SUBCHAPTER 4.2

ENERGY IMPACTS

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4.2 ENERGY IMPACTS

4.2.1 INTRODUCTION

This subchapter examines impacts on the supply and demand of energy sources from proposed control measures in the 2003 AQMP. Additional information and supporting data for this analysis are contained in Appendix C; Supporting Documentation for Energy Impact Analysis.

All control measures in the 2003 AQMP were evaluated to determine whether or not they could generate direct or indirect energy impacts based on the method of control. Some of the measures will require increased energy use, for example through increased pumping loads or more extensive exhaust filtering systems. Other measures will alter the form of energy used, for example switching from gasoline or diesel power to alternative fuels such as reformulated fuels, natural gas, and electricity.

4.2.2 2003 AQMP CONTROL MEASURES WITH POTENTIAL ENERGY IMPACTS

The energy impact analysis in this Program EIR identifies the net effect on energy resources from implementing the 2003 AQMP. All control measures were analyzed to identify both beneficial effects (energy conserving) and adverse impacts (energy consuming).

Implementing some of 2003 AQMP control measures could increase energy demand in the region from affected facilities. Specifically some types of control equipment will increase demand for electrical power to operate the equipment, natural gas for combustion devices, natural gas used as an alternative clean fuel for mobile sources, etc.

Evaluation of control measures was based on examination of the impact of the control measures and technologies in light of current energy trends. Evaluation of control methods for each control measure indicated that there are 33 control measures that could have potential energy consumption or conserving impacts. As shown in table 4.2-1, 17 source control measures (plus two contingency measures) to be implemented by the SCAQMD and 14 control measures to be implemented by other agencies are expected to have energy impacts.

4.2.3 SIGNIFICANCE CRITERIA

Implementation of the 2003 AQMP will be considered to have significant adverse energy impacts if any of the following conditions occur:

- The project encourages activities which will result in the use of large amounts of fuel or energy resources.

- The project will result in the use of fuel or energy resources in a wasteful manner.

- The project will result in substantial depletion of existing energy resource supplies.

TABLE 4.2-1

Control Measures with Potential Energy Impacts

Control Measures	Control Measure Description	Control Methodology	Impact
MEASURES TO BE IMPLEMENTED BY THE SCAQMD			
CMB-09	Emission Reductions from Petroleum Refinery FCCUs	Add on control equipment	Potential increase in electricity use
CMB-10	Additional Reductions for NOx RECLAIM	Add on ctrl. equip., process changes, purchase RTCs	Potential increase in electricity and natural gas use
CTS-10	Miscellaneous Industrial Coatings and Solvent Operations	Reformulation/Alternative Applications, Innovative implementation mechanism	Potential increase in electricity and natural gas use
FUG-05	Emission Reductions from Fugitive Sources	Enhanced inspection & maintenance, leakless valves, add on control equipment	Potential increase in electricity and natural gas use.
PRC-03	Emission Reductions from Restaurant Operations	Add on control equipment, equipment modification	Potential increase in electricity use
WST-01	Emission Reductions from Livestock Waste	Removal and disposal of manure	Potential increase in electricity and petroleum fuel use
WST-02	Emission Reductions from Composting	Best management practices. Add on control equipment	Potential increase in electricity use
BCM-07	Further PM10 Reductions from Fugitive Dust Sources	Improved test methods, soil stabilization, work practices, track-out control devices	Potential increase in petroleum fuel use
BCM-08	Further Emission Reductions from Aggregate and Cement Plant Manufacturing Operations	Dust suppression, covering of conveyors, wheel washing system	Potential increase in petroleum fuel use
MSC-01	Promotion of Lighter Color Roofing and Road Materials and Tree Planting Programs	Lighter color roofing/paving material, tree plantings	Potential energy savings
MSC-04	Emission Reductions from Miscellaneous Ammonia Sources	Add on control equipment	Potential increase in electricity and natural gas use
MSC-05	Truck Stop Electrification	Provide electricity to eliminate use of diesel engines at truck stops	Potential increase in electricity use. Potential savings in petroleum fuel use.
MSC-06	Emission Reductions From Wood Burning Fireplaces and Wood Stoves	Certified wood stoves or fireplace inserts, incentive programs, and public outreach	Potential increase in natural gas use
MSC-07	Natural Gas Fuel Specifications	Fuel specifications (higher heating value content)	Potential increase in natural gas use
MSC-08	Further Emission Reductions from Large VOC Sources	Emission Reduction Plan; Controls based on specific source categories	Potential increase in electricity and natural gas use
FSS-06	Further Emission Reductions From In-Use Off-Road Vehicles and Equipment	Add on control equipment and use of alternative fuels	Potential increase/savings in petroleum fuel use. Potential increase in alternative fuel use.

TABLE 4.2-1 (Continued)

Control Measures with Potential Energy Impacts

Control Measures	Control Measure Description (Pollutant)	Control Methodology	Impact
MEASURES TO BE CONSIDERED BY OTHER AGENCIES			
TCB-01	Transportation Conformity Budget Backstop Control Measures	Watering, chemical stabilization, paving, revegetation, track-out control, construction project signage; sweeping; VMT reduction strategies; motor vehicle emission controls or other strategies	Potential increase/savings in petroleum fuel use. Potential increase in alternative fuel use
LTM-ALL	Long-Term Control Measures	Near-zero or zero VOC coating and solvent formulations, add-on controls, inspection & maintenance, process changes	Potential increase in electricity and natural gas use
ON-RD HVY DUTY-3	Pursue Approaches to Clean Up the Existing Truck/Bus Fleet	Reduce emissions from existing heavy-duty diesel vehicles through a mix of strategies	Potential increase in electricity use. Potential increase/savings in petroleum fuel use
OFF-RD CI-1	Pursue Approaches to Clean Up the Existing Heavy-Duty Off-Road Equipment Fleet (Compression Ignition Engines)	Engine modifications, add on control technology, alternative clean fuels	Potential increase in petroleum fuel use
OFF-RD LSI-2	Clean up Off-Road Gas Equipment Fleet Through Retrofit Controls and New Emission Standards (Spark Ignition Engines 25 hp or Greater)	Use of electricity	Potential increase in electricity and alternative fuel use
MARINE-1	Pursue Approaches to Clean Up the Existing Harbor Craft Fleet – Retrofit Controls, Cleaner Engines and Fuels	Retrofit control technology, alternative clean fuels, electrification, add on control devices	Potential savings in petroleum fuel use. Potential decrease in engine efficiency and increase in petroleum fuel use. Potential increase in electricity and alternative fuel use.
MARINE-2	Pursue Approaches to Reduce Land-Based Emissions at Ports	Retrofit control technology, alternative clean fuels, electrification, operational changes	Potential savings in petroleum fuel use. Potential decrease in engine efficiency and increases in petroleum fuel use. Potential increase in electricity and alternative fuel use.
FUEL-2	Set Lower-Sulfur Standards for Diesel Fuel Trucks/Buses, Off-Road Equipment, and Stationary Engines	Alternative clean diesel fuels	Potential increase in petroleum fuel use
FVR-1	Increase Recovery of Fuel Vapors from Aboveground Storage Tanks	Add on control technology	Potential increase in electricity use

TABLE 4.2-1 (Continued)

Control Measures with Potential Energy Impacts

Control Measures	Control Measure Description (Pollutant)	Control Methodology	Impact
FVR-2	Recover Fuel Vapors from Gasoline Dispensing at Marinas	Add on control technology	Potential increase in electricity use
LONG TERM	On-Road Heavy Duty Vehicles - Provide incentives for cleaner trucks and buses	Emission reductions through a mix of strategies	Potential increase/savings in petroleum fuel use. Potential increase in alternative fuel use.
	Off-Road Class 1 Vehicles - Provide incentives for cleaner off-road equipment	Engine modifications, add on control technology, alternative clean fuels	Potential increase/savings in petroleum fuel use. Potential increase in alternative fuel use.
	Ports/Marine – Pursue advanced technologies and innovative strategies – alternatives for dockside power and propulsion in/out or port, operational controls, cleanup existing ship fleet.	Operational controls, cleaner fuels, cold ironing, retrofit controls, smoke limits	Potential increase/savings in petroleum fuel use. Potential increase in electricity and alternative fuel use.
	Airports – Reduce Emissions from Jet Aircraft, Pursue approaches to reduce emissions from vehicles traveling to and from airports	Alternative fuels, particulate filters, infrastructure for alternative fuel/ electric vehicles, entry fees, increased transport options, retrofit controls	Potential increase/savings in petroleum fuel use. Potential increase in electricity and alternative fuel use.
	Railroad Locomotives	Accelerate intro. of new, lower emitting locomotive engines, add on controls, alternative fuels, new standards	Potential increase/savings in petroleum fuel use. Potential increase in alternative fuel use.
	Diesel Engines – Set toxics standard for stationary and portable diesel engines	Retrofit technology, electrification, engine performance use of alternate fuels, particulate filters	Potential increase/savings in petroleum fuel use
	Fuels – sulfur/ash limits for lubrication oils, advanced technology; zero-emission vehicles – electric, hydrogen; low sulfur diesel fuel	Sulfur/ash limits, construction of new infrastructure.	Potential increase in electricity and alternative fuel use. Potential increase/savings in petroleum fuel use.
TCM	Transportation Control Measures	Installation of HOV improvement projects, transit & systems management, and information systems	Decrease savings in petroleum fuel use

TABLE 4.2-1 (Concluded)

Control Measures with Potential Energy Impacts

Control Measures	Control Measure Description (Pollutant)	Control Methodology	Impact
CONTINGENCY MEASURES			
CTY-04	Enhanced Oxygenated Fuel Content for CO	Higher oxygen content of gas sold in winter months	Potential increase in petroleum fuel use
CTY-14	Emission Reductions from Misc. Sources (weed abatement)	Require mowing vs. discing, lower vehicle speeds, watering	Potential increase in petroleum fuel use
CONCEPTUAL IDEAS FOR POSSIBLE CONSIDERATION AS LONG-TERM MEASURES			
Conceptual Control Measures	Control of Emissions from Port Operations	Cold-ironing, electrification, diesel truck retrofit, low sulfur diesel fuel	Potential increase/savings in petroleum fuel use. Potential increase in electricity and alternative fuel use.

4.2.4 POTENTIAL IMPACTS AND MITIGATION

4.2.4.1 Electricity

Potential electric energy impacts relative to the energy baseline forecast year 2010 are discussed below. The potential increase in electricity use due to implementation of the 2003 AQMP is associated with the potential installation of add-on control equipment. A number of control measures could result in the installation of add-on control equipment including CMB-09, CMB-10, CTS-10, FUG-05, PRC-03, WST-01, WST-02, MSC-04, MSC-08, FVR-1, and FVR-2. There is a potential increase in electricity use associated with the electrification of mobile sources, including OFF-RD LSI-2, MARINE-2, some of the CARB long term control technologies, and some of the conceptual ideas for possible consideration as long-term measures.

The electricity market in California was restructured under Assembly Bill 1890, which was signed into law in 1996. Restructuring involved: decentralizing the generation, transmission, distribution and customer services which had previously been integrated into individual privately-owned utilities to theoretically increase competition in the power generation business. Increasing customer choice through the Power Exchange and releasing control by privately-owned utilities of their transmission lines to a central operator called the Independent System Operator (ISO). Prior to restructuring, Southern California Edison Company supplied approximately 70 percent of the total electricity demand in the district.

For stationary sources, a slight increase in electricity demand is expected from the use of add-on air pollution controls associated with refinery FCCUs, additional controls at RECLAIM facilities, add-on controls associated with industrial coatings and solvent operations, fugitive VOC emissions reductions, add-on controls associated with restaurant operations, add-on controls associated with livestock waste, add-on controls associated with composting, add-on controls associated with ammonia sources, add-on controls associated with large VOC emission sources, add-on controls associated with vapor recovery from aboveground storage tanks, and

add-on controls associated with gasoline dispensing at marinas. The amount of electricity to run these control devices is unknown. Alternative processing equipment is expected to be the primary method of control for some of the control measures. For example, the primary method of control for PRC-03 is expected to be the installation of different types of burners.

Energy impact savings of about 709 GWh have been estimated from the light roofing programs (SCAQMD, 1997) associated with control measure MSC-01.

Mobile sources are expected to increase the district's electricity use. Shifting some of the fuel source of cars, trucks, off-road vehicles and marine vessels to electricity as well as additional electrical load due to CNG recharging will, on balance, add less than one percent consumption (1,265 kwh) to the electricity baseline (SCAQMD, 1997).

SCAG estimates that about 70 kWh of electricity was used in 1998 for transportation sources in southern California (SCAG, 2001).

The estimated baseline electricity use in the district is about 106,311 million kwh in 2000 (see Chapter 3.2, Table 3.2-1). SCAG estimates that an increase in electricity demand of 38 percent will occur between 1998 to 2025 (SCAG, 2001). Assuming about half of that increase occurs by 2010, an increase in electricity demand of about 19 percent is expected [(106,311 x 0.19) + 106,311 = 126,510 kwh] (see Table 4.2-2).

TABLE 4.2-2

Electricity Impacts for the District in 2010
(million kWh)

	2010
Baseline	126,510*
Impact from the AQMP	
Stationary Source Measures (electricity reductions)	-709
Mobile Source Measures (includes CNG recharging)	1,265
Total of Measures (for which electricity impacts can be calculated)	566
Percent of Baseline	>0.5%

*Assumes about a 19 percent increase in electricity use between 2000 and 2010 (SCAG, 2001)

Southern California Edison has estimated that it will need to add about 200 megawatts of capacity by 2008 to accommodate the increase in electric vehicles (SCAQMD, 1997). Relative to the projected peak electricity demand in 2010, implementation of all the control measures is expected to result in an overall increase in 2010 of less than one percent (see Table 4.2-3).

TABLE 4.2-3

Peak Electricity Demands for the District in 2010
(MW)

	2010
Baseline	65,000*
Overall Impact	200
Percent of Baseline	>0.3%

*CEC, 2003

The electric energy impacts from the implementation of the 2003 AQMP are expected to be less than significant. The electric energy impacts above represent a conservative estimate of electric energy demand and peak demand impacts. For example, the electric energy savings associated with implementation of light roofing and tree planting programs only include savings from the use of lighter roofing materials. Additional energy savings are expected from the implementation of tree planting programs.

Further, this analysis conservatively includes increases in electricity demand due to the use of add-on controls from coating and solvent control measures. It is expected based on current practices that reformulated products will be used to meet future VOC emission reductions from these control measures. Add-on controls will be used only if they are cost effective.

The electric energy impacts presented above are expected to be conservative. The demands for electricity associated with increased electrification of mobile sources could be partially offset by charging equipment (e.g., forklifts) at night when the electricity demand is low, thus minimizing impacts on peak electricity demands. The 2003 AQMP includes strategies that promote energy conservation. These energy impacts, although unavoidable, are expected to be less than significant because power generating utilities are expected to have the capacity to supply the estimated electrical increase.

PROJECT-SPECIFIC MITIGATION: No mitigation measures are required because no significant impacts on electricity demand were identified.

4.2.4.2 Natural Gas

PROJECT-SPECIFIC IMPACTS: Control measures in the 2003 AQMP will result in an increase in demand for natural gas associated with use as alternative fuels, with add-on controls, e.g., MSC-04, MSC-06, MSC-08 and indirectly for utility electricity generators as the demand for electricity (e.g., for electric vehicles and the electrification of diesel engines) increases. There is a potential increase in natural gas use associated with some of the CARB long-term control technologies, and some of the conceptual ideas for possible consideration as long-term measures. Total natural gas (end use) consumption in California is approximately 13,000 million therms, which is equivalent to approximately 1,300,000 billion British thermal units (Btu). The residential, commercial, and industrial sectors account for approximately 37, 15, and 28 percent,

respectively, of total statewide natural gas (end use) consumption. The mining sector accounts for another 15 percent. Space and water heating account for approximately 83 percent of residential natural gas consumption and approximately 47 percent of commercial natural gas consumption. Natural gas consumption in southern California represents approximately 50 percent of the statewide total. The demand for natural gas in southern California is expected to increase by approximately 40 percent from 1998 to 2025 (SCAG, 2001).

According to the CEC and CARB, the district will show an increase in natural gas consumption used as an alternative fuel. Light-duty CNG vehicles appear to be market ready at this time. It is believed they will penetrate the gasoline vehicle market once their more costly vehicle purchase prices are offset by fuel and other operational savings. Due to the limited range associated with CNG vehicles, CEC and CARB assumed the need for home refueling units (CEC/CARB, 2002).

The number of fueling stations needed for the intermediate market is assumed to be adequate to meet the total number of vehicles, with stations large enough to handle a maximum number of vehicles with a minimum number of stations. Assuming a high-use rated station with each filling station or pump, handling 40,000 therms per month (32,000 gasoline gallon equivalents) or 384,000 gasoline gallon equivalents per year would require approximately 50,000 filling pumps. Assuming that each full station has on average five pumps results in 10,000 stations, approximately the same number of gasoline stations that are currently operating in California (CEC/CARB, 2002). Table 4.2-4 summarizes the amount of gasoline expected to be displaced by compressed natural gas in the target years shown.

TABLE 4.2-4

Reduction in Gasoline Consumption and Increase in Natural Gas Use as Fuel in the District*

	2010	2020
Annual Reduction in Gasoline Consumption (Million gallons)	325	935
Annual Increase in Natural Gas Consumption (Million Cubic Feet)	39,975	115,505

*Assumes district consumes 50 percent of the natural gas within the state (SCAG, 2001)
CEC/CARB, 2002

Some of the control measures in the AQMP could result in an increase in the use of natural gas in medium- and heavy-duty on road vehicles. Expanded use of alternative fuels in medium-duty and heavy-duty trucks using more efficient, advanced natural gas engine technologies can reduce projected diesel fuel use from this sector (CEC/CARB, 2002). Natural gas medium- and heavy-duty vehicles are an attractive environmental option to diesel fueled vehicles because they emit fewer criteria pollutants and toxic components. However, the limited availability of refueling facilities, and typically higher vehicle purchase prices, has affected the sale of natural gas fuel vehicles (CEC/CARB, 2002).

Diesel demand reductions in 2010 and 2020 from on-road heavy-duty vehicles are estimated based on projected sales of natural gas heavy-duty vehicles, associated improvements in advanced natural gas engine fuel economy, existing and projected vehicle populations, infrastructure costs and other assumptions (CEC/CARB, 2002). Table 4.2-5 shows the estimated diesel fuel reductions and the related increase in natural gas based upon in-state diesel fuel purchases.

TABLE 4.2-5

Reduction in Diesel Fuel Consumption and Increase in Natural Gas Use as Fuel in the District*

	2010	2020
Annual Reduction in Diesel Fuel Consumption (Million gallons)	8.5	30
Annual Increase in Natural Gas Consumption (Million Cubic Feet)	1,148	4,050

*Assumes district consumes 50 percent of the diesel fuel consumed within the state (SCAG, 2001)
CEC/CARB, 2002

For stationary sources, a slight increase in natural gas demand is expected from the use of add-on air pollution controls associated with industrial coatings and solvent operations, add-on controls associated with fugitive emission reductions, add-on controls associated with restaurant operations, add-on controls associated with livestock operations, add-on controls associated with large VOC emission sources, add-on controls associated with vapor recovery from aboveground tanks, and add-on controls associated with gasoline dispensing at marinas. The amount of natural gas to run these control devices is unknown. Alternative processing equipment is expected to be the primary method of control, e.g., the primarily method of control for PRC-03 is expected to be the installation of different types burners. It is also expected based on current practices that reformulated products will be used to meet some of the future VOC emission reductions from these control measures. Add-on controls will be used only if they are cost effective.

Approximately 40 percent of the natural gas consumed in California is used to generate electricity. Southern California Edison has estimated that it will need to add about 200 megawatts of capacity by 2008 to accommodate the increase in electric vehicles (SCAQMD, 1997). The increase in electricity is expected to be generated from the use of natural gas resulting in an increased demand for natural gas. The increase in natural gas associated with the additional electricity demands is expected to be negligible.

Within California, the CEC predicts that PG&E will need additional receiving capacity in Northern California between 2007 and 2012. The Southern California Gas Company recently completed major infrastructure projects. As a result, the CEC believes that under average conditions, Southern California Gas Company has ensured adequate capacity for its service territory through 2012 (CEC, 2002g).

The natural gas impacts are summarized in Table 4.2-6.

TABLE 4.2-6

Natural Gas Impacts for the District
(Billion Cubic Feet /Year)

	2010
Baseline	2,657[(1)]
Control Measures	
Stationary Measures	-
Mobile Source Measures	0.041
Total All Measures	0.041
Percent of Baseline	<0.01

(1) CEC, 2002j

The natural gas impacts from the implementation of the 2003AQMP are expected to be less than significant. The 2003AQMP includes strategies that promote energy conservation. These energy impacts, although unavoidable, are expected to be less than significant because sufficient natural gas capacity and supplies are expected be available. Further, the Southern California Gas Company has indicated that it is expected to have sufficient natural gas resources to continue to supply natural gas to the region, without the need for new or substantially altered natural gas systems (Levin, 2002).

PROJECT-SPECIFIC MITIGATION: No mitigation measures are required because no significant impacts on natural gas resources.

4.2.4.3 Petroleum Fuels

Implementation of the 2003AQMP is expected to result in a decrease in the demand for petroleum fuels (i.e., diesel, distillate, residual oil, and gasoline) due to mobile source control measures. As discussed above, a decrease in the use of approximately 650 million gallons of gasoline and 17 million gallons of diesel fuel is expected in year 2010 statewide (CEC/CARB, 2002). Approximately 50 percent of that reduction will occur in the district (an estimated 325 million gallons of gasoline and 8.5 million gallons of diesel fuel). According to the Caltrans, 9,261 million gallons of vehicle fuel (both gasoline and diesel fuel) consumption can be expected in the district in 2010 (Caltrans, 2002).

The largest reductions in petroleum based fuels are expected from the on-road mobile source sector switching to alternative clean fuels. For on-road mobile sources, the combination of fleet standards for both light- and heavy-duty vehicles, as well as trip reduction measures, produce these large reductions in the use of petroleum-based fuels. A smaller reduction in on-road diesel

consumption would be expected if emulsified diesel fuels (diesel fuel mixed with water) were used.

An increase in the use of add-on control equipment associated with mobile sources could result in an increase in the use of petroleum fuels. Add-on control devices, such as diesel particulate filters, SCRs, catalytic controls, etc., generally result in a decrease in engine efficiency. The amount of fuel that would be required would be dependent on the type of control equipment installed and the energy requirement to operate the equipment.

There is also the possibility that specifications for reformulated fuels, (e.g., CARB Phase IV gasoline) could result in a slightly decrease in the fuel efficiency for some vehicles and have an adverse impact on energy demand. The specifications for such fuels have not been developed so the magnitude of this impact is not currently known. Reformulation of fuels has lead to a general decrease in fuel efficiency of about two to three percent (Kortum, et al.).

Implementation of CTY-04 would result in an increase in the oxygenated fuel content in gasoline sold in the winter months. Increasing oxygenates in the fuels would result in a decrease in fuel energy as a result of the increased oxygenate (Kortum, et al.). The theoretically expected decrease in fuel energy as a result of oxygenate use is in the two to three percent range when compared to gasoline. This corresponds to 0.5 to 0.8 mile per gallon for a car that averages 27 miles per gallon. The fuel economy loss experienced as a result of oxygenate use agrees with the theoretical prediction for fuel energy loss. Thus, it is reasonable to conclude that any fuel economy loss experienced with oxygenate use is solely a function of the change in fuel composition and the resulting slight decrease in energy content of fuel. The decrease in fuel economy would be associated with increasing the oxygenate content of the fuel. Assuming an increase in ethanol concentration from 2.0 to 2.7 percent, this control measure is expected to result in an increase in fuel use of about 117,800 gallons in the district.

Based on Table 4.2-7, implementation of the AQMP is expected to result in a larger decrease in the use of petroleum fuels than an increase in petroleum fuel use, resulting in less demand on the use of petroleum fuels. Therefore, implementation of the 2003 AQMP is not expected to result in a significant impact on petroleum fuel use.

TABLE 4.2-7

Impact of Petroleum Fuels for the District
(million gallons/year)

	Year 2010
Baseline*	9,261
Stationary Source Control Measures	0
Decreased Use Associated with Mobile Source Control Measures*	-333.5
Increased Use Associated with Mobile Source Control Measures	0.12

* Caltrans, 2002

PROJECT SPECIFIC MITIGATION MEASURE: No significant impacts on petroleum fuels associated with the 2003 AQMP were identified so that no mitigation measures are required.

4.2.4.4 Alternative Fuels

The 2003 AQMP continues to call for progressively lower vehicle emissions through the lowering of vehicle emission standards. These proposed control measures for on- and off-road mobile sources are expected to cause a shift from conventional petroleum fuels to alternative fuels. (Please note that the impacts associated with reformulated petroleum fuels, e.g., emulsified diesel fuels and oxygenated gasoline, are included under the discussion of petroleum fuels as they are predominately comprised of petroleum-based fuels.)

The use of alternative fuels in California's transportation energy market continues at a gradual pace, but could be limited by a variety of market and regulatory uncertainties. Continuing progress in reducing new gasoline vehicle emissions is having an important effect on auto industry development and marketing of alternative fuel vehicles. The use of cleaner-burning alternative fuels such as CNG is not receiving as much emphasis in light-duty vehicle emission-reducing strategies as previously expected. The combination of gasoline reformulation and advances in automotive emission control technology appears to be making the exhaust emission levels required by California's low-emission vehicle standards achievable without relying on the use of alternative fuels. Therefore, the demand for alternative fuels would depend on their marketing strategies and the development of infrastructure to affect consumer choice.

There is growing interest and financial support for the use of hydrogen-powered fuel cells to power cars, trucks, homes and business. In his State of the Union address, U.S. President George Bush announced the Freedom Fuel initiative to reverse American's growing dependence on foreign oil by developing technology for commercially viable hydrogen-powered fuel cells. The Initiative provides funding for the development of technologies and infrastructure to produce, store, and distribute hydrogen for use in fuel cell vehicles and electricity generation. The Initiative proposes a total of $1.7 billion over the next five years to develop hydrogen-powered fuel cells, hydrogen infrastructure and advance automotive technologies.

Hydrogen fuel cells are proven technology but more work is needed to make them cost-effective for use in cars, trucks, homes or businesses. Hydrogen fuel cells create electricity to power cars with minimal pollution. While hydrogen fuel cell technology is promising, its use in the future is dependent on many things (cost-effectiveness of the technology, availability of hydrogen, etc.), so that the extent to which it may be used in the future is currently unknown.

One of the goals of the 2003 AQMP is to shift from conventional petroleum based fuels to less polluting alternative transportation fuels. Although an increase in alternative transportation fuels is expected, this increase is not expected to be significant since alternative fuels (e.g., natural gas and hydrogen) are available or the feedstock that produces the fuels are generally available. Future demand could be met through increased production. The energy impacts associated with the future use of alternative fuels are expected to be less than the current strategy that uses

predominately petroleum-based fuels so that no significant impacts on alternative fuels are expected.

PROJECT-SPECIFIC MITIGATION: No significant impacts on alternative fuels are expected so that no mitigation measures are expected.

4.2.4.5 Energy Impacts Associated with Long-Term Control Measures

Additional energy impacts could occur due to implementation of the long-term control measures. Examples of the potential control options for mobile sources under the long-term strategy include: (1) accelerated retirement of older vehicles; (2) retrofit of existing vehicles such as passenger cars and light and medium-duty trucks with advanced emission controls (e.g., OEM catalytic converters, oxygen sensors); (3) retrofitting heavy-duty diesel trucks and buses with NOx reducing catalysts; (4) repowering construction and industrial equipment with cleaner diesel engines or alternative fuels; and (5) replacing 2-stroke lawn and garden equipment and recreational boats with 4-stroke or electric alternatives (where feasible).

Federal sources such as planes, trains, ships, 49-state vehicles, and farm and construction equipment less than 175 horsepower will also be required to achieve significant reductions under the long-term control strategy. The emission reductions from these sources will be based on more stringent emission standards for new engines as well retrofit controls (e.g., NOx catalyst, SCR, alternative fuels) for existing engines. Therefore, it is expected that long-term measures will place greater reliance on the use of alternative fuels, especially natural gas and hydrogen.

Implementation of the long-term control measures would be expected to result in additional energy impacts. The specific details of the long-term control measures have not yet been developed and will need to be developed as part of the rulemaking process. Therefore, the impacts related to the long-term control measures are discussed qualitatively since detailed information for a quantitative analysis is not available. The potential energy impacts from the long-term measures for each of the resources discussed in this subchapter are evaluated below.

Electricity

The long-term control measures could include increased electrification of mobile sources including sources at marine ports and airports. The proposed cold-ironing of ocean-going vessels is likely to impose unknown power demands on the local grid. The potential increase and amount of electricity is unknown. Because the control measure is general in nature, its difficult to determine what, if any, impacts could be expected. Therefore, the electrical impacts of cold-ironing are considered speculative and no further environmental analysis is required (CEQA Guidelines §15145). The impacts of the remaining long term control measures are not expected to result in an incremental increase in electricity demand materially different from that evaluated for the short-term measures. The increase in electricity associated with the short-term control measures is considered to be less than significant. While there may be an increase in electricity associated with the long-term control measures (due to increased electrification of sources) over that evaluated for short-term control measures, the overall increase in electricity is expected to be

minor as compared to the overall electrical use in the district. No additional significant impacts from implementation of long-term control measures are expected due to increased electricity demand.

Natural Gas

The energy impacts associated with implementation of the short-term control measures is expected to result in an increase in natural gas consumption. Sufficient natural gas resources are available so that no significant adverse impacts associated with natural gas resources are expected. While there may be an increase in natural gas use associated with the long-term control measures (due to increased electrification of sources and possibly increased use as an alternative fuel) over that evaluated for short-term control measures, the overall increase in natural gas is expected to be remain minor as compared to the overall natural gas use in the district. No additional significant adverse impacts from implementation of long-term control measures are expected due to increased natural gas demand.

Petroleum Fuels

The energy impacts associated with implementation of the short-term control measures is expected to result in a reduction in use (less demand) of petroleum fuels. Implementation of the long-term control strategies are expected to depend on the use of cleaner fuels, alternative fuels, electrification of some sources and so forth. These control measures are expected to reduce the overall use of petroleum fuels (e.g., diesel fuels and gasoline) so that no significant adverse impacts on petroleum fuels are expected.

Alternative Fuels

Although an increase in alternative transportation fuels is expected due to implementation of the short-term control measures, this increase is not expected to be significant since alternative fuels (e.g., natural gas and hydrogen) are available or the feedstock that produces the fuels are generally available. Future demand could be met through increased production. The energy impacts associated with the future use of alternative fuels are expected to be less than the current strategy that uses predominately petroleum based fuels so that no significant impacts on alternative fuels are expected.

The energy impacts associated with implementation of the long-term control measures could result in addition use of alternative fuels because the long-term control measure are expected to use additional alternative fuels to gain additional emission reductions. The increased use in alternative fuels is not expected to be significant since alternative fuels are available or the feedstock that produces the fuels are generally available.

4.2.5 CUMULATIVE ENERGY IMPACTS

The analysis of adverse cumulative impacts to energy resources is different than the comparable analysis for other impacts areas for several reasons. First, it is difficult to quantify past energy impacts relative to implementation of the past AQMPs because it is difficult to determine an

actual link between past business practices (and associated energy demand) and compliance with AQMP rules and regulations. There is no methodology to estimate past energy demand relative to past AQMPs. A second difficulty inherent in evaluating cumulative energy resources impacts is that it is difficult to predict if an affected facility will alter its energy demand in the future or switch to a different resource as a result of complying with an AQMP control measure or because of other business considerations. For example, an affected facility owner might switch to an alternative clean fuel if equipment using that alternative clean fuel is much more efficient than the old equipment using conventional fuels. This decision could have been made for a variety of reasons such as cost savings, increased production capacity, etc., and may not be related to the AQMP, yet there is currently no way for an analysis does not make this distinction.

The energy impacts associated with implementation of the 2003 AQMP are analyzed relative to future baseline energy projections. The future baselines are based upon existing baselines, which is essentially past energy resource utilization plus future energy resource utilization. The estimated future energy resource demand from the 2003 AQMP is present energy demand plus future anticipated demand. Therefore, the project-specific energy resource impacts evaluated in preceding sections are equivalent to a cumulative impact analysis. Therefore, since no project-specific energy resource impacts were identified, no significant adverse cumulative energy resources are anticipated.

CUMULATIVE ENERGY IMPACT MITIGATION: No significant adverse cumulative energy impacts were identified so no mitigation measures are required.

4.2.6 SUMMARY OF ENERGY IMPACTS

The following is the summary of the conclusions of the analysis of energy impacts associated with implementation of the 2003 AQMP.

- Electricity: The increase in electricity associated with the control measures and strategies in the 2003 AQMP is considered to be less than significant. While there may be an increase in electricity associated with the 2003 AQMP control measures, the overall increase in electricity is expected to be minor as compared to the overall electrical use in the district. No significant impacts are expected due to increased electricity demand.

- Natural Gas: The energy impacts associated with implementation of the control measures and strategies in the 2003 AQMP are expected to result in an increase in natural gas consumption. Sufficient natural gas resources are available so that no significant impacts associated with natural gas resources are expected.

- Petroleum Fuels: The energy impacts associated with implementation of the control measures and strategies in the 2003 AQMP are expected to result in a reduction in use (less demand) of petroleum fuels so that no significant impacts on petroleum fuels are expected.

- Alternative Fuels: Although an increase in alternative transportation fuels is expected due to implementation of the control measures and strategies in the 2003 AQMP, this increase is not expected to be significant since alternative fuels (e.g., natural gas and hydrogen) are available

or the feedstock that produces the fuels are generally available. Future demand is expected be met through increased production. The energy impacts associated with the future use of alternative fuels are expected to be less than the current strategy that uses predominately petroleum based fuels so that no significant impacts on alternative fuels are expected.

- Energy Impacts Associated with Long-Term Control Measures: Additional energy impacts are expected due to implementation of the long-term control measures (over and above those discussed in other portions of the EIR). The increase in energy demand is expected to be within the available resources so that no significant impacts are expected.

- Cumulative Energy Impacts: The energy impacts associated with implementation of the 2003 AQMP are analyzed relative to future baseline energy projections. The future baselines are based upon existing baselines, which is essentially past energy resource utilization plus future energy resource utilization. The estimated future energy resource demand from the 2003 AQMP is present energy demand plus future anticipated demand. Therefore, the project-specific energy resource impacts evaluated are equivalent to a cumulative impact analysis. Therefore, since no project-specific energy resource impacts were identified, no significant adverse cumulative energy resources are anticipated.