2.4 Energy

This chapter was prepared pursuant to CEQA Guidelines Section 15126 and Appendix F of the CEQA Guidelines, which require that EIRs include a discussion of the potential energy impacts of projects, with particular emphasis on avoiding or reducing inefficient, wasteful, and unnecessary consumption of energy. This chapter discusses the energy impacts of implementing transportation improvements in the proposed Plan, as well as the direct and indirect energy-related consequences of land use decisions that are consistent with the proposed Plan's policy guidance. The transportation-related analysis in this section includes issues related to consumption of non-renewable energy sources for construction and operation of projects, while the land use-related analysis in this section includes energy consumption due to residential and non-residential growth consistent with the proposed Plan's policy direction. The energy consumption analysis is presented on a per capita basis to allow for comparison as the Bay Area increases in both population and jobs under the proposed Plan. For an analysis of greenhouse gas production and proposed Plan impacts on climate change, please see *Chapter 2.5: Climate Change and Greenhouse Gases.*

Energy related to land use is primarily direct energy consumption for space heating and onsite electricity/heating/cooling (co-generation) facilities at residential and commercial uses, industrial plant energy consumption, and indirect energy consumed in generation of electricity at power plants. Transportation energy use is related to the efficiency of cars, trucks and public transportation; choice of travel modes (automobile, carpool and public transit); and miles traveled by these modes. Energy is also consumed with construction and routine operation and maintenance of the transportation infrastructure.

Energy usage is typically quantified using the British thermal unit (Btu), and this analysis discusses impacts in terms of Btu. As points of reference, the approximate amount of energy contained in a gallon of gasoline, a cubic foot of natural gas, and a kilowatt hour (kWhr) of electricity are 123,000 Btu, 1,000 Btu, and 3,400 Btu, respectively.

Environmental Setting

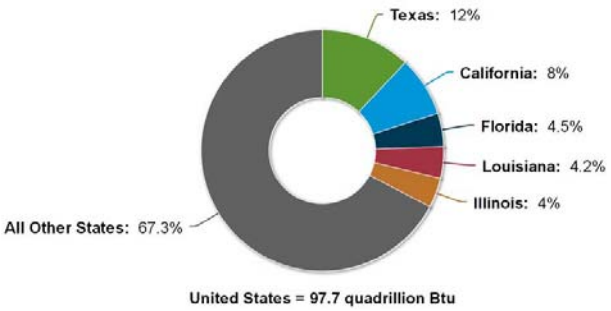
PHYSICAL SETTING

Energy Types and Sources

Total energy consumption in the U.S. in 2010 was approximately 98.0 quadrillion Btu, which represents about 19 percent of the world's energy consumption. The U.S. is the second largest consumer of energy in the world, behind China; the U.S. remains the world's largest per-capita consumer of energy, with an

average yearly per capita consumption rate of 308 Million Btus. Fossil fuels provide approximately 83 percent of the energy used in the U.S. Nuclear Power and renewable energy each provide approximately 8.5 percent.[1,2]

California is the most populous state in the U.S., and its energy consumption is second only to Texas. However, because of the energy-efficiency programs and policies administered at the state level, California has the lowest per capita energy consumption rate in the country, with a yearly per capita consumption rate of 217 million Btus. The transportation sector is by far the largest energy consumer in California, with more registered vehicles than any other state and among the longest work commute times in the nation.[3]



Source: U.S. Energy Information Administration, State Energy Data System 2010

California relies on a regional power system composed of a diverse mix of natural gas, renewable, hydroelectric, and nuclear generation resources. Approximately 71 percent of the electrical power needed to meet California's demand is produced in the state; the balance, approximately 29 percent, is imported from the Pacific Northwest and the Southwest.[4] In 2010, California's in-state electricity was derived from natural gas (53.4 percent), large hydroelectric resources (14.6 percent), coal (1.7 percent), nuclear sources (15.7 percent), and renewable resources that include geothermal, biomass, small hydroelectric resources, wind, and solar (14.6 percent).[5]

The energy consumed by the transportation sector accounts for roughly 41 percent of California's petroleum demand and 38 percent of its greenhouse gas emissions. The transportation sector, including on-road and rail transportation (but excluding aviation), consumes roughly 16 billion gallons of gasoline and four billion gallons of diesel fuel each year. California is the third largest consumer of gasoline in the world, behind the U.S. (as a whole) and China.[6]

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1 Energy Information Administration Annual Energy Review, 2010 U.S. Primary Energy Consumption by Source and Sector, available at http://www.eia.gov/totalenergy/data/annual/showtext.cfm?t=ptb0101

2 Barr, Robert. *China Surpasses U.S. as Top Energy Consumer.* MSNBC. NBCNews.com June 8, 2001. Accessed August, 6, 2012

3 EIA, 2009. *California Energy Fact Sheet.* November 2009.

4 CEC, *Energy Almanac.* Total Electricity System Power. August 2012.

5 CEC, *Energy Almanac.* California's Major Sources of Energy. April 2011.

6 Energy Information Administration Annual Energy Review, 2010 U.S. Primary Energy Consumption by Source and Sector, available at http://www.eia.gov/totalenergy/data/annual/showtext.cfm?t=ptb0101

Petroleum

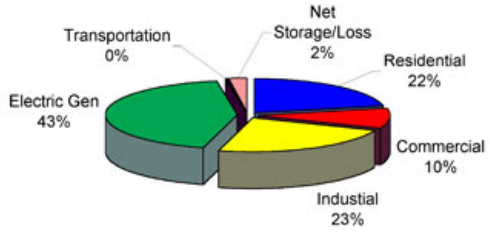
California is a net importer of oil. It produces only about 37.2 percent of the petroleum it uses. In 2007, the consumers in the state spent nearly $50 billion on gasoline and $9.7 billion on diesel. Petroleum-based fuels account for 96 percent of the state's transportation needs. The dependence on a single type of transportation fuel makes Californians vulnerable to petroleum price spikes.[7]

Most gasoline and diesel fuel sold in California for motor vehicles is refined in California to meet State-specific formulations required by the California Environmental Protection Agency's Air Resources Board. Major petroleum refineries in California are concentrated in three counties: Contra Costa County in northern California, Kern County in central California, and Los Angeles County in southern California. In the Bay Area, Valero, Tesoro, Phillips, Shell and Chevron operate refineries in Contra Costa County and adjacent Solano County.

California processes approximately 2 million barrels per day of crude oil from its 20 operable refineries. California ranks third in petroleum refining capacity in the U.S. and accounts for more than one-tenth of the total U.S. capacity. Approximately 38 percent of the petroleum refined in California comes from in-state oil production facilities, 12 percent comes from Alaska, and the remaining 50 percent comes from foreign sources. The long-term oil supply outlook for California indicates that in-state and Alaskan supplies are declining, leading to increasing dependence on foreign oil sources.[8]

Natural Gas

Four regions supply California with natural gas. Three of them—the Southwestern U.S., the Rocky Mountains, and Canada—supply approximately 87 percent of all natural gas consumed in California. The remainder is produced in California.



Source: Utility and pipeline filings to the California Energy Commission

As illustrated in the chart to the right, in 2006, approximately 43 percent of all natural gas consumed in the state was used to generate electricity. Residential consumption represented approximately 22 percent of California natural gas use with the balance consumed by the industrial, resource extraction, and commercial sectors.[9] Pacific Gas & Electric (PG&E) is the primary natural gas provider for the San Francisco Bay Area.

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[7] CEC, *Energy Almanac*. California Petroleum Statistics and Data. April 2011.

[8] EIA, 2009. *California Energy Fact Sheet*. November 2009.

[9] CEC, *Energy Almanac*. California's Major Sources of Energy. April 2011.

Natural gas has become an increasingly important source of energy as more of the state's power plants rely on this fuel. While California's successful efficiency programs and its reliance on renewable sources of electricity should slow the demand for natural gas, competition for the state's imported supply is increasing.

Electricity and Renewables

Power plants in California meet approximately 71 percent of the in-state electricity demand; hydroelectric power from the Pacific Northwest provides another 8 percent and power plants in the southwestern U.S. provide another 21 percent.[10] The contribution of in-state and out-of-state power plants depends upon, among other factors, the precipitation that occurred in the previous year and the corresponding amount of hydroelectric power that is available. In the Bay Area, Contra Costa County is home to one of the largest power plants in California: Mirant Corp.'s Pittsburg Power Plant. It is the seventh largest power plant in California (second largest in Northern California after Dyenergy's Moss Landing plant in Monterey County) and consumes natural gas. Smaller power plants and cogeneration facilities are located throughout the Bay Area. PG&E is the primary electricity supplier to northern California.

California is the leading producer of electricity generation from non-hydroelectric renewable energy sources in the U.S. California generates electricity using wind, geothermal, solar, fuel wood and municipal solid waste/landfill gas resources. The state is the top producer of geothermal energy in the nation with over 2,500 megawatts of capacity. A collection of 22 geothermal power plants known as "The Geysers," located in the Mayacamas Mountains (Lake County) north of San Francisco, is the largest complex of its kind in the world, with more than 700 megawatts of installed capacity. California is also a leading producer of wind energy and holds nearly ten percent of the nation's capacity. Additionally, the world's largest solar power facility operates in the Mojave Desert.[11]

Alternative Fuels

The U.S. Department of Transportation currently recognizes the following as alternative transportation fuels: methanol and denatured ethanol (alcohol mixtures that contain no less than 70 percent of the alcohol fuel), natural gas (compressed or liquefied), liquefied petroleum gas, hydrogen, coal-derived liquid fuels, fuels derived from biological materials (i.e., biomass), and electricity. The liquid fuel referred to as Methanol (M85) consists of methanol and gasoline and is derived from natural gas, coal, or woody biomass. The liquid fuel referred to as Ethanol (E85) consists of ethanol and gasoline and is derived from corn, grains or agricultural waste. Natural gas consists of a high percentage of methane (generally above 85 percent), and varying amounts of ethane, propane, butane, and inerts (typically nitrogen, carbon dioxide, and helium) and comes from underground reserves. Liquefied petroleum gas (LPG) consists mostly of propane and is a byproduct of petroleum refining or natural gas processing. Current technologies for electric vehicles include lead acid and nickel metal hydride batteries.

Commercial and Residential Energy Use

Homes built between 2000 and 2005 used 14 percent less energy per square foot than homes built in the 1980s and 40 percent less energy per square foot than homes built before 1950. However, larger home

[10] Ibid.

[11] EIA, 2009. *California Energy Fact Sheet*. November 2009.

sizes have offset these efficiency improvements. Primary energy consumption in the residential sector totaled 20.99 quadrillion Btu in 2009, equal to 54 percent of consumption in the buildings sector and 22 percent of total primary energy consumption in the U.S. Energy consumption increased 24 percent from 1990 to 2009. However, because of projected improvements in building and appliance efficiency, the Energy Information Administration's 2012 Annual Energy Outlook forecast a 13 percent increase from 2009 to 2035.[12]

Commercial buildings represent just under one-fifth of U.S. energy consumption, with office space, retail space, and educational facilities representing about half of commercial sector energy consumption. In aggregate, commercial buildings consumed 46 percent of building energy consumption and approximately 19 percent of U.S. energy consumption. In comparison, the residential sector consumed approximately 22 percent of U.S. energy consumption.[13]

Commercial and residential space heating (including onsite co-generation facilities at commercial buildings) comprise a large share of direct energy end use in the Bay Area. Other major energy users include industrial facilities (including oil refineries that consume energy in the production of gasoline and other fuels) and electricity-generating power plants, which burn fossil fuels (generally natural gas) to convert those fuels to electricity. Electricity generation is typically classified as "indirect" energy use because the end product, electricity, is consumed at a location distinct from the power plant where it is produced.

Electricity and natural gas consumption for the nine Bay Area counties in 2010 is shown in **Table 2.4-1.**

TABLE 2.4-1: ELECTRICITY AND NATURAL GAS CONSUMPTION IN THE SAN FRANCISCO BAY AREA, 2010

County	*Electricity (million kWh)*	*Natural Gas (million Therms)*
Alameda	10,878	420
Contra Costa	9,215	1,015
Marin	1,422	79
Napa	1,024	40
San Francisco	5,855	264
San Mateo	4,756	221
Santa Clara	16,564	458
Solano	3,128	226
Sonoma	2,875	115
Total Bay Area	**55,717**	**2,838**

Source: California Energy Commission, Energy Consumption Data Management System, 2010: http://ecdms.energy.ca.gov/

[12] U.S. Department of Energy, Building Data Energy Book, 2012.

[13] Ibid.

Energy Use for Transportation

Transportation is the largest energy consumer nationwide, accounting for 27 percent of the total national energy use.[14] On-road vehicles are estimated to consume approximately 80 percent of California's transportation energy demand, with cars, trucks, and buses accounting for nearly all of the on-road fuel consumption. Petroleum products (gasoline, diesel, jet fuel) account for almost 99.5 percent of the energy used by the California transportation sector with the rest provided by ethanol, natural gas and electricity.[15]

On-road vehicles use about 90 percent of the petroleum consumed in California. Caltrans estimates that in 2006, over 3.2 billion gallons of gasoline and diesel fuel were consumed in the nine Bay Area counties—an increase of about 8 million gallons over 2000 consumption levels.[16]

Vehicle Miles Traveled and Gasoline Consumption

According to Caltrans, California can expect a 57 percent increase in total gasoline consumption and a 61 percent increase in the number of vehicle miles traveled (VMT) from 2007 to 2030.[17] As noted in the regulatory setting, several State mandates and efforts, such as SB 375, seek to reduce VMT. However, fuel consumption per capita in California decreased by nearly 3 percent from 2000 to 2007, while the Bay Area experienced an 8 percent decrease in fuel consumption per capita.[18] Despite the progress in decreasing per capita VMT and per capita fuel consumption, the continued projected increases in total fuel consumption and VMT can be attributed to the overall increase in population; see *Chapter 2.1: Transportation* for more information on VMT and other travel-related data.

Total gasoline usage in California did not change in 2010 compared to the previous year. Gasoline use in California was estimated at a total of 14.851 billion gallons for the 12 months of 2010. However, since 2007, gasoline sales have declined by approximately 5 percent (15.672 billion gallons in 2007).[19]

Gasoline and diesel consumption for the nine Bay Area counties during 2010 and 2011 are shown in **Table 2.4-2**. Over this period, gasoline and diesel consumption in the Bay Area decreased by approximately 1.5 percent, with 4 percent decreases in Santa Clara and Solano counties.

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[14] U.S. Department of Energy, Energy Information Administration, Monthly Energy Review, March 2012.

[15] Bureau of Transportation Statistics, Transportation Energy Consumption by Energy Source: 2008, available at http://www.bts.gov/publications/state_transportation_statistics/state_transportation_statistics_2010/html/table_07_01.html.

[16] California Department of Transportation, 2008 California Motor Vehicle Stock, Travel, and Fuel Forecast, June 2009.

[17] Ibid.

[18] California Department of Transportation, 2010 California Regional Progress Report. *One State, Many Resources. Our Future.*

[19] California State Board of Equalization, Fuel Taxes Division. Taxable Gasoline Gallons 10 Year Report (excluding aviation gasoline).

TABLE 2.4-2: GASOLINE AND DIESEL CONSUMPTION IN THE SAN FRANCISCO BAY AREA, 2010 AND 2011 (1,000 GALLONS)

County	*2010*	*2011*	*% Change*
Alameda	709,971	691,879	-0.02%
Contra Costa	415,568	417,289	0.4%
Marin	138,606	139,564	0.7%
Napa	61,120	61,454	0.5%
San Francisco	158,105	164,537	0.4%
San Mateo	310,976	311,078	0.03%
Santa Clara	765,325	737,831	-4.0%
Solano	236,490	226,451	-4.0%
Sonoma	204,797	206,692	0.9%
Total Bay Area	3,000,985	2,956,775	-1.5%

Source: California Department of Transportation, Division of Transportation System Information, 2010, http://www.dot.ca.gov/hq/tsip/tab/mvstaff.html; Environmental Science Associates, 2012.

With the highest fuel prices in the nation, California has seen fuel usage continue its downward trend, and gasoline consumption per capita is also slowing. The average California gas price per gallon at the pump increased from $1.88 in 2003 to $3.12 in 2007 to $3.61 in 2008 to $4.07 in August of 2012.[20]

Long-term energy consumption trends for transportation will be largely determined by fuel efficiency trends for motor vehicles, as motor vehicles are the predominant transportation mode for passengers and commercial goods.

Energy Used By Public Transit

Public transit energy consumption includes energy consumed for the operation of public buses, electrified and diesel rail systems, and ferries. Energy factors used by MTC for buses, BART (heavy rail), commuter rail (Caltrain and SMART), light rail (VTA and SFMTA) and ferries are provided in **Table 2.4-3.** The energy efficiency of each of these modes may vary according to operating conditions and ridership. For example, if a ferry that uses 1.256 million Btu per mile carries 400 passengers on a trip, the energy usage is approximately 3,140 Btu per passenger mile, while a bus that consumes 37,310 Btu per mile uses about 1,245 Btu per passenger mile if it carries 30 passengers.

[20] CEC, Energy Almanac. California Gasoline Statistics & Data. August 2012.

TABLE 2.4-3: ENERGY FACTORS OF TRANSIT SERVICE

Service	*Energy Factor (Btu/Vehicle Mile)[a]*
Bus	37,310
Light Rail Transit	62,797
Heavy Rail Transit	62,797
Commuter Rail Transit	92,739
Ferry Transit	1,255,797

a. Energy use per passenger mile is less, depending on passenger load of transit vehicle.

Source: MTC, 2008; U.S. Department of Energy, 2008 (bus and rail); American Public Transit Association, 2008 (ferry).

Energy Used by Private and Commercial Vehicles

Commercial vehicles, generally composed of light, medium, and heavy trucks, are typically fueled by diesel or gasoline, and are part of the general fleet mix of vehicles present within the Bay Area transportation system.

Average fuel economy is expected to increase for automobiles and all types of trucks. The federal Corporate Average Fuel Economy (CAFE) is the required average fuel economy for a vehicle manufactures' entire fleet of passenger cars and light trucks for each model year. For many years, the standard for passenger automobiles was 27.5 miles per gallon (mpg), and the standard for light trucks, a classification that also includes sport utility vehicles (SUVs) under 8,500 pounds, rose to 22.5 mpg for 2008 models. Effective with the 2011 model year, the CAFE standard was revised from a single number to a model-specific formulation based on the size of the vehicle, in square feet (wheelbase times track, or the distance between the axles multiplied by the distance between the wheels of each axle), referred to the vehicle's "footprint." For 2012, the average CAFE standard for passenger cars is 33.3 mpg, while for light trucks, it is 25.4 mpg.[21]

Based on data provided by MTC, this energy analysis uses an average on-road vehicle fleet fuel economy of 17.94 mpg for the baseline (2010) year and 25.03 mpg for 2040.[22]

Energy Use and Global Warming

Scientists and climatologists have produced evidence that the burning of fossil fuels by vehicles, power plants, industrial facilities, residences and commercial facilities have led to an increase of the earth's temperature. For an analysis of greenhouse gas production and proposed Plan impacts on climate change, please see *Chapter 2.5: Climate Change and Greenhouse Gases*.

[21] Federal Register, Vol. 75, No. 88, May 7, 2010; p. 25330.

[22] MTC, 2012.

REGULATORY SETTING

Federal and State agencies regulate energy consumption through various policies, standards, and programs. At the local level, individual cities and counties regulate energy through their regulatory and planning activities.

Energy conservation is embodied in many federal, State, and local statutes and policies. At the federal level, energy standards apply to numerous products (e.g., the EnergyStar™ program) and transportation (e.g., fuel efficiency standards). At the State level, Title 24 of the California Administrative Code sets forth energy standards for buildings, rebates/tax credits are provided for installation of renewable energy systems, and the Flex Your Power program promotes conservation in multiple areas.

Federal Regulations

Energy Policy and Conservation Act, and CAFE Standards

The Energy Policy and Conservation Act (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. The U.S. EPA calculates a CAFE value for each manufacturer based on city and highway fuel economy test results and vehicle sales. The CAFE values are a weighted harmonic average of the EPA city and highway fuel economy test results. Based on information generated under the CAFE program, the U.S. Department of Transportation is authorized to assess penalties for noncompliance. Under the Energy Independence and Security Act of 2007 (described below), the CAFE standards were revised for the first time in 30 years.

Energy Policy Act of 1992 (EPAct)

The Energy Policy Act of 1992 (EPAct) was passed to reduce the country's dependence on foreign petroleum and improve air quality. EPAct includes several parts intended to build an inventory of alternative fuel vehicles (AFVs) in large, centrally fueled fleets in metropolitan areas. EPAct requires certain federal, state, and local government and private fleets to purchase a percentage of light duty AFVs capable of running on alternative fuels each year. In addition, financial incentives are also included in EPAct. Federal tax deductions will be allowed for businesses and individuals to cover the incremental cost of AFVs. States are also required by the act to consider a variety of incentive programs to help promote AFVs.

Energy Policy Act of 2005

The Energy Policy Act of 2005 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

The Energy Independence and Security Act of 2007 is designed to improve vehicle fuel economy and help reduce U.S. dependence on oil. It represents a major step forward in expanding the production of renewable fuels, reducing dependence on oil, and confronting global climate change.

The Energy Independence and Security Act of 2007:

- 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.

By addressing renewable fuels and CAFE standards, the Energy Independence and Security Act of 2007 will build on progress made by the Energy Policy Act of 2005 in setting out a comprehensive national energy strategy for the 21st century.

California Greenhouse Gas Waiver

In December of 2005, the California Air Resources Board (ARB) requested, and on June 14, 2011, the EPA granted an amendment to California's motor vehicle GHG emission standards beginning with model year 2009. EPA Clean Air Act standards require a waiver for states to enact more stringent emission standards for new cars. On June 14, 2011, the EPA confirmed that ARB's amendments to its motor vehicle GHG emission standards are within the scope of the existing waiver of preemption issued.

State Regulations

Warren-Alquist Act

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

State of California Energy Plan

The CEC is responsible for preparing the State 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 plan is the 1997 California Energy Plan.[23] The 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

[23] California Energy Commission, 1997.

implementing incentive programs for zero-emission vehicles and addressing their infrastructure needs; and encouragement of urban designs that reduce 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), the CEC and the ARB 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 vehicles miles traveled.[24] Further, in response to the CEC's 2003 and 2005 *Integrated Energy Policy Reports*, the Governor directed the CEC to take the lead in developing a long-term plan to increase alternative fuel use.[25]

A performance-based goal of AB 2076 is to reduce petroleum demand to 15 percent below 2003 demand. The options include:[26]

- Near-Term Options (could be fully implemented by 2010)
  - Use more fuel efficient replacement tires with proper inflation
  - Improve fuel economy in government fleets
  - Improve private vehicle maintenance
- Mid-Term Options (could be fully implemented in the 2010-2020 time frame)
  - Double fuel efficiency of current model light duty vehicles to 40 miles per gallon
  - Use natural gas-derived Fischer-Tropsch fuel as a 33 percent blending agent in diesel
- Long-Term Options
  - Introduce fuel cell light duty vehicles in 2012, increasing to 10 percent of new vehicle sales by 2020, and 20 percent by 2030.

Recommendations included:

- The Governor and Legislature should adopt the recommended State-wide goal of reducing demand for on-road gasoline and diesel to 15 percent below the 2003 demand level by 2020 and maintaining that level for the foreseeable future.

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[24] Reducing California's Petroleum Dependence, California Energy Commission and Air Resources Board, joint agency report, August 2003, publication #P600-03-005.

[25] Letter from Governor Arnold Schwarzenegger to the Legislature, attachment: Review of Major Integrated Energy Policy Report Recommendations, August 23, 2005.

[26] California Energy Commission/California Air Resources Board: Reducing California's Petroleum Dependence, August 14, 2003 Final, Adopted, Joint Agency AB 2076 Report, publication # 600-03-006F.

- The Governor and Legislature should work with the California delegation and other states to establish national fuel economy standards that double the fuel efficiency of new cars, light trucks and SUVs.
- The Governor and Legislature should establish a goal to increase the use of non-petroleum fuels to 20 percent of on-road fuel consumption by 2020 and 30 percent by 2030.

Integrated Energy Policy Report

Senate Bill (SB) 1389 (Chapter 568, Statutes of 2002) required the CEC to: "[C]onduct assessments and forecasts of all aspects of energy industry supply, production, transportation, delivery and distribution, demand, and prices. The Energy Commission 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." (Public Resources Code Section 25301(a)) This work culminated in the Integrated Energy Policy Report (IEPR).

The CEC adopts an IEPR every two years and an update every other year. The 2011 IERP is the most recent IEPR, which was adopted in February 8, 2012. The 2011 IERP 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 progress toward State-wide renewable energy targets and issues facing future renewable development; efforts to increase energy efficiency in existing and new buildings; progress by utilities in achieving energy efficiency targets and potential; improving coordination among the State's energy agencies; streamlining power plant licensing processes; results of preliminary forecasts of electricity, natural gas, and transportation fuel supply and demand; future energy infrastructure needs; the need for research and development efforts to support State-wide energy policies; and issues facing California's nuclear power plants.[27]

Senate Bill 1078: California Renewables Portfolio Standard Program

Senate Bill (SB) 1078 (Chapter 516, Statutes of 2002) 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. This target date was moved forward by SB 1078 to require compliance by 2010. In addition, electricity providers subject to the RPS must increase their renewable share by at least 1 percent each year. The outcomes of this legislation will impact regional transportation powered by electricity.

Assembly Bill 1493: Reduction of Greenhouse Gas Emissions

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

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[27] California Energy Commission, 2011. 2011 Integrated Energy Policy Report. Publication Number: CEC-100-2011-001-CMF.

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 the U.S. Environmental Protection Agency (EPA) initially denied the waiver in 2008, the EPA approved a waiver in June 2009, and in September 2009, ARB approved amendments to its initially adopted regulations to apply the Pavley standards that reduce greenhouse gas emissions (GHG) to new passenger vehicles in model years 2009 through 2016. According to ARB, implementation of the Pavley regulations is expected to reduce fuel consumption while also reducing GHG emissions.[28]

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 (the PUC, the 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 needs. It was the first time that energy policy agencies formally collaborated to define a common vision and set of strategies to address California's future energy needs and emphasize the importance of the impacts of energy policy on the California environment.

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

Assembly Bill 1007: State Alternative Fuels Plan

Assembly Bill (AB) 1007 (Chapter 371, Statutes of 2005) required the CEC to prepare a State plan to increase the use of alternative fuels in California. The 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 greenhouse gas 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 #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 Executive Order establishes the following target to increase the production and use of bioenergy, including ethanol and biodiesel fuels made from renewable resources: produce a minimum of 20 percent of its biofuels within California by 2010,

[28] California Air Resources Board, "Clean Car Standards - Pavley, Assembly Bill 1493" webpage; last updated October 4, 2010. Available at: www.arb.ca.gov/cc/ccms/ccms.htm. Reviewed January 15, 2013.

40 percent by 2020, and 75 percent by 2050. The Executive Order also calls for the State to meet a target for use of biomass electricity.

Governor's Low Carbon Fuel Standard (Executive Order #S-01-07)

In January 2007, Executive Order S-01-07 established a Low-Carbon Fuel Standard. The Order calls for a statewide goal to be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020 ("2020 Target"), and that a Low Carbon Fuel Standard (LCFS) for transportation fuels be established for California. Further, it directs the ARB to determine if an LCFS can be adopted as a discrete early action measure pursuant to AB 32, and if so, consider the adoption of a LCFS on the list of early action measures required to be identified by June 30, 2007, pursuant to Health and Safety Code Section 38560.5. The LCFS applies to all refiners, blenders, producers or importers ("Providers") of transportation fuels in California, will be measured on a full fuels cycle basis, and may be met through market-based methods by which Providers exceeding the performance required by a LCFS shall receive credits that may be applied to future obligations or traded to Providers not meeting the LCFS.

In June 2007, the ARB approved the LCFS as a Discrete Early Action item under AB 32 and in April 2009 the ARB approved the new rules and carbon intensity reference values with the new regulatory requirements taking effect in January 2011. The standards require providers of transportation fuels to report on the mix of fuels that they provide and demonstrate that they meet the LCFS intensity standards annually. This is accomplished by ensuring that the number of "credits" earned by providing fuels with a lower carbon intensity than the established baseline (or obtained from another party) is equal to or greater than the "deficits" earned from selling higher intensity fuels.

In December 2011 the U.S. District Court for the Eastern District of California issued three rulings against the LCFS including a requirement for ARB to abstain from enforcing the LCFS. In April 2012, the Ninth Circuit granted ARB's motion for a stay of the injunction while it continues to consider ARB's appeal of the lower court's decision.

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 the CEC in 1978 in response to a legislative mandate to create uniform building codes to reduce California's energy consumption, and provide energy efficiency standards for residential and nonresidential buildings. In 2008, the CEC updated Title 24 standards with more stringent requirements effective January 1, 2010. The 2010 standards are expected to substantially reduce the growth in electricity and natural gas use of new construction versus existing rules. Additional savings result from the application of the standards on building alterations. 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 Global Warming Solutions Act of 2006 (AB 32)

Assembly Bill (AB) 32, the California Global Warming Solutions Act (Health and Safety Code Section 38500 et seq.), was signed in September 2006. The Act requires the reduction of statewide GHG emissions to 1990 levels by the year 2020. This change, which is estimated to be a 25 to 35 percent

reduction from current emission levels, will be accomplished through an enforceable statewide cap on GHG emissions that will be phased in starting in 2012. The Act also directs the Air Resources Board (ARB) to develop and implement regulations to reduce statewide GHG emissions from stationary sources and address GHG emissions from vehicles. The ARB has stated that the regulatory requirements for stationary sources will be first applied to electricity power generation and utilities, petrochemical refining, cement manufacturing, and industrial/commercial combustion. The second group of target industries will include oil and gas production/distribution, transportation, landfills and other GHG-intensive industrial processes.

In 2008, the ARB adopted the Scoping Plan for AB 32- the main strategies California will use to reduce the GHGs that cause climate change (many of those by products of energy use). The Scoping Plan has a range of GHG reduction actions which include direct regulations, alternative compliance mechanisms, monetary and non-monetary incentives, voluntary actions, market-based mechanisms such as a cap-and-trade system, and an AB 32 program implementation regulation to fund the program. The Scoping Plan recognizes that the SB 375 regional GHG emissions reduction targets is the main action required to obtain the necessary reductions from the land use and transportation sectors in order to achieve the 2020 emissions reduction goals of AB 32.

Senate Bill 375 (Chapter 728, Statutes of 2008)

Senate Bill (SB) 375, adopted September 30, 2008 helps meet the AB 32 goals of reducing emissions from cars and light duty trucks. SB 375 requires regional planning agencies to include a Sustainable Communities Strategy (SCS) in their regional transportation plan (RTP) that demonstrates how the region could achieve GHG emissions reductions set by ARB through integrated land use and transportation planning. Local governments retain control of land use planning authority; however, SB 375 amended the California Environmental Quality Act (Pub. Resources Code § 21000 et seq.) to ease environmental review of specific types of developments that are anticipated to reduce emissions. Plan Bay Area is the integrated SCS and RTP for the San Francisco Bay Area, consistent with SB 375.

Local Regulations

County and City General Plans

Many of the counties and cities in the Bay Area region have general plan elements and policies that specifically address energy use and conservation. Those energy conservation measures contain goals, objectives, and policies aimed at reducing energy consumption. These include policies on energy retrofits to existing residential and commercial land uses, zoning and building ordinances for energy efficiency of new construction, and ways to reduce VMT through land use and transportation priorities.

County and City Climate Action Plans

Additionally, many counties and cities in the Bay Area region are drafting or have adopted climate action plans or energy action plans. These documents set goals and targets on the reduction of greenhouse gas emissions and outline polices to help achieve those goals. Strategies often focus on reducing emissions from transportation, which modify land use and transportation policy specifically focused on reducing VMT. For an analysis of greenhouse gas production and proposed Plan impacts on climate change, please see *Chapter 2.5: Climate Change and Greenhouse Gases.*

Impact Analysis

IMPACT SIGNIFICANCE CRITERIA

Implementation of the proposed Plan would have a potentially significant adverse impact if the Plan would:

Criterion 1: Result in an increase in overall per capita energy consumption (i.e., consumption of electricity, natural gas, gasoline, diesel, or other non-renewable energy types) relative to baseline conditions; increase reliance on fossil fuels; decrease reliance on renewable energy sources; or otherwise use energy in an inefficient, wasteful, or unnecessary manner, contrary to the guidance in Appendix F of the *CEQA Guidelines*.

Criterion 2: Be inconsistent with adopted plans or policies related to energy conservation.

METHOD OF ANALYSIS

Energy would be consumed during both the construction and operational phases of development under the proposed Plan, in the form of direct and indirect energy. Direct energy is the fuel consumed to propel the vehicle and the energy (electricity and natural gas) used in buildings. Indirect energy is all of the remaining energy needed to construct, operate, and maintain the buildings and infrastructure. The analysis estimates the total amount of energy expected to be consumed in 2040 with implementation of the proposed Plan, and compares this to current energy use (baseline of 2010). Both direct (i.e., operational) energy and indirect (i.e., construction/manufacturing and maintenance of the facility and vehicles) energy impacts are quantified using standard energy models (i.e., Btu).

Direct Energy Use

The estimated average annual energy consumption factors by land use are presented in **Table 2.4-4** and were used to calculate direct energy consumption from land use changes under the proposed Plan.

TABLE 2.4-4: DIRECT LAND USE ENERGY CONSUMPTION FACTORS

Land Use/Energy Source	*Usage/Unit*
Single-Family Residential	
Electricity	7,415 kWh/du/yr
Natural Gas	49.6 MMBtu/du/yr
Multi-Family Residential	
Electricity	4,434 kWh/du/yr
Natural Gas	22.5 MMBtu/du/yr
Commercial	
Electricity	13.64 kWh sf/yr
Natural Gas	0.02949 MMBtu/sf
Office	
Electricity	21.35 kWh/ sf/yr
Natural Gas	0.02052 MMBtu/sf
Industrial	
Electricity	7.71 kWh/ sf/yr
Natural Gas	0.00433 MMBtu/sf

Notes:
du: dwelling unit sf: square feet
kWh: kilowatt hour MMBtu: 1 million Btu

Source: Bay Area Greenhouse Gas Model, Bay Area Air Quality Management District, April 2010.

Direct energy consumption for transportation involves energy used by the operation of vehicles. In assessing the direct energy impact, consideration was given to the following factors:

- Vehicle mix, including light-duty vehicles, medium trucks, and heavy trucks;
- Annual regional VMT per capita; and
- Variation of fuel consumption rates by vehicle type.

Indirect Energy Use

Indirect or construction energy effects involve the one-time, non-recoverable energy associated with construction of roadways and structures, and construction and maintenance of the vehicles using the facility. Indirect energy consumption for land use is the total energy spent in the production of a building, from the manufacture of materials to their delivery and construction. **Table 2.4-5** presents the indirection land use energy consumption factors.

TABLE 2.4-5: INDIRECT LAND USE ENERGY CONSUMPTION FACTORS

Land Use	*Usage/Unit*
Single-Family Residential[1]	1,674,400 MMBtu/du
Multi-Family Residential[1]	867,280 MMBtu/du
Commercial	940 MMBtu/sf
Office	1,640 MMBtu/sf
Industrial	974 MMBtu/sf

Notes:
1. Single-family dwellings assumed at an average of 2,392 sq. ft.; multi-family dwellings at an average of 1,172 sq. ft.
du: dwelling unit; sf: square feet; MMBtu: 1 million Btu

Source: Energy used in construction from: Advisory Council on Historic Preservation, *Assessing the Energy Conservation Benefits of Historic Preservation,* 1979. (http://www.achp.gov/1979%20%20Energy%20Conserv%20and%20Hist%20Pres.pdf); Building size from: U.S. Department of Energy, *Buildings Data Energy Book 2011* (http://buildingsdatabook.eren.doe.gov/).

Indirect energy is calculated by determining the energy equivalent of all of the material products and operations necessary to keep the transportation system operable. The indirect energy analysis was conducted using the Input-Output Method, which converts either VMT or Year 2012 construction dollars into energy consumption. The analysis is based on existing data from other roadway improvement projects in the United States, utilizing conversions listed in **Table 2.4-6.**

TABLE 2.4-6: INDIRECT TRANSPORTATION PROJECT ENERGY CONSUMPTION FACTORS

	Energy Factor
Construction	
Automobiles and Trucks (manufacturing)	1,410 Btu/Vehicle Mile[1]
Bus (manufacturing)	3,470 Btu/Vehicle Mile[1]
Roadway (construction)	27,500 Btu/1977$[2]
Track Work	5,044 Btu/1982$[2]
Maintenance	
Automobiles and Trucks	1,400 Btu/Vehicle Mile[1]
Bus	13,142 Btu/Vehicle Mile[1]

Notes:
1. Energy use per passenger mile is less, depending on passenger load of transit vehicle.
2. 2012$ converted to 1977$ and 1982$.

Source: Caltrans, 1983, Energy and Transportation Systems. July 1983.

SUMMARY OF IMPACTS

Direct and Indirect Energy Use

Implementation of the proposed Plan (including transportation projects and land use development) combined with improvements in vehicle technology would result in lower per capita daily energy consumption relative to existing conditions (2010). Thus the overall energy impact is considered to be less than significant (LS).

Policy Consistency

The Integrated Energy Policy Report (IEPR) remains the guiding document for California energy policy.[29] To the extent that the proposed Plan can address statewide energy policy, it would generally be consistent with the IEPR because the proposed Plan attempts to leverage funding in ways that reduce the need for energy use. In particular the proposed Plan supports the IEPR in efforts to increase energy efficiency in existing and new buildings through increased density and reduce transportation fossil fuel demand by increasing alternative transportation modes. Thus, there is no adverse impact (NI) related to consistency between the proposed Plan and the primary guiding document for California energy policy.

IMPACTS AND MITIGATION MEASURES

Impact

2.4-1 Implementation of the proposed Plan could result in an increase in per-capita direct and indirect energy consumption compared to existing conditions.

Impacts of Land Use Projects

Total and per capita annual direct energy consumption in the nine-county region are shown in **Table 2.4-7**. In 2010, annual per capita consumption was over 38.85 million Btu per person. Assuming the growth in the proposed Plan, annual per capita energy consumption is expected to be just under 38.5 million Btu per person by 2040, a per capita decrease of approximately 1 percent.

[29] California Energy Commission, 2011. 2011 Integrated Energy Policy Report. Publication Number: CEC-100-2011-001-CMF.

TABLE 2.4-7: ANNUAL DIRECT LAND USE ENERGY USE IN THE BAY AREA

Land Use	*2010 Baseline*		*2040 Project*		*Change*[1]
	Electricity MWh/yr	*Natural Gas MMBtu/yr*	*Electricity MWh/yr*	*Natural Gas MMBtu/yr*	
Residential	16,486,370,327	103,410,804	20,218,975,130	124,961,755	22.6% / 20.8%
Non-Residential[2]	26,825,719,955	26,651,104	36,272,270,190	36,010,262	35.2% / 35.1%
Total	**41,851,958,700**	**129,002,788**	**55,034,827,392**	**160,395,541**	**30.4% / 23.8%**
Combined Total	277,842,760 MMBtu/yr		353,720,146 MMBtu/yr		+28.6%
Per Capita Total	38.85 MMBtu/yr/person		38.47 MMBtu/yr/person		-1%

Notes:

1. Percent Change for Residential, Non-Residential Use, and Total Use is given as Electricity / Natural Gas.
2. The job generating factors used include: retail: 1:424 sf; office: 1:403 sf; industrial: 1:815 sf, consistent with the UrbanSim land use model.

MWh – Megawatt-hour; MMBtu – Million British thermal units

Source: Metropolitan Transportation Commission Model Outputs 2012, Environmental Science Associates, 2012

The decrease in residential per capita energy demand for land use is due in part to the expected change in land use patterns under the proposed Plan. The electricity and natural gas estimates include lower energy consumption for multi-family residential units. According to a study from the Energy Information Administration, multi-family residential units, when compared to single family residential units, are 44 percent more efficient on a per unit basis in terms of consumption of electricity and 35 percent more efficient with natural gas consumption.[30] Multifamily units are projected to increase from 37 percent of all residential units in 2010 to 44 percent in 2040. Due to space efficiency, multifamily units consume less energy than single family homes.

Electricity and natural gas consumption per job would increase approximately three percent over the time horizon of the proposed Plan as a result of an increase in technology sector jobs, which are typically located in the energy intensive office environment.

The indirect energy use for land uses is related to the total energy consumed in the construction of structures, including the energy used to create all of the building materials used in those structures. As such, while the analysis includes a column for existing (2010) conditions in **Table 2.4-8,** this represents energy "embedded" in existing buildings. However, the focus is on the change in per capita energy consumed in construction, since that is the most appropriate measure of a change in efficiency from the baseline conditions to the proposed Plan. As presented in **Table 2.4-8**, the indirect energy consumption for buildout of the proposed Plan would increase by 18 percent. However, the indirect energy consumption is growing at a slower rate than the projected population growth of 30 percent, resulting in a decrease in per capita consumption. This can be attributed to the focus on multifamily homes which use less indirect energy to construct.

[30] Energy Information Administration, 2005, *Residential Energy Consumption Survey.*

TABLE 2.4-8: ESTIMATED INDIRECT LAND USE ENERGY CONSUMPTION (IN BnBTUS)

			Change 2010 to 2040	
	2010	*2040*	*Numerical*	*Percent*
Indirect Energy				
Single Family	2,762,239,262	3,117,816,520	355,577,258	11%
Multifamily	832,058,025	1,254,147,590	422,089,565	34%
Commercial	7,122,192	7,665,001	542,809	7%
Office	61,589,951	91,049,101	29,459,150	32%
Industrial	16,898,925	18,389,359	1,490,434	8%
Indirect Energy Total	**3,679,908,355**	**4,489,067,571**	**809,159,216**	**18%**
Per Capita Energy (BnBTUs)	519	488	-31	-6%
Per Capita Daily Energy (MMBTUs)	47.4	44.6	-2.8	-6%

BnBTU: Billion British Thermal Units; MMBT: Million British Thermal Units

Note: Numbers may not add due to rounding.

Source: Environmental Science Associates, 2013; Metropolitan Transportation Commission Model Outputs 2012.

Although total electricity use and demand for natural gas would increase under the proposed Plan, energy use per capita would decrease. Further, as noted in the Environmental Settings section above, under existing conditions, California receives 14.6 percent of its electricity supply from renewable resources (i.e., geothermal, biomass, small hydroelectric resources, wind, and solar). The analysis does not account for potential increases in renewable energy, the use of which is discussed in Appendix F of the *CEQA Guidelines,* stating that energy goals should "decrease reliance on fossil fuels" and "increase reliance on renewable energy sources." Further, this analysis does not account for anticipated adoption of stricter local green building codes, energy action plans, and similar documents, which would be expected to result in actual future energy use being lower than that projected based on existing and past rates of consumption. Since the analysis does not account for an increase in the use of renewable sources of energy or future energy efficiency, it can be considered conservative, as these changes are expected to occur over the course of the Plan horizon. Therefore, implementation of the proposed Plan does not conflict with the goal of decreasing overall per capita energy consumption.

Additionally, the preceding discussion does not include an analysis of the impact of the AB 32 Scoping Plan measures on per capita energy consumption. Although the Scoping Plan includes measures and strategies to achieve GHG emissions reductions, several measures achieve reductions through a decrease in energy consumption specific to the built environment. Specifically, the following measures from the Scoping Plan would further reduce energy consumption per capita through 2040:

- E-1 Energy Efficiency and Conservation–More stringent building and appliance standards help reduce electricity consumption.
- E-3 Renewable Electricity Standard–Reach 33 percent renewables by 2020.
- E-4 Million Solar Roofs–Move away from natural gas and electricity to on-site renewables.CR-1 Energy Efficiency and Conservation–More stringent building and appliance standards help reduce natural gas consumption.

- CR-2 Solar Hot Water–Goals of AB 1470, use of renewable energies for water heaters.

See *Chapter 2.5: Climate Change and Greenhouse Gases* for more information on Scoping Plan measures and reductions.

Impacts of Transportation Projects

Implementation of the proposed transportation strategy would result in lower daily per capita energy consumption in 2040 relative to baseline existing conditions (2010). The proposed Plan's daily per capita energy consumption for direct transportation energy (including on-road transportation energy) would be 28 percent lower than baseline energy use, with the decline in energy use attributable to an anticipated increase in average miles per gallon for automobiles due to implementation of the Pavley rules regarding vehicle emissions (see discussion under Regulatory Setting), which would more than offset increased vehicle miles traveled. While bus energy use would more than double, cars and trucks would continue to consume the vast majority of directly expended transportation energy, and thus would drive the overall decrease in direct energy use per capita. Data used in the direct energy calculations and the results for transportation energy use are shown in **Table 2.4-9.**

TABLE 2.4-9: DAILY DIRECT TRANSPORTATION ENERGY USE IN THE BAY AREA

	VMT by Mode (daily)	*Daily Fuel by Mode (gal)*	*Btu per gal*	*On-Road Energy Use (BnBtus[1])*	*Btu Use per Capita*
Existing Conditions (2010)					
Passenger	136,393, 170	6,759,650	114,000	771	109,966
Trucks	7,470,993	898,378	129,500	116	16,601
Buses	395,507	75,409	129,500	10	1,393
Other Vehicles	4,786,330	234,778	114,000	27	3,819
Total				**923**	**131,780**
Proposed Plan (2040)					
Passenger	160,959,546	5,027,199	114,000	573	62,720
Trucks	15,856,360	2,048,456	129,500	265	29,031
Buses	1,062,667	182,825	129,500	24	2,591
Other Vehicles	1,529,427	69,751	114,000	8	870
Total				**870**	**95,213**
Total Change 2010 to 2040			**53**		**36,567**
% Change 2010 to 2040			**-6%**		**-28%**

1. BnBtu (Billion British Thermal Units) per day

Source: Metropolitan Transportation Commission Model Outputs 2012, Environmental Science Associates, 2012.

There would also be indirect energy impacts from the consumption of energy for construction, manufacturing, and maintenance purposes (see **Table 2.4-10**). The average daily indirect energy consumption for the proposed Plan would increase from 2010 conditions as a result of increased alternative mode construction (i.e., light rail, commuter rail, bus rapid transit, etc.), increased vehicle maintenance, and the energy used in manufacture of autos and transit vehicles.

TABLE 2.4-10: ESTIMATED DAILY INDIRECT TRANSPORTATION ENERGY CONSUMPTION (IN BILLION BTUS)

			Change 2010 to 2040	
	2010	*2040*	*Numerical*	*Percent*
Indirect Energy				
Manufacturing/Maintenance	213.3	263.6	50.3	24%
Construction	--	107.8	107.8	100%
Indirect Energy Total	213.3	371.5	126.8	74%
Per Capita Daily Energy (BTUs)	30,438.1	40,652.8	10,214	33%

BTU: British Thermal Units

Note: Numbers may not add due to rounding.

Source: Environmental Science Associates, 2012; Metropolitan Transportation Commission Model Outputs 2012

Combined Effects

The combined effect of both the land use and transportation projects associated with the proposed Plan would result in lower direct per capita energy use by about 16 percent, compared to existing conditions, as shown in **Table 2.4-11**. Construction, manufacturing, and maintenance energy use would increase by 33 percent, but the overall change (direct and indirect energy use combined) would be a 10 percent decline per capita in energy use. Therefore, it is determined that implementation of the proposed Plan would not increase overall per capita energy consumption, nor would it substantially increase reliance on fossil fuels (less transportation energy), substantially decrease reliance on renewable energy sources (the proposed Plan would reduce energy use per capita), or otherwise use energy in an inefficient, wasteful, or unnecessary manner. The impact is considered less than significant (LS) and no mitigation measures are required.

TABLE 2.4-11: DAILY PER CAPITA ENERGY USE (BTUS PER PERSON)

			Change 2010 to 2040 Project	
Category	*2010*	*2040 Project*	*Numerical*	*Percent*
Land Use Energy	106,448	105,387	-1,061	-1%
Direct Transportation Energy	131,781	95,213	-36,567	-27.7%
Subtotal: Direct Energy	**238,229**	**200,600**	**-37,62**	**-15.8%**
Land Use Energy	47	45	-2	-
Direct Transportation Energy	30,439	40,653	10,213	33.6%
Subtotal: Indirect Energy	**30,487**	**40,698**	**10,211**	**33.6%**
Total	**268,716**	**241,254**	**-27,462**	**-10.2%**

BTU: British Thermal Units

Note: Numbers may not add due to rounding.

Source: Environmental Science Associates, 2012; Metropolitan Transportation Commission Model Outputs 2012

Mitigation Measures

None required.

Impact

2.4-2 Implementation of the proposed Plan could be inconsistent with adopted plans or polices related to energy conservation.

Impacts of Land Use and Transportation Projects

The analysis of consistency with existing energy plans and policies focuses on the California Integrated Energy Policy Report, as it is the primary guiding document for California energy policy. The most recent version of that report, issued in 2011, calls for California's industries to meet environmental goals while accommodating economic and population growth; attainment of AB 32 goals to reduce California's greenhouse gas emissions to 1990 levels by 2020; and meeting the State's growing energy needs while reducing carbon dioxide emissions (see *Chapter 2.5: Climate Change and Greenhouse Gases* for further discussion of AB 32).

The proposed Plan would be consistent with the Integrated Energy Policy Report (IEPR) because it leverages funding (such as through the OneBayArea Grant program) to promote compact, mixed-use development that combines both residential and commercial uses and is located close to public transit, jobs, schools, shopping, parks, recreation and other amenities.[31] For example, projects located in Priority Development Areas are given priority for grants over projects outside those established areas. These types of land uses are more energy efficient in the transportation sector (i.e., reduced single occupancy travel) and built environment sector (i.e., reduced square footage), a primary goal outlined in the IEPR.

There are many factors beyond the control of MTC and ABAG and outside the scope of the proposed Plan that could influence future energy use, including State and federal regulatory actions (e.g., changes in fuel economy standards), local land use decisions (i.e., where city and county government approve subsequent development projects, both foreseen and unforeseen in the Plan, and the resulting energy required to travel to and from these projects), global economic factors (e.g., the cost of oil, natural gas, electricity, and other forms of energy), and others. In light of these factors, MTC's and ABAG's jurisdiction is limited and cannot ensure future energy reductions in the Bay Area.

The overall intent of the proposed Plan is consistency with the goals of SB 375, which, through regional land use and transportation planning, is expected to result in reductions in energy consumption, compared to what would otherwise occur in future years. This analysis concludes that, on a programmatic level, the proposed plan is consistent with the most current statewide guiding energy policy contained in the IEPR, therefore resulting in no adverse impact (NI). No mitigation is required.

Mitigation Measures

None required.

[31] Metropolitan Transportation Commission, *Bay Area Agencies Approve Preferred Land Use Scenario and Transportation Investment Strategy*, 2012.