GWh) of electricity (California Energy Commission [CEC] 2017a) and produced a total of 196,194 GWh in-state (CEC 2017b). Table 24 illustrates the electricity and natural gas consumption by county and that county's respective proportion of statewide consumption in 2015.

Table 24 2015 Electricity and Natural Gas Consumption by County

	Electricity Consumption			Natural Gas Consumption		
County	2015 Consumption (GWh)[1]	Per Capita Consumption (kWh)	Statewide Proportion	2015 Consumption (MMthm)[2]	Per Capita Consumption (thm)	Statewide Proportion
Monterey	2,660.2	6,112.00	0.9%	102.5	235.4	0.4%
Santa Cruz	1,221.0	4,445.40	0.4%	50.3	183.1	0.2%
San Benito	368.0	6,194.50	0.1%	12.9	217.3	<0.1%
AMBAG Total	4,249.2	5,523.4	1.5%	165.7	215.3	0.7%

[1] Electricity consumption is quantified in Millions of Kilowatt-Hours (GWh), while per capita electricity is quantified in Kilowatt-Hours (kWh).

[2] 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 2015 data from the CEC for overall county-wide consumption and divided by the 2016 county population retrieved from the United States Census Bureau database. Individual entries may not add up to exact total amounts as a result of rounding to a single decimal point.

Sources: CEC 2017c; CEC 2017d; U.S. Census Bureau 2017

As shown in Table 24, the AMBAG region accounted for approximately 1.5 percent of the State's electricity consumption and 0.7 percent of the State's natural gas consumption in 2015 (EIA 2017f; CEC 2017c; CEC 2017d). The three counties within AMBAG are served by one electricity and natural gas provider: Pacific Gas and Electric (PG&E).

Petroleum

Energy consumed by the transportation sector accounts for roughly 39.3 percent of California's energy demand, amounting to approximately 3,017 trillion Btu in 2015 (EIA 2017g). California's transportation sector, including on-road and rail transportation, consumed roughly 558,115,000 bbl of petroleum fuels in 2015 (EIA 2017h). Furthermore, petroleum-based fuels are used for approximately 98.5 percent of the State's transportation activity (EIA 2017h). 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 concentrated in three counties: Contra Costa, Kern and Los Angeles (CEC 2016).

Daily vehicle miles travelled (VMT) within the AMBAG region were estimated at approximately 15.8 million in 2015 (refer to Table 28 below). Based on this daily VMT and estimated diesel sales in the region for 2015, approximately 152 billion Btu were consumed per day in 2015 as shown in Table 25.

Table 25 Fuel Consumption by County

Fuel	2015 Annual Fuel Use (million gallons)	2015 Annual Fuel Use (billion Btu)	2015 Daily Energy Use (billion Btu)	2015 Daily Per Capita Energy Use (thousand Btu)
Monterey County				
Gasoline	345.92	39,434.88	108.34	248.92
Diesel	52.64	7,301.16	20.06	46.08
San Benito County				
Gasoline	28.20	3,214.80	8.83	148.65
Diesel	0.75	104.02	0.28	4.81
Santa Cruz County				
Gasoline	180.48	3,713.32	10.20	37.14
Diesel	11.28	1,564.53	4.29	15.62
AMBAG Total	**619.27**	**55,332.71**	**152.01**	**197.59**

Note: The per capita consumption for fuel was determined by using 2015 data from correspondence with CEC staff (Gordon Schremp Senior Fuel Specialist [CEC, 2017e]) to estimate overall county-wide consumption and divided by the 2015 county population retrieved from the United States Census Bureau database.

Note: Totals may not add up due to rounding.

Sources: CEC, 2017e; United States Census Bureau, 2016

As stated in Section 4.14, *Transportation and Circulation*, nearly 15,836,000 vehicle miles were traveled each day within the AMBAG region in 2015. Table 26 illustrates the daily and VMT for the AMBAG region in 2015.

Table 26 Daily VMT for the AMBAG Region

County/Area	Daily VMT (2015)
Light Truck and Cars Only	
Monterey County	8,778,578
San Benito County	1,234,352
Santa Cruz County	4,438125
AMBAG Total	14,451,910
Full Fleet	
AMBAG Total	15,835,910

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

Source: AMBAG, 2017. EMFAC Summary Outputs.

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 (e.g. Low Carbon Fuel Standard). Conventional gasoline and diesel may be replaced, depending on the capability of the vehicle, with many transportation fuels including the following:

Hydrogen is being explored for use in combustion engines and fuel cell electric vehicles. There is 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 (two to

three times more efficient than gasoline vehicles). Currently, 34 hydrogen refueling stations are located in California; however, none are located in the AMBAG region (U.S. Department of Energy [DOE] 2017).

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, but fueling stations have been slow to make it available. There are currently 10 biodiesel refueling stations in California, one of which is located in Santa Cruz County at 433 Ocean Street in Santa Cruz (DOE 2017).

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 on board the vehicle to power electric motors. There are approximately 55 electrical charging stations in Monterey County, four in San Benito County and 31 in Santa Cruz County (DOE 2017).

c. Regulatory Setting

Programs and policies at the State and national levels have emerged to bolster the previous trend towards energy efficiency, as discussed below.

Federal

Energy Policy Conservation Act (EPCA) and CAFE 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.

American Recovery and Reinvestment Act of 2009

The American Recovery and Reinvestment Act (ARRA) of 2009 appropriates funds toward infrastructure modernization, investments in energy independence and renewable energy technologies among other things. ARRA supports a variety of alternative fuel and advanced vehicle technologies.

State

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.

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 (CEC 2017f).

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.

Senate Bill X1-2: California Renewable Energy Portfolio Standard

In 2011, Governor Brown signed SB X1-2, which requires retail sellers of electricity, including investor-owned utilities and community choice aggregators, to provide at least 33 percent of their electricity supply (portfolio) from renewable sources by 2020. CPUC and CEC jointly implement the Statewide RPS program through rulemakings and monitoring the activities of electric energy utilities in the state.

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).

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 (CPUC, CEC 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 demand. With the adoption of the first EAP in 2003, the CEC, CPUC and California Power Authority articulated a unified approach to meeting California's electricity and natural gas needs. A key element was the loading factor, which specified California's policy to invest first in energy efficiency and demand response and then renewables and distributed generation before convention generation. Combined heat and power, as a form of distributed generation, is given preferred resource status in the loading order.

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. The CEC

adopted an update to the EAP II in February 2008 that supplemented the earlier EAPs and examined the State's ongoing actions in the context of global climate change.

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 (CARB & CEC 2007).

Executive Order S-01-07 (Low Carbon Fuel Standard)

Executive Order S-01-07 (17 CCR 95480 et seq.) requires the state to achieve a 10 percent or greater reduction by 2020 in the average fuel carbon intensity for transportation fuels in California regulated by ARB. ARB identified the Low Carbon Fuel Standard (LCFS) as a discrete early action item under AB 32.

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 (CEC 2011). The 2012 Bioenergy Action Plan updates the 2011 Plan and provides a more detailed action plan to achieve the following goals (CEC 2012):

- 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 2016, CEC updated Title 24 standards with more stringent requirements effective January 1, 2017. 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 (CEC 2015). 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 (2016), 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 2016, 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.

Regional

Electric Vehicle Infrastructure for the Monterey Bay Area Plan

In 2013, AMBAG published the Electric Vehicle Infrastructure for the Monterey Bay Area Plan. The Electric Vehicle Infrastructure for the Monterey Bay Area Plan includes a siting plan to identify potential charging locations and presents a framework for establishing an electric vehicle charging network in the Monterey Bay Area (AMBAG 2013a). The three major goals of the siting plan are to:

- Provide charging opportunities for plug-in electric vehicle owners that lack access to home charging
- Extend the range of plug-in electric vehicle for intra- and interregional travel along various corridors
- Maximize all electric miles by providing ample opportunities for charging while minimizing the risk of stranded plug-in electric vehicles

Monterey Bay Plug-In Electric Vehicle Readiness Plan

The Electric Vehicle Infrastructure plan was the precursor to the Monterey Bay Plug-In Electric Vehicle Readiness Plan, a comprehensive regional plan to promote plug-in electric vehicle adoption throughout the region completed in July 2013. The goal of the Readiness Plan is to encourage the mass adoption of plug-in electric vehicles in the region and reduce greenhouse gas emissions by providing a toolbox of recommended approaches for public, private and non-profit organizations (AMBAG 2013b). The Readiness Plan identifies specific regional targets for significantly expanding plug-in electric vehicle adoption in the Monterey Bay Area by 2020 and 2025.

AMBAG Energy Watch Program

AMBAG works closely with PG&E to promote reduced energy use and energy savings to these counties through the AMBAG Energy Watch Program. AMBAG Energy Watch reduces energy use by providing the following resources to eligible PG&E customers:

- Developing Energy Action Strategies for jurisdictions;
- Compiling greenhouse gas inventories for jurisdictions;
- Energy assessments and audits;
- Direct installation of energy efficient equipment;
- Technical assistance and financial incentives for energy efficient retrofits in municipal buildings;
- Energy efficiency seminars and training courses in the region;
- Information on other PG&E energy efficiency programs and services; and
- Assistance accessing financing for energy efficiency projects.

In addition, AMBAG Energy Watch has developed programs that would help reduce greenhouse gas (GHG) emissions including preparing local GHG inventories, climate action planning support services and Energy Action Strategies (AMBAG 2017a).

The California Public Utilities Commission (CPUC) regulates privately owned electric and natural gas companies. The CPUC has developed energy efficiency programs such as smart meters, low income programs, distribution generation programs, self-generation incentive programs and a California solar initiative (CPUC 2017).

Local

General Plans

The Monterey County General Plan (Monterey County, 2010a) and Santa Cruz County General Plan and Local Coastal Program (Santa Cruz County, 1994) address energy efficiency in their Conservation and Open Space Elements. The goals and policies of their Conservation and Open Space Elements promote energy efficiency by encouraging all energy sectors (i.e. agricultural, residential, commercial, industrial, and public building applications) to employ renewable energy sources to the maximum extent feasible. The San Benito County 2035 General Plan (San Benito County, 2015a) addresses energy efficiency in the Land Use, Public Facilities and Services and Natural and Cultural Resources Elements. The goals and policies of the Land Use Element encourage the County to use energy conservation and efficiency techniques in new building design, orientation and construction (San Benito County 2015b), while policies found in the Natural and Cultural Resources and Public Facilities and Services Elements encourage greater utilization and accessibility to renewable energy sources (San Benito County 2015c; San Benito County 2015d).

The General Plans for local jurisdictions in the AMBAG region contain initiatives to reduce overall energy consumption and improve energy efficiency. Many of the cities' General Plans also contain goals that guide their intent to reduce energy consumption. For example, the Conservation Element of the City of Monterey General Plan (City of Monterey, 2005) contains Goal e, *Encourage the effective use of energy in all its critical forms by public and private users alike*. This goal is then actualized through programs such as Program e.1.1, *Consider aesthetically compatible independent energy sources in new public and private buildings*, and Program e.1.2, *Encourage energy retrofitting in existing residential and commercial structures*. Building and transportation energy conservation

has been improvement significant over time through statewide policies; however, the Circulation, Conservation and Land Use elements of local jurisdiction General Plans help facilitate the implementation of state and local energy efficiency initiatives.

4.6.2 Impact Analysis

a. Methodology and Significance Thresholds

Appendix F of the CEQA Guidelines provides a list of six environmental impacts related to use of energy in Section II (c). Unless otherwise noted, the significance criteria developed for this EIR are based on that list of environmental impacts provided in Appendix F. AMBAG has consolidated the list and edited the wording in an effort to develop significance criteria that reflect the programmatic level of analysis in this EIR and the unique nature of the proposed Plan.

Specifically, CEQA Appendix F criterion (C)(1) addresses a project's energy use requirements and energy use efficiency by amount and fuel type and criterion (C)(2) addresses a project's effects on local and regional energy supplies. These criteria have been combined and modified in the first threshold. Criteria (C)(3) and (C)(4) related to energy demand and standards, respectively, are aligned with the second threshold. The third threshold addresses the effects of the project on energy resources consistent with criterion (C)(5). For the purposes of this EIR, implementation of the proposed Plan would have a significant impact if it would:

1. Result in an increase in overall per capita energy consumption relative to baseline conditions, or otherwise use energy in an inefficient, wasteful, or unnecessary manner;
2. Result in an increased reliance on fossil fuels and decreased reliance on renewable energy sources; and/or
3. Require or result in the construction of new energy facilities or the expansion of such facilities to adequately meet projected demands, the construction of which could cause a significant environmental effect.

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 2040 MTP/SCS projects, it also includes energy consumption that is not due to the 2040 MTP/SCS, but rather is due to changes in VMT caused by 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 the roadway and rail system (Caltrans 1983). Indirect energy accounts for construction-related energy (e.g., the energy required to construct transportation improvements), which would 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

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, including buses and trains. The direct energy analysis for the project is based on baseline (2015), 2020 and 2040 VMT with and without the 2040 MTP/SCS (as analyzed in Section 4.14, *Transportation and Circulation*).

The 2015 gasoline and diesel fuel consumption data for Monterey County, San Benito County and Santa Cruz County was converted to Btu (refer to Table 11) and divided by region-wide daily VMT (refer to Table 12) to derive a regional Btu/VMT conversion factor of 9,599 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, particularly if the fleet-wide goal of 35 mpg by year 2020 proposed under the Energy Independence and Security Act is met. Applying the 2015-based factor to future year (2040) VMT therefore provides a conservative evaluation of energy consumption as the energy efficiency of vehicles in 2040 is likely to be higher than current fuel efficiency of 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 2040 MTP/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 27 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 27 Indirect Energy Consumption Factors

Mode	Factor
Manufacturing	
Passenger Vehicles	1,410 Btu/VMT
Transit Buses	3,470 Btu/VMT
Roadway (Construction)	27,300 Btu/VMT
Rail (Construction)	2,108 Btu/VMT
Maintenance	
Passenger Vehicles	1,400 Btu/VMT
Transit Buses	13,142 Btu/VMT
Rail	7,060 Btu/VMT

Note: 2017 dollars converted to 1977 dollars as a reasonable worst-case inflation assumption using United States Department of Labor and Statistics inflation converter. Note that transportation projects with construction costs planned further in the future would result in lower energy use relative to construction cost, due to anticipated additional future inflation.

Source: Caltrans Transportation Laboratory. July 1983. *Energy and Transportation Systems*. Available at: http://www.dot.ca.gov/hq/env/air/documents/energytranssystems_ocr.pdf. Accessed October 22, 2017.

b. Project Impacts and Mitigation Measures

This section describes impacts associated with the 2040 MTP/SCS. Due to the programmatic nature of the 2040 MTP/SCS, a precise, project-level analysis of the specific impacts associated with individual transportation and land use projects is not possible. In general, implementation of proposed transportation improvements and future projects under the land use scenario envisioned by the 2040 MTP/SCS could result in impacts as described in the following sections.

Threshold 1:	Result in an increase in overall per capita energy consumption relative to baseline conditions, or otherwise use energy in an inefficient, wasteful, or unnecessary manner
Threshold 2:	Result in an increased reliance on fossil fuels and decreased reliance on renewable energy sources

Impact E-1 **FUTURE TRANSPORTATION IMPROVEMENT PROJECTS AND IMPLEMENTATION OF THE LAND USE SCENARIO ENVISIONED BY THE 2040 MTP/SCS WOULD INCREASE DEMAND FOR ENERGY BEYOND EXISTING CONDITIONS. HOWEVER, THE 2040 MTP/SCS WOULD NOT RESULT IN INEFFICIENT, UNNECESSARY, OR WASTEFUL DIRECT OR INDIRECT CONSUMPTION OF ENERGY AND WOULD BE CONSISTENT WITH APPLICABLE FEDERAL, STATE AND LOCAL ENERGY CONSERVATION POLICIES. AS SUCH, THIS IMPACT WOULD BE LESS THAN SIGNIFICANT.**

Daily operation of the regional 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 the 2040 MTP/SCS would increase vehicle capacity, allowing a greater number of vehicles to use facilities in the region. Increases in motor vehicle trips are primarily a combined function of population and employment growth. It should be noted that population growth and growth in VMT would occur within the region regardless of whether the 2040 MTP/SCS is implemented. As a result, energy consumption as it relates to vehicles would increase beyond the 2015 baseline in any scenario. However, many 2040 MTP/SCS projects (e.g., bikeway and pedestrian projects, rail projects, transit projects, Transportation System Management [TSM] and Transportation Demand Management [TDM] projects, etc.) would improve the availability of alternative transportation modes, and help reduce congestion and resultant air pollutants in the AMBAG region.

Construction and maintenance of the proposed 2040 MTP/SCS projects would result in short-term consumption of energy resulting from the use of construction equipment and processes. 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, as well as construction of future infill and transit oriented development (TOD) projects/developments envisioned by the 2040 MTP/SCS. The California Green Building Standards Code (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, as well as future infill and TOD envisioned by the 2040 MTP/SCS and would help to minimize waste and energy consumption. All construction and maintenance conducted pursuant to the 2040 MTP/SCS, or as a result of improvements made by the 2040 MTP/SCS, would be required to comply with relevant provisions of the CALGreen Code.

Table 28 shows daily VMT and estimated fuel consumption translated into energy use (Btu) in the AMBAG region under existing (2015) conditions and the 2040 MTP/SCS.

Table 28 Direct and Indirect Transportation Energy Use

Year	Daily VMT	Direct Energy Use (Daily Billion Btu)	Indirect Energy Use (Daily Billion Btu)	Total Energy Use (Daily Billion Btu)	Per Capita Energy Use (Daily Thousand Btu)
2015 Baseline	15,835,910	152.0	44.3	196.3	255.9
2040 MTP/SCS	19,687,508	160.8	50.4	211.2	242.2

Notes: Daily VMT, drawn from Table 26, was used on information from Table 27 to identify direct and indirect daily Btu consumption. 2015 U.S. Census Bureau population records (U.S. Census Bureau 2017) were then consulted to identify daily per capita Btu consumption.

As shown in Table 28, regionwide daily VMT and total daily energy use would increase over time as the result of regional socioeconomic (population and employment) growth. However, the 2040 MTP/SCS would result in an approximately five percent decrease in per capita energy usage when compared to 2015 baseline conditions.

Transportation Improvement Projects

The transportation improvements proposed under the 2040 MTP/SCS would result in a more efficient transit system. The 2040 MTP/SCS would result in greater availability of public transit and other alternative modes of transportation, such as Complete Streets and active transportation, as well as a more energy efficient land use scenario. The reduction in overall congestion resulting from these service level improvements would reduce fuel consumption and promote fuel efficiency beyond what can be quantified in the above analysis. In addition, 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 the Electric Vehicle Infrastructure for the Monterey Bay Area Plan.

New transportation facilities that require energy for operation, such as signal lighting, roadway or parking lot lighting and electronic equipment will increase energy demand. New landscaping irrigation also increases 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.

Land Use Changes

The 2040 MTP/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 (e.g., bus service that has headways of 15 minutes or less during the peak period, Bus Rapid Transit [BRT], express bus or rail) and improved bicycle and pedestrian infrastructure. 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) and resulting in fewer vehicle trips. Operation of future infill projects would increase overall demand for energy beyond existing demand; however, such development would not require unusual, unnecessary, or wasteful amounts of energy. Future mixed use and infill projects would to 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.

Consistency with Energy Conservation and Renewable Energy Policies

As discussed above, the 2040 MTP/SCS would result in an approximately five percent decrease in per capita energy use in the region and would not result in energy used in an unnecessary or wasteful manner. Although implementation of the 2040 MTP/SCS would result in greater net energy consumption than 2015 baseline conditions, the 2040 MTP/SCS would not result in the inefficient, wasteful, or unnecessary consumption of energy if it is consistent with existing relevant energy conservation policies. Accordingly, inconsistencies between the 2040 MTP/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.

AMBAG monitors regulations related to fuel efficiency standards and alternative fuel vehicles. The 2040 MTP/SCS would not conflict with such regulations (e.g., *Energy Policy and Conservation Act* and *CAFE Standards*, *EPAct*, *Energy Independence and Security Act of 2007*, *AB 1493: Reduction of Greenhouse Gas Emissions*, *AB 1007: State Alternative Fuels Plan*).

The 1975 *Warren-Alquist Act* established the California Energy Resource Conservation and Development Commission, now known as the California Energy Commission (CEC), and established a State policy to reduce wasteful, uneconomical and unnecessary uses of energy. Based on the data above, and explained in the conclusion below, the 2040 MTP/SCS would not result in wasteful, inefficient, or unnecessary use of energy. Therefore, the 2040 MTP/SCS is consistent with the *Warren-Alquist Act* policies.

Senate Bill (SB) 1078 as accelerated by SB 350, establishes a renewable portfolio standard for electricity supply, and requires that retail sellers of electricity, including investor-owned utilities and community choice aggregators, provide 33 percent of their supply from renewable sources by 2020. In addition, the 2017 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 2040 MTP/SCS would not conflict with these policies. Refer to Section 4.8, *Greenhouse Gas Emissions/Climate Change,* for a discussion of greenhouse gas emissions reductions related to the proposed 2040 MTP/SCS.

In addition, many 2040 MTP/SCS projects promote energy efficiency as they support implementation of the 2010 Clean Air Plan transportation control measures including transportation demand management, transportation system management, commuter and public transit; rail, bike and pedestrian programs, among others (refer to Section 4.2, *Air Quality and Health Impacts/Risks*).

Locally, the proposed 2040 MTP/SCS would be consistent with the 2010 Monterey County General Plan, the 1994 Santa Cruz County General Plan and Local Coastal Program and the 2015 San Benito County 2035 General Plan. These plans encourage the use of renewable energy, energy conservation and energy efficiency techniques in all new building design, orientation and construction and support of alternative transportation and fuels. As described above, the 2040 MTP/SCS includes TDM and TSM intended to improve the efficiency and effectiveness of the transportation system, reducing fuel consumption, transit and other alternative modes of

transportation, such as new pedestrian and bicycle facilities and promotes mixed use and infill development.

In summary, the 2040 MTP/SCS would not result in wasteful or inefficient energy consumption within the region, and is generally consistent with applicable policies regarding energy conservation and renewable energy. Therefore, the 2040 MTP/SCS would not have a significant impact on energy. Impacts would be less than significant.

Mitigation Measures

None required.

Threshold 3:	Require or result in the construction of new energy facilities or the expansion of such facilities to adequately meet projected demands, the construction of which could cause a significant environmental effect

Impact E-2 IMPLEMENTATION OF THE 2040 MTP/SCS WOULD GENERATE ENERGY DEMAND THAT MAY REQUIRE CONSTRUCTION OF NEW ENERGY FACILITIES OR THE EXPANSION OF SUCH FACILITIES. IMPACTS WOULD BE SIGNIFICANT AND UNAVOIDABLE.

As shown in Table 28, implementation of the 2040 MTP/SCS would result in an approximately 7.5 percent increase in energy consumption compared to 2015 baseline conditions. Additional increases in energy consumption would be caused by land use projects that implement the 2040 MTP/SCS. As a result, new or expanded energy facilities would likely be needed to meet future energy needs within the AMBAG region, including power plants, distributed generation, electrical transmission and distribution infrastructure and natural gas facilities (e.g., storage, pipelines).

PG&E utilizes a long-term planning process to plan for increased energy demand in the future with its publication of ten-year Transmission Plans. The most recent, *PG&E's 2010 Electric Transmission Grid Expansion Plan*, details planned projects between 2010 and 2020 that aim to ensure compliance with North American Electric Reliability Corporation (NERC) 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 2010). Some projects encompassed within this Transmission Plan are within the AMBAG region, including the replacement of transformers in Soledad, the construction of a new distribution substation in Natividad and the rebuilding of the Green Valley-Rob Roy line into a double-circuit line, among others (PG&E 2010). Each Transmission Plan published by PG&E is a ten-year planning document, thus, PG&E will continue to assess the reliability and capacity of its energy facilities every ten years based on critical system conditions, growth assumptions and study years agreed upon by the California Independent System Operator Corporation (CAISO) and participating stakeholders. In addition, Monterey Bay Community Power (MBCP) is a regional project among local government agencies in the AMBAG region that aims to provide electricity to residents and businesses throughout Monterey, San Benito and Santa Cruz counties through the new Community Choice Energy (CCE) model (MBCP 2017). CCE enables communities to choose clean-source power at a cost equivalent to PG&E, while retaining PG&E's role in maintaining power lines and providing customer service.

The provision of new or expansion of existing energy facilities would result in short-term construction-related impacts and long-term operational impacts, such as air quality, noise, traffic and other resource areas. Construction-related and long-term operational impacts are typically

controllable and avoided or substantially lessened by mitigation measures adopted by the implementing agency, including adherence to existing regulations and best management practices. Because details are not known about timing, location and other project-specific information for new or expanded energy facilities, it cannot be guaranteed that impacts from the construction and operation of new or physically altered energy facilities would be less than significant for all projects. Therefore, impacts related to new or expanded energy facilities needed to accommodate energy demand from the MTP/SCS would be significant.

Mitigation Measures

To minimize impacts associated with the construction of new energy facilities or the expansion of such facilities, PG&E and local jurisdictions involved in Monterey Bay Community Power with responsibility for the construction or approval of new energy facilities or the expansion of existing facilities to adequately meet projected capacity needs can and should implement Mitigation Measure E-2(a). In addition, cities and counties should implement Mitigation Measure E-2(b). Project-specific environmental documents may adjust these mitigation measures as necessary to respond to site-specific conditions.

E-2(a) Mitigate Impacts of New or Expanded Energy Facilities

During the planning, design and project-level CEQA review process, apply necessary mitigation measures to avoid or reduce significant environmental impacts associated with the construction or expansion of such facilities. The environmental impacts associated with such construction or expansion shall be avoided or reduced through the imposition of conditions required to be followed by those directly involved in the construction or expansion activities. Such conditions shall include those necessary to avoid or reduce environmental impacts associated with, but not limited to: air quality, noise, traffic, biological resources, cultural resources, GHG emissions, hydrology and water quality and others that apply to specific construction or expansion of natural gas and electric facilities projects.

E-2(b) Develop Energy Demand Calculations and Reduce Energy Demand

During the planning, design and project-level CEQA review process for individual development projects, develop electricity and natural gas demand calculations for any project anticipated to require substantial energy consumption. Implementing agencies shall implement design and mitigation measures that reduce energy consumption and promote the use of on-site renewable energy. This may include, but would not be limited to: installing energy-reducing shading mechanisms for windows, porches, patios, etc.; installing energy-reducing day lighting systems (e.g., skylights); use of low-energy interior and street lighting; and/or installation of solar photovoltaic (PV) panels or other on-site renewable energy that generates a minimum of 30 percent of the project's total energy demand.

Implementing Agencies
Implementing agencies for energy projects include PG&E and local jurisdictions involved in Monterey Bay Community Power with responsibility for the construction or approval of new energy facilities or the expansion of existing facilities. Implementing agencies for land use projects include cities and counties.

Significance After Mitigation

Implementation of Mitigation Measures E-2(a) and E-2(b) would reduce impacts associated with the construction of natural gas and electricity facilities. However, it cannot be guaranteed that all future project-level impacts can be mitigated to a less than significant level. Therefore, this impact would remain significant and unavoidable. No additional mitigation measures to reduce this impact to less-than-significant levels are feasible.

c. Specific MTP/SCS Projects that May Result in Impacts

As discussed above, the 2040 MTP/SCS would result in less than significant impacts related to energy consumption. No specific projects have been identified that would result in significant consumption of energy.

d. Cumulative Impact Analysis

The 2040 MTP/SCS would increase demand for energy resources such as natural gas, electricity and transportation fuels by approximately 7.5 percent over the 25-year planning horizon. However, many of the transportation improvement projects under the 2040 MTP/SCS would conserve transportation energy by relieving congestion and contributing towards other transportation efficiencies, resulting in lower per capita transportation energy consumption in 2040 than in the 2015 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 2040 MTP/SCS would not contribute to significant 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 2040 MTP/SCS as compared to existing 2015 conditions.

In addition, adherence to existing applicable policies and regulations, such as CalGreen 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 2040 MTP/SCS. As such, the 2040 MTP/SCS would not contribute to a cumulative impact to the wasteful, unnecessary, or inefficient use of energy. Based on the analysis provided above, the 2040 MTP/SCS's contribution to cumulative impacts related to energy consumption would not result in the inefficient use of energy resources. As such, the 2040 MTP/SCS's impacts related to per capita energy consumption and reliance on fossil fuels would not be a cumulatively considerable contribution to a significant cumulative energy impact, and therefore, impacts would be less than significant.

New or expanded facilities for generation, transmission, storage and distribution of electricity, natural gas, diesel and alternative transportation fuels would be needed to meet the increased demand associated with the 2040 MTP/SCS, the construction of which would cause potentially significant environmental effects. Growth and transportation projects in adjoining counties would add to these effects, thereby causing significant cumulative effects. Combined with impacts from projected growth and development located throughout the region causing increased demand for electricity, natural gas and diesel, the 2040 MTP/SCS's contribution to impacts resulting from the construction of new or expanded energy facilities would be cumulatively considerable. The 2040 MTP/SCS contribution would remain cumulatively considerable after mitigation because it cannot be guaranteed that all future project-level impacts can be mitigated to a less than significant level.