# SUBCHAPTER 4.3

# ENERGY

# 4.3 ENERGY

## 4.3.1 Introduction

This subchapter examines impacts on the supply and demand of energy sources from proposed control measures in the 2012 AQMP. All control measures in the 2012 AQMP were evaluated to determine whether or not they could generate direct or indirect energy impacts based on the anticipated methods of control. Some of the measures would require increased energy use, for example through increased pumping loads or more extensive exhaust filtering systems. Other measures would alter the form of energy used, for example switching from gasoline or diesel power to alternative fuels such as hydrogen, natural gas, and electricity.

## 4.3.2 2012 AQMP Control Measures with Potential Energy Impacts

The energy impact analysis in this Final Program EIR identifies the net effect on energy resources from implementing the 2012 AQMP. All control measures were analyzed to identify both beneficial effects (energy conserving) and adverse impacts (energy consuming).

Implementing some of 2012 AQMP control measures could increase energy demand in the region from affected facilities. Specifically some types of control equipment would 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 25 control measures that could have potential energy consumption or conserving impacts. As shown in Table 4.3-1, three control measures related to PM2.5 emission reductions and 22 control measures related to emission reductions from ozone precursors are expected to have energy impacts.

## 4.3.3 Significance Criteria

Implementation of the 2012 AQMP would be considered to have significant adverse energy impacts if any of the following conditions occur:

- The project would result in the use of renewable and non-renewable fuel or energy resources, in a wasteful manner.
- The project conflicts with adopted energy conservation plans or standards.
- The project would result in substantial depletion of existing energy resource supplies.
- The project would increase demand for utilities impacts the current capacities of the electric and natural gas utilities.

- The project would increase demand for energy resources by one percent or more of the baseline energy demand.

**TABLE 4.3-1**

Control Measures with Potential Secondary Energy Impacts

| CONTROL MEASURES | CONTROL MEASURE DESCRIPTION (POLLUTANT) | CONTROL METHODOLOGY | ENERGY IMPACT |
|---|---|---|---|
| **Short-Term PM2.5 Control Measures** | | | |
| BCM-01 | Further Reductions from Residential Wood Burning Devices (NOx) | Lower current mandatory Basin-wide wood burning curtailment threshold from 35 $\mu g/m^3$ to 30 $\mu g/m^3$. | Potential increased demand for natural gas. |
| BCM-03 (formerly BCM-05) | Emission Reductions from Under-Fired Charbroilers (PM2.5) | Add-On Control Equipment with Ventilation Hood Requirements (e.g., ESPs, HEPA filters, wet scrubbers, or thermal oxidizers) | Potential increase in electricity and/or natural gas for control technologies. Potential increase in diesel-fuel demand during construction and/or filter replacement. |
| BCM-04 (formerly MCS-04B) | Further Ammonia Reductions from Livestock Waste (NH3) | Reducing pH level in manure through the application of acidifier sodium bisulfate to | Potential increase in diesel fuel demand use for delivery and application of acidifier. |
| CMB-01 | Further NOx Reductions from RECLAIM – Phase I and Phase II (NOx) | RECLAIM sources will be examined for further reductions for this control measure and potential rule making. Control technologies could include: elective catalytic reduction, low NOx burners, NOx reducing catalysts, oxy-fuel furnaces, and selective non-catalytic reduction | Potential increase in electricity and/or natural gas for control technologies. Potential increase in diesel-fuel demand during construction and related ammonia and/or catalyst replacement. |
| CMB-02 | NOx Reductions from Biogas Flares (NOx) | Replacement of existing biogas flares with more efficient biogas flares | Potential increase in diesel-fuel demand during construction. |
| CMB-03 | Reductions from Commercial Space Heating (NOx) | This control measure seeks emission reductions from unregulated commercial fan-type central furnaces used for space heating. | Potential increase in diesel-fuel demand during construction. |
| IND-01 | Backstop Measure for Indirect Sources of Emissions from Ports and Port-Related Facilities (NOx, SOx, PM2.5) | Environmental lease conditions, port rules, tariffs or incentives | Additional emission controls could result in increased electricity. Incentives to purchase electric or gaseous fueled equipment could cause potential increase in electricity and natural gas demand. Potential increase in alternative fuels. Potential increase in diesel-fuel demand during construction. |

## TABLE 4.3-1 (CONTINUED)

Control Measures with Potential Secondary Energy Impacts

| CONTROL MEASURES | CONTROL MEASURE DESCRIPTION (POLLUTANT) | CONTROL METHODOLOGY | ENERGY IMPACT |
|---|---|---|---|
| **Ozone Control Measures** | | | |
| CTS-02 | Further Emission Reduction from Miscellaneous Coatings, Adhesives, Solvents and Lubricants (VOC) | Reduce the allowable VOC content in product formulations by using alternative low-VOC products or non-VOC product/equipment | Potential increase in electricity use for application and/or control |
| FUG-01 | ~~Further~~ VOC Reductions from Vacuum Trucks (VOC) | VOC control devices such as carbon adsorption systems, internal combustion engines, thermal oxidizers, refrigerated condensers, liquid scrubbers and positive displacement (PD) pumps | Potential increase in electricity and/or natural gas for control technologies. Potential increase in diesel-fuel demand during construction and related ammonia and/or catalyst replacement. |
| FUG-02 | Emission Reduction from LPG Transfer and Dispensing – Phase II (VOC) | Expand applicability of rule to LPG transfer and dispensing at facilities other than those that offer LPG for sale to end users included currently exempted facilities | Potential increase in diesel-fuel demand during construction and inspection and monitoring. |
| FUG-03 | Further ~~VOC~~ Reductions from Fugitive VOC Emissions (VOC) | Upgrade inspection/ maintenance rules to at least a self-inspection program, or to an optical gas imaging-assisted LDAR program where feasible; use of new technologies to detect and verify VOC fugitive emissions | Potential increase in electricity and/or natural gas for control technologies. Potential increase in diesel-fuel demand during construction and inspection and monitoring/inspections. |
| MCS-01 | Application of All Feasible Measures Assessment (All Pollutants) | Control measure could require new retrofit technology control standards as new BARCT standards become available. | Potential increase in electricity and/or natural gas for control technologies. Potential increase in diesel-fuel demand during construction and/or related transportation. |
| MCS-02 | Further Emission Reductions from Green Waste Processing (Chipping and Grinding Operations not associated with composting) (VOC) | Require chipped or ground greenwaste material to be covered after chipping or grinding or removed from site; and seasonal covering of chipped or ground greenwaste material. | Potential increase in diesel-fuel related transportation. |
| MCS-03 | Improved Start-up, Shutdown and Turnaround Procedures (All Pollutants) | Diverting or eliminating process streams that are vented to flares, and installing redundant equipment to increase operational reliability. | Reduction of process gas vented to flares.<br><br>Potential increase in diesel-fuel during construction. |

## TABLE 4.3-1 (CONTINUED)

Control Measures with Potential Secondary Energy Impacts

| CONTROL MEASURES | CONTROL MEASURE DESCRIPTION (POLLUTANT) | CONTROL METHODOLOGY | ENERGY IMPACT |
|---|---|---|---|
| **Ozone Control Measures** | | | |
| INC-01 | Economic Incentive Programs to Adopt Zero and Near-Zero Technologies (NOx) | Installation of cleaner, more efficient combustion equipment, such as boilers, water heaters and commercial space heating or installation of control technologies including fuel cells, diesel particulate filters (DPF), NOx reduction catalysts, alternative electricity generation, such as wind and solar, battery electric, hybrid electric, and usage of low NOx and alternative fuels such as natural gas | Incentives to purchase electric or gaseous fueled equipment could cause potential increase in electricity and natural gas demand.<br><br>Potential increase in electricity and/or natural gas for control technologies. Potential increase in diesel-fuel during construction and related filter and/or catalyst replacement. |
| ONRD-01 | Accelerated Penetration of Partial Zero-Emission and Zero Emission Vehicles (VOC, NOx, PM) | Incentives to replace older vehicles with electric or hybrid vehicles | Incentives to purchase electric vehicle could result in an increase in electricity. |
| ONRD-02 | Accelerated Retirement of Older Light-Duty and Medium-Duty Vehicles (VOC, NOx, PM) | Incentives to replace older light- and medium-duty vehicles with low-emitting vehicles. | Incentives to purchase electric vehicle could result in an increase in electricity. |
| ONRD-03 | Accelerated Penetration of Partial Zero-Emission and Zero Emission Medium Heavy-Duty Vehicles (NOx, PM) | Incentives to replace older medium-duty vehicles with low-emitting vehicles. Highest priority would be given to zero-emission vehicles and hybrid vehicles with a portion of their operation in an “all electric range” mode. | Incentives to purchase electric vehicle could result in an increase in electricity and increase the use of alternative fuels. |
| ONRD-05 | Further Emission Reductions from Heavy-Duty Vehicles Serving Near-Dock Railyards (NOx, PM) | Incentives to replace older medium- and heavy-duty vehicles with low- and zero emitting vehicles. | Incentives to purchase low emission vehicles could result in an increase in electricity and increase the use of alternative fuels. |
| OFFRD-01 | Extension of the SOON Provision for Construction/Industrial Equipment (NOx) | Accelerate equipment repowering; use of air pollution control technologies (e.g., advanced fuel injection, air induction, and after-treatment technologies). | Potential increase in the use of alternative fuels. |

## TABLE 4.3-1 (CONTINUED)

Control Measures with Potential Secondary Energy Impacts

| CONTROL MEASURES | CONTROL MEASURE DESCRIPTION (POLLUTANT) | CONTROL METHODOLOGY | ENERGY IMPACT |
|---|---|---|---|
| **Ozone Control Measures** | | | |
| OFFRD-02 | Further Emission Reductions from Freight Locomotives (NOx, PM) | Repower existing engines with Tier 4 engines with control equipment (e.g., SCRs, DPM filters, electric batteries, and alternative fuels). | Potential increase in fuel use from the use of more efficient engines; minor decrease in fuel use from loss of efficiency to control technologies, and increase in alternative fuels associated with repowered engines. |
| OFFRD-03 | Further Emission Reductions from Passenger Locomotives (NOx, PM) | Repower existing engines with Tier 4 engines with control equipment (e.g., SCRs, DPM filters, electric batteries, and alternative fuels). | Potential increase in fuel use from the use of more efficient engines; minor increase in fuel economy from loss of efficiency to control technologies, and increase in alternative fuels associated with repowered engines. |
| OFFRD-04 | Further Emission Reductions from Ocean-Going Marine Vessels at Berth (VOC, NOx, PM) | Shore power of vessels at berth; use of air pollution control technologies on exhaust gases from auxiliary engines and boilers (e.g., SCRs, DPM filters, electric batteries, and alternative fuels). May increase the use or installation of new local electricity generation. | Potential increase in electricity use associated with increased use of shore-side power and additional air pollution control technologies and minor increase in fuel economy from loss of efficiency to control technologies.<br><br>Potential increase in diesel-fuel during construction. |
| OFFRD-05 | Emission Reductions from Ocean-Going Marine Vessels (NOx) | Enhance Ports' existing financial incentive programs for early deployment of Tier 2 and Tier 3 vessels calling at the Ports. | Potential increase in electricity use associated with increased use of shore-side power and additional air pollution control technologies and minor decrease in fuel use from loss of efficiency to control technologies.<br>Potential increase in diesel-fuel demand during construction. |
| ADV-01 | Proposed Implementation Measures for the Deployment of Zero- and Near-Zero Emission On-Road Heavy-Duty Vehicles (NOx) | Construct "wayside" electric or magnetic infrastructure; construction battery charging and fueling infrastructure | Reduced emission standards could result in an increase in electricity and increase the use of alternative fuels.<br><br>Potential increase in diesel-fuel demand during construction. |

## TABLE 4.3-1 (CONCLUDED)

Control Measures with Potential Secondary Energy Impacts

| CONTROL MEASURES | CONTROL MEASURE DESCRIPTION (POLLUTANT) | CONTROL METHODOLOGY | ENERGY IMPACT |
|---|---|---|---|
| **Ozone Control Measures** | | | |
| ADV-02 | Proposed Implementation Measures for the Deployment of Zero- and Near-Zero Emission Locomotives (NOx) | Construct "wayside" electric or magnetic infrastructure; construct battery charging or fueling infrastructure. | Measure could result in an increase in electricity and increase the use of alternative fuels.<br><br>Potential increase in diesel-fuel demand during construction. |
| ADV-03 | Proposed Implementation Measures for the Deployment of Zero- and Near-Zero Emission Cargo Handling Equipment (NOx) | Construct electric gantry cranes; construct battery charging or fueling infrastructure; use of alternative fuels and fuel additives | Measure could result in an increase in electricity and increase the use of alternative fuels.<br>Potential increase in diesel-fuel demand during construction. |
| ADV-04 | Actions for the Deployment of Cleaner Commercial Harborcraft (NOx) | Construct battery charging or fueling infrastructure; use of air pollution control equipment (e.g., SCR; use of alternative fuels and fuel additives). | Measure could result in an increase in electricity and increase the use of alternative fuels.<br><br>Potential increase in diesel-fuel demand during construction. Increase in fuel consumption from loss of efficiency from control equipment. |
| ADV-05 | Proposed Implementation Measures for the Deployment of Cleaner Ocean-Going Marine Vessels (NOx) | Employ aftertreatment control technologies such as SCR and wet/dry scrubbers; use of alternative fuels. | Measure could result in an increase in electricity and increase the use of alternative fuels.<br><br>Potential increase in diesel-fuel demand during construction. Increase in fuel consumption from loss of efficiency from control equipment. |
| ADV-06 | Proposed Implementation Measures for the Deployment of Cleaner Off-Road Equipment (NOx) | Construct battery charging or fueling infrastructure; increased use of alternative fuels and fuel additives. | Measure could result in an increase in electricity and increase the use of alternative fuels. |
| ADV-07 | Proposed Implementation Measures for the Deployment of Cleaner Aircraft Engines (NOx) | Use alternative fuels and fuel additives, lean combustion burners, high rate turbo bypass, advanced turbo-compressor design, and engine weight reduction. | Measure could result in an increase use of alternative fuels. |

## 4.3.4 Potential Energy Impacts and Mitigation Measures

### 4.3.4.1 Electricity

Potential electric energy impacts relative to the energy baseline are discussed below. The potential increase in electricity use due to implementation of the 2012 AQMP is partially 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 BCM-03 - Emission Reductions from Under-Fired Charbroilers, CMB-01 - Further NOx Reductions from RECLAIM –Phase II, IND-01 - Backstop Measure for Indirect Sources of Emissions from Ports and Port-Related Facilities (if triggered), FUG-01 - ~~Further~~ VOC Reductions from Vacuum Trucks, FUG-03 - Further ~~VOC~~ Reductions from Fugitive VOC Emissions, MCS-01 - Application of All Feasible Measures Assessment, and INC-01 -- Economic Incentive Programs to Adopt Zero and Near-Zero Technologies. There is also a potential increase in electricity use associated with the electrification of mobile sources or control equipment for mobile sources, including IND-01, INC-01, ONRD-01 - Accelerated Penetration of Partial Zero-Emission and Zero Emission Vehicles, ONRD-02 - Accelerated Retirement of Older Light-Duty and Medium-Duty Vehicles, ONRD-03 - Accelerated Penetration of Partial Zero-Emission and Zero Emission Medium Heavy-Duty Vehicles, ONRD-05 - Further Emission Reductions from Heavy-Duty Vehicles Serving Near-Dock Railyards, OFFRD-01 - Extension of the SOON Provision for Construction/Industrial Equipment, OFFRD-02 - Further Emission Reductions from Freight Locomotives, OFFRD-03 - Further Emission Reductions from Passenger Locomotives, OFFRD-04 - Further Emission Reductions from Ocean-Going Marine Vessels at Berth, ADV-01 - Proposed Implementation Measures for the Deployment of Zero- and Near-Zero Emission On-Road Heavy-Duty Vehicles, ADV-02 - Proposed Implementation Measures for the Deployment of Zero- and Near-Zero Emission Locomotives, ADV-03 - Proposed Implementation Measures for the Deployment of Zero- and Near-Zero Emission Cargo Handling Equipment, ADV-04 - Actions for the Deployment of Cleaner Commercial Harborcraft, ADV-05 - Proposed Implementation Measures for the Deployment of Cleaner Ocean-Going Marine Vessels, and ADV-06 - Proposed Implementation Measures for the Deployment of Cleaner Off-Road Equipment.

**Stationary and Area Sources -** A number of control measures could result in the installation of add-on control equipment including BCM-03, CMB-01, IND-01, CTS-02, FUG-01, FUG-03, MCS-01, and INC-01. Add-on control equipment can reduce air emissions in a number of different ways (e.g., filters to remove particulates, or units that produce a chemical reaction to remove a pollutant), but they generally require energy to function. The use of add-on air pollution controls (e.g., wet scrubbers, low NOx burners, and catalysts) could result in an increase in electricity demand. For example, a wet gas electrostatic precipitator (ESP) and wet gas scrubber (WGS) were installed on the Fluid Catalytic Cracking Unit (FCCU) at the ConocoPhillips Los Angeles Refinery. The estimated electricity required to operate the ESP and WGS was about 715 kilowatts (kW) (SCAQMD, 2007). FCCUs are large emission sources and the electricity used for the ESP and WGS at the ConocoPhillips Refinery would be representative of control equipment for large sources. Energy use for smaller sources would be less. The specific potential increase in the amount of electricity use due to the implementation of the 2012 AQMP is unclear at

this time as specific information regarding the number and size of the control units are currently unknown. Additionally, 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 of VOC emissions from coatings and solvents (CTS-01 and CTS-02) is expected to be reformulation of coatings and solvents along with more efficient application techniques, and not add-on control equipment which would be largely expected to be energy neutral.

**Mobile Sources -** Mobile source control measures in the 2012 AQMP are expected to increase the electricity demand in the district. A number of control measures would result in an increase in electricity demand associated with the electrification of mobile sources, including IND-01, ONRD-01, ONRD-02, ONRD-03, ONRD-05, ADV-01, ADV-02, ADV-03, ADV-04, ADV-05, and ADV-06. This is expected to shift some of the fuel source of cars, trucks, off-road vehicles and marine vessels to electricity, as well as, create an additional electrical load demand due to CNG recharging. The CEC estimates there were about 10,000 electric vehicles on the road operating in California in 2011 with an estimated electricity consumption of 100 gigawatts per hour (gWh). The CEC projects anywhere from 835,000 to 3,575,000 electric vehicles by 2022 depending on the energy demand scenario. These vehicles will require 2,200 gWh for the low demand scenario and more than 7,000 gWh in the high scenario (CEC, 2012j).

The estimated baseline electricity use in Los Angeles, Orange, Riverside, and San Bernardino counties was about 115,000 gWh in 2010 (CEC, 2012b). Therefore, currently electric vehicles are a small portion of the overall electricity used (less than 0.1 percent). CEC estimates that an increase in electricity demand of about 18 percent will occur between 2010 and 2023 with an annual average growth rate of about 1.3 percent (CEC, 2012j). Assuming a similar annual growth rate between 2023 and 2030, about 148,750 gWh will be required in 2030 (see Table 4.3-2).

The potential increase in electricity can be estimated for Control Measures ONRD-01, ONRD-02, ONRD-03, and ONRD-05 where the increase in the number of hybrid/zero emission vehicles introduced can be estimated (see Table 4.3-2)[1]. As shown in Table 4.3-2, the estimated increase in electricity associated with associated with ONRD-01, ONRD-02, ONRD-03, and ONRD-05 is about 446.2 gWh. In 2023, the increase in electricity would represent a 0.4 percent increase in electricity since 2010 (baseline). ADV-01 could result in the construction of "wayside" electric or magnetic power built into roadway infrastructure to boost the pulling capacity or range of the heavy-duty vehicles. The “wayside” electric or magnetic power for appropriately equipped heavy-duty trucks would require additional electricity. The recently circulated Draft EIR for the I-710 Corridor Project included an alternative that evaluated impacts from installing “wayside” electric roadway infrastructure and an estimated electricity demand between 157 and 183 GWh per year (Caltrans, 2012) In addition to the I-710 Corridor Project, ADV-01 identifies the 60 freeway as an east-west

[1] It should be noted that the specific technologies to be employed to comply with these 2012 AQMP control measures is unknown. However, to present a worst-case analysis of potential electricity demand impacts, for the purposes of this analysis, it is assumed that all affected mobile sources would be powered by electricity. Similarly, this worst-case assumption does not assume that the SCAQMD endorses electricity technologies over other compliant technologies.

corridor that has potential location for additional "wayside" electric roadway infrastructure. There is currently a pilot project under consideration to install catenary lines at one of two sites, a site along the Terminal Island Freeway or on Navy Way at the Port of Los Angeles. To estimate the potential electrical demand for a "wayside" electric roadway infrastructure on the 60 freeway, it is assumed that the electrical demand per mile would be equivalent to that estimated for the I-710 Corridor Project with a distance twice as long. Therefore, the estimated electrical demand for the 60 freeway would be between 320 and 380 GWh. The use of "wayside" electric roadway infrastructure elsewhere in the district would be speculative at this time. Therefore, the estimated electrical demand associated with ADV-01 is 563 GWh (see Table 4.3-2).

ADV-02 could result in the construction of "wayside" electric or magnetic power built into railway infrastructure to convert diesel locomotives to electrical traction motors. The "wayside" electric or magnetic power would require additional electricity. ADV-02 would convert 300 line haul, 140 switcher, and 52 passenger diesel locomotives to "wayside" electric infrastructure. Based on an annual fuel use of 34.7 million gallons of diesel fuel, the estimated electrical demand would be 880 GWh (see Table 4.3-2). The 880 GWh assumes 56 percent diesel engine efficiency, 95 percent electrical traction efficiency, and seven percent transmission loss.

**TABLE 4.3-2**

Electricity Impacts for Los Angeles, Orange, Riverside, and San Bernardino Counties (GW-h)

| CONTROL MEASURE | 2010 | 2023 [A] |
|---|---|---|
| Baseline | 115,000 | 136,079 |
| ONRD-01 – Incentivize light- and medium-duty trucks (9,000 vehicles) [c] | -- | 38.6 |
| ONRD-02 – Accelerated retirement and replacement of pre-1992 light- and medium-duty vehicles (18,000 vehicles) [b] | -- | 77.1 |
| ONRD-03 – Encourage the introduction of hybrid and zero-emission vehicles (5,000 vehicles) [c] | -- | 83 |
| ONRD-05 – Replace 1000 trucks with zero-emission vehicles (1000 vehicles) [e] | -- | 49.5 |
| ADV-01 – "Wayside" Electric Roadway Infrastructure of the I-710 and 60 Freeways | | 563 |
| ADV-02 – "Wayside" Electric Rail Infrastructure | | 880 |
| Total of Mobile Source Measures | -- | 1,691 |
| Percent of Baseline | -- | 1.5% |

Source: CEC, 2012a
[a] Projections based on CEC, 2012j
[b] Based on 12,600 miles/year and 0.34 kWh/mile.
[c] Based on 16,600 miles/year and one kWh/mile.
[d] Based on 16,600 miles/year and one kWh/mile.
[e] Table 3.3-1

ADV-03 would result in the deployment of zero and near-zero emission cargo handling equipment which could result in an increase in electricity use (e.g., electric gantry cranes).

The Southern California International Gateway Project (Los Angeles Harbor Department, 2011) is proposing to use electric gantry cranes to move cargo from trucks to rail. The estimated increase in electricity to operate the electric gantry cranes ranges from 5,500,000 to 8,700,000 kWh for industrial uses that include electric gantry crane operations (as well as rail track signals/ lighting, site and security lighting, administrative offices, and maintenance and repair building operations). The use of the electric gantry cranes are the largest portion of the estimated electricity use at this facility. While this is only an example of electricity use for cargo handling equipment, the electrification of cargo handling equipment throughout the ports could require a substantial amount of electricity.

Control Measure IND-01 is a backstop measure that would require the ports to control stationary and mobile sources at the port and port-related facilities in the event that controls at the ports are needed or the emission targets assumed in the 2012 AQMP for the port-related sources are not met. One goal of the ports' Clean Air Action Plan and IND-01 is to move all container berths, cruise ship operations, and other frequent visitors calling at the ports to shore-side power and to move other vessel types toward alternative hotelling emissions reduction technologies. With regard to shore-side power, the two ports are in different positions from an infrastructure standpoint. Generally, the Port of Los Angeles has the main electrical trunk lines in place from which to "step down" and condition power for ships. The Port of Long Beach, on the other hand needs to bring new electrical service lines from Interstate 405 into the Harbor District to supply the appropriate power, which will require significant infrastructure improvements (PLAX/PLB, 2010).

Over the next five years, the Port of Los Angeles proposes to conduct a massive infrastructure improvement program to make alternative marine power (referred to as AMP) available at a number of berths at container, liquid bulk terminals, cruise terminals, and dredge plug-in locations. The Port of Los Angeles is expected to have alternative marine power available at 24 berths by 2014 (PLAX/PLB, 2010). However, since IND-01 is a backstop measure so it is unclear if it would need to be implemented and, if it would need to be implemented, to what extent it would need to be implemented. Further, details of the measure and the means for reducing emissions have not been identified; electricity usage from this measure cannot be estimated at this time.

OFFRD-05 - Emission Reductions from Ocean-Going Marine Vessels may increase electricity use to shore power marine vessels at berth. This control measure would provide incentives for the cleanest marine vessels (e.g., Tier III) to visit the ports. Although not anticipated, electrical power for hotelling operations could be provided to these ships via electrical cables using shorepower. Shorepower can be locally generated at the port or obtained from the grid. Shorepower can be locally generated using clean technologies such as fuel cells, gas turbines, microturbines, and combined cycle units. Due to technical and operational (e.g., frequency of calls) reasons, however, cold ironing may not be a viable option for all types of ships.

The Port of Long Beach is actively implementing its shore power program. In 2006, the port began improvements on the shore power infrastructure at the BP terminal at berth T121. Construction is completed and since mid-2009, the shore power infrastructure has been operational and is being used. Over the next five years, the port will continue to undergo

electrical infrastructure improvements, constructing an additional 6.6 kV sub-transmission line to serve the Port of Long Beach Harbor District, and completing infrastructure improvements for the remaining container terminals, electric dredge plug-ins, and additional infrastructure for electrification of certain types of yard equipment. Over 23 berths at container terminals at the Port of Long Beach are scheduled to be shore power ready by the end of 2014 (PLAX/PLB, 2010).

The EIR prepared for the Middle Harbor development in the Port of Long Beach estimated that the electricity consumption would be about 986 megawatt-hours for the Middle Harbor container terminal operations that would include shore-to-ship power ("cold-ironing") and connections to buildings and other wharf structures (e.g., lighting). While the increase demand was considered extensive, it was determined to not be substantial relative to the existing and project regional electricity supply (Port of Long Beach, 2009).

Based on the above information, since the means of reducing emissions and the details of whether local or grid power have not been established, electricity usage associated with OFFRD-05 cannot be estimated at this time.

In spite of energy conservation programs in California, it is likely that additional power plants will be required to supply the projected electricity due to general population growth, both in California and outside of California. Increased demand for electricity would occur with or without implementing the 2012 AQMP. Currently, there are a number of power plant projects planned in southern California to meet future needs. Relative to the existing electricity use and the projected future peak electricity demand, implementation of all the control measures is expected to result in an overall increase in 2023 of approximately 1.5 percent of the existing electricity use of 115,000 GW-h (see Table 4.3-2). While this increase is expected to be within the electric generating capacity of the region, an increase in electricity of one percent or greater exceeds the SCAQMD's energy significance threshold. Thus, the electric energy impacts from the implementation of the 2012 AQMP are expected to be significant.

**Conclusion: Electricity -** The electric energy impacts presented above for those control measures where sufficient data exist, 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., electric vehicles) at night when the electricity demand is low, thus minimizing impacts on peak electricity demands. Further, the analysis assumes that all sources affected by a control measure that has the potential to increase demand for electricity, would use electricity rather than the more likely result of multiple types of energy being used. In addition, any increase in electricity demand would likely result in a concurrent reduction in demand for other types of fuels, particularly petroleum-based fuels. The 2012 AQMP is not expected to result in the use of large amounts of fuel or energy resources or result in the use of fuel or energy resources in a wasteful manner. However, the 2012 AQMP includes incentives to shift from diesel and gasoline fuel use to increased electrification of stationary and mobile sources. Depending on the location and the amount of energy use (e.g., port projects), electricity portions of energy conservation plans may need to be updated. Therefore, the proposed project may conflict with existing adopted energy conservation plans. Therefore, the 2012 AQMP could result in a substantial increase in

electricity (greater than one percent of the existing electricity use in the Basin), and increased electricity demand is potentially significant.

The 2012 AQMP includes strategies that promote energy conservation (EDU-01) without identifying specific targets; therefore, its benefits have not been quantified in this analysis. Nonetheless, the 2012 AQMP impacts on electricity resources are potentially significant.

**Project-Specific Mitigation:** Mitigation measures are required as potentially significant impacts on electricity demand associated with the 2012 AQMP have been identified. As individual control measures are promulgated as new rules or rule amendment, specific mitigation measures will be identified as necessary to minimize electricity impacts. Mitigation measures are expected to include the following:

E-1 Project sponsors should pursue incentives to encourage the use of energy efficient equipment and vehicles and promote energy conservation.

E-2 Utilities should increase capacity of existing transmission lines to meet forecast demand that supports sustainable growth, where feasible and appropriate in coordination with local planning agencies.

E-3 Project sponsors should submit projected electricity calculations to the local electricity provider for any project anticipated to require substantial electricity consumption. Any infrastructure improvements necessary should be completed according to the specifications of the electricity provider.

E-4 Project sponsors should include energy analyses in environmental documentation with the goal of conserving energy through the wise and efficient use of energy.

E-5 Project sponsors should evaluate the potential for reducing peak energy demand by encouraging charging of electrical vehicles and other mobile sources during off-peak hours.

E-6 Project sponsors should evaluate the potential for reducing peak energy demand by encouraging the use of catenary or way-side electrical systems developed for transportation systems to operate during off-peak hours.

E-7 Project sponsors should evaluate the potential for reducing peak energy demand by encouraging the use of electrified stationary sources during off-peak hours (e.g., cargo handling equipment).

**Remaining Electricity Impacts:** The preceding analysis concluded that significant adverse electricity consumption impacts could be created by the proposed project because the potential 2023 electricity usage increase would exceed baseline electricity consumption by 1.5 percent. In spite of implementing the above mitigation measures, electricity consumption impacts would remain significant.

### 4.3.4.2 Natural Gas

**Project-Specific Impacts:** Control measures in the 2012 AQMP may result in an increase in demand for natural gas associated with stationary sources due to the need for additional emission controls (e.g., BCM-03, CMB-01, IND-01, FUG-01, MCS-01, INC-01, ADV-01, ADV-02, ADV-03, ADV-04, and ADV-05). Other control measures are expected to encourage the use of natural gas as a fuel to offset the use of petroleum fuels including ONRD-01, ONRD-02, ONRD-03, ONRD-05, ADV-04, and ADV-06. In addition, increased demand for electricity will require additional natural gas, as most of the power plants in California are operated using natural gas.

Total natural gas (utility) consumption in California in 2010 was approximately 4,729 million cubic feet per day with about 36.5 percent of the natural gas consumed in Los Angeles, Orange, Riverside, and San Bernardino counties (see Table 4.3-3). The residential, commercial, industrial, and electrical generation sectors account for approximately 25, 10, 17, and 39 percent, respectively, of total statewide natural gas (utility) consumption. The demand for natural gas in southern California is expected to increase by approximately 0.20 percent from 2010 to 2020[2]. The projected per capita consumption is lower than previously projected because of higher natural gas prices than previously anticipated. Natural gas for vehicle fuel use has steadily grown to where it totaled about 33 million cubic feet per day, which is about, about 0.70 percent of the total statewide natural gas (utility) use (California Gas Report, 2010).

**TABLE 4.3-3**

Natural Gas (Utility) Impacts for Los Angeles, Orange, Riverside, and San Bernardino Counties (Million Cubic Feet/Year)

| NATURAL GAS USE | 2010 | 2020 [a] | 2030 [a] |
|---|---|---|---|
| Baseline | 1,726 | 1,730 | 1,735 |

Source: California Gas Report, 2012
[a] Projections based on CEC, 2012j

**Mobile Sources** - According to the CEC, there were about 24,819 light-duty natural gas vehicles and about 11,500 heavy-duty natural gas vehicles in California in 2009 (CEC, 2011). The CEC expects a steady increase in natural gas consumption used as an alternative fuel (see Table 4.3-4), but since there is currently no policy mandate to directly incentivize the production of more natural gas vehicles, penetration of these vehicles in the light-duty sector is relatively low compared to other alternative fuel technologies (CEC, 2012j).

Some of the control measures in the 2012 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

[2] Review of the *2012 California Gas Report*, indicates SoCalGas projects total gas demand to grow at an annual rate of 0.12% from 2011 to 2030. Over the forecast period 2012-2030, demand is expected to exhibit annual decline (of 0.13%) from the level in 2012 due to modest economic growth. However, since the CEC's future natural gas demand provides a conservative analysis and future natural gas demand impacts are concluded to be significant, it is not necessary to revise the analysis.

technologies would be expected to reduce projected diesel-fuel use. 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 light-duty natural gas fuel vehicles (CEC, 2011). Further, hybrid vehicles and zero emission electric vehicles are further along in the development phase and expected to be the preferred source of power as opposed to natural gas.

**TABLE 4.3-4**

Projected Petroleum Fuel Displaced with Natural Gas in California

| FUEL TYPE | 2010 | 2020 |
|---|---|---|
| Natural Gas Vehicle Fuel Consumption in California (billion cubic feet) | 12.1 | 16.1 |
| Estimated Natural Gas Vehicle Fuel Consumption in Southern California (billion cubic feet) | 9.9 | 12.8 |
| Petroleum Fuel Displaced in California (million gallons gasoline equivalents) | 95.5 | 127.1 |
| Petroleum Fuel Displaced in Southern California (million gallons gasoline equivalents) | 78.2 | 101.0 |

Source: California Gas Report, 2012

**Stationary Sources** - For stationary sources, natural gas is already BACT, so new equipment would already be required to use natural gas. Under the 2012 AQMP control measures, a slight increase in natural gas demand is expected from the use of add-on air pollution controls associated with NOx emission reduction, add-on controls associated with VOC emission reductions, and add-on controls associated with particulate matter control. The amount of natural gas to run these control devices is unknown because the number of equipment required and the equipment sizes are not known. ~~Alternative processing~~ Replacement or retrofitted equipment is expected to be the primary method of control (e.g., the primar~~il~~y method of control for CMB-01 is expected to be new low NOx burners). Low NOx burners ~~which~~ are not expected to result in an increase in natural gas consumption, because this would require replacing one type of burner with a more efficient burner.

Approximately 39 percent of the natural gas consumed in California is used at power plants to generate electricity. Southern California Edison will need to add additional electricity generating capacity to accommodate the increase in population growth. The increased electricity demand expected in the Basin would be generated by natural gas fueled power plants resulting in an increased demand for natural gas, the amount of which is currently unknown.

FUG-01 may result in an increase in natural gas used to combust VOC emissions from vacuum trucks used to remove materials from storage tanks, vessels, sumps, boxes and pipelines. SCAQMD staff estimates that 27 million cubic feet per year of natural gas may be used to combust fugitive VOCs from storage tanks, vessels, sumps, boxes and pipelines pulled by a vacuum truck. The amount of natural gas used to combust fugitive VOCs in FUG-01 would be less than the amount of natural gas reductions expected from other

control measures (see Table 4.3-6). The increased demand for an additional 27 million cubic feet per year associated with implementing 2012 AQMP Control Measure FUG-01 would represent an increase in natural gas demand of 1.6 percent compared to the year 2010 natural gas baseline demand of the 1,726 million cubic feet per year. Therefore, the proposed project could be significant for natural gas use.

**Project-Specific Mitigation:** Mitigation measures are required as potentially significant impacts on natural gas resources associated with the 2012 AQMP have been identified. As individual control measures are promulgated as new rules or rule amendment, mitigation measures will be identified as necessary to ensure that natural gas impacts remain less than significant. Mitigation measures are expected to include the following:

E-8 Project sponsors should pursue incentives to encourage the use of energy efficient equipment and vehicles and promote energy conservation.

E-9 Utilities should increase capacity of existing natural gas lines to meet forecast demand that supports sustainable growth, where feasible and appropriate in coordination with local planning agencies.

E-10 Project sponsors should submit projected natural gas calculations to the local natural gas provider for any project anticipated to require substantial natural gas consumption. Any infrastructure improvements necessary should be completed according to the specifications of the natural gas provider.

E-11 Project sponsors should include energy analyses in environmental documentation with the goal of conserving energy through the wise and efficient use of energy.

E-12 Project sponsors should evaluate the potential for reducing peak energy demand by encouraging the use of natural gas stationary sources during off-peak hours.

**Remaining Natural Gas Energy Impacts: The** preceding analysis concluded that significant adverse natural gas consumption impacts could be created by the proposed project because natural gas usage would exceed the 2010 natural gas consumption by 1.6 percent. In spite of implementing the above mitigation measures, natural gas consumption impacts would remain significant.

#### 4.3.4.3 Petroleum Fuels

General growth in the district is expected to result in a substantial increase in the use of petroleum fuels between current conditions and 2035. Table 4.3-5 summarizes the expected increases in fuel usage, as predicted by SCAG's transportation and air quality model, between 2011 and 2035 with the investments in the Regional Transportation Plan (RTP) and without the RTP.

**TABLE 4.3-5**

Projected Transportation Fuel Consumption in Southern California
(thousand gallons per day)

| YEAR | FUEL CONSUMPTION | PERCENT INCREASE OVER 2011 |
|---|---|---|
| 2011 | 16,630 | -- |
| 2035 (without 2012-2035 RTP/SCS) | 20,274 | 8.8 |
| 2035 (with 2012-2035 RTP/SCS) | 15,342 | -17.6 |

Source: California Gas Report, 2012

Implementation of the 2012 AQMP is expected to result in a decrease in the future increased demand for petroleum fuels (e.g., diesel, distillate, residual oil, and gasoline) due to mobile source control measures (Tables 4.3-5 and 4.3-6), as well as a potential increase in engine efficiency associated with the retrofit of new engines. Control measures that are expected to result in a decrease in the demand for petroleum fuels include control measures that would result in the installation of new engines in mobile sources, which tend to be more fuel efficient, result in the use of alternative fuels, or result in an increase in electrification of mobile sources, which would eliminate the use of petroleum fuels from mobile sources. Control Measures ONRD-01, ONRD-03, and ONRD-05 are expected to encourage the introduction of about 15,000 zero to partial zero emissions vehicles. The estimated reduction in fuel use is shown in Table 4.3-6. Other control measures that are expected to result in a decrease in petroleum fuel use include OFFRD-01 (repower at least 1,200 locomotive engines with Tier 4 engines using control equipment), OFFRD-03 (replace 30 tier zero locomotives with Tier 4 engines using control equipment), and OFFRD-04 (an additional 25 percent of vessel calls would deploy shorepower technologies or alternative forms of emission reductions). Specific reduction in fuel use from these three control measures, however, is not known at this time. ADV-01 and ADV-02 may result in a decrease in diesel fuel use should "wayside" electrical infrastructure be implemented for specific freeway routes and locomotives (e.g., 300 line haul, 140 switcher, and 52 passenger). The estimated diesel fuel reduction from ADV-01 is not known, however, ADV-02 is estimated to reduce diesel fuel use by 34.7 million gallons per year.

**TABLE 4.3-6**

Estimated Reduction in Petroleum Fuels Associated with 2012 AQMP Control Measures
(gallons per year)

| CONTROL MEASURE | 2013 | 2023 |
|---|---|---|
| ONRD-01 – Incentivize light- and medium-duty trucks (9,000 vehicles) [a] | 663,157 | 5,968,421 |
| ONRD-02 – Accelerated retirement and replacement of pre-1992 light- and medium-duty vehicles (18,000 vehicles) [a] | 1,326,315 | 11,936,842 |
| ONRD-03 – Encourage the introduction of hybrid and zero-emission vehicles (5,000 vehicles) [b] | 1,509,091 | 7,545,455 |
| ADV-02 – Electrification of 492 locomotive engines [c] | | 34,700,000 |
| **Total** | **3,498,563** | **60,150,718** |

[a] Based on 12,600 miles/year and 19 miles/gallon.
[b] Based on 16,600 miles/year and 11 miles/gallon.
[c] Estimated assuming electrification of locomotives is the selected technology.

Some of the control measures are also expected to result in the installation of retrofit equipment (catalysts, PM traps, etc.) including OFFRD-01, OFFRD-02, and OFFRD-03 Table 4.3-7). These control measures would be expected to result in both reductions as well as increases in petroleum fuel use. 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 because add-on control devices, such as diesel particulate filters, SCRs, catalytic controls, etc., generally result in a decrease in engine efficiency. The use of SCR and diesel particulate filters on construction equipment, for example, could result in an increase in fuel use for the retro-fitted equipment. The amount of additional fuel that would be required would be dependent on the type of control equipment installed and the energy requirement to operate the equipment. However, mobile sources that would have newer engines installed would be expected to result in an increase in efficiency and decrease in fuel use, the amount of which is currently unknown.

Additional diesel fuel may also be required for operational activities under control measures such as FUG-03 - Further ~~VOC~~ Reductions from Fugitive VOC Emissions, which would require additional monitoring and inspection; MCS-02, which may require additional haul trips to remove green waste; and BCM-04, which would require delivery and application of acidifiers. Details of these activities and which facilities may be affected are not known at this time, so the amount of additional diesel fuel cannot be estimated at this time.

**TABLE 4.3-7**

Off-Road Equipment and Related Control Equipment

| CONTROL MEASURE | TYPE OF EQUIPMENT | TYPES OF EMISSION CONTROLS | ASSUMED NUMBER OF UNITS AFFECTED |
|---|---|---|---|
| OFFRD-01 | Off-road diesel construction vehicles | SCR, Diesel particulate filters | 1,200 |
| OFFRD-02 | Freight locomotive (line haul) | SCR, Diesel particulate filters | 300 |
| OFFRD-02 | Freight locomotive (switcher) | SCR, Diesel particulate filters | 140 |
| OFFRD-03 | Passenger locomotives | SCR, Diesel particulate filters | 52 |

Construction activities that could be required to implement control measures in the 2012 AQMP would also increase the use of gasoline and diesel, including BCM-03, CMB-01, CMB-02, CMB-03, IND-01, FUG-01, FUG-02, FUG-03, MCS-01, MCS-02, MCS-03, INC-01, ONRD-05, OFFRD-01, OFFRD-05, ADV-01, ADV-02, ADV-03, ADV-04, ADV-05, and ADV-06. Construction activities could be required under a number of the control measures to develop transportation infrastructure (e.g., overhead catenary lines), install air pollution control equipment, and further develop electricity to support electrification of sources. The amount of petroleum fuels required would depend on the extent of the specific construction activities. Larger construction projects, which would use the most fuels, are likely to require project specific CEQA review and their specific energy requirements would be evaluated at that time. However, there are currently adequate fuel supplies in California. In fiscal year 2011, 14,728,734,063 gallons of gasoline and 2,564,017,901 gallons of diesel were sold in California (California State Board of Equalization, 2012). Construction activities are temporary and all construction equipment will cease once construction activities are finished. As the use of petroleum fuels in other mobile sources decreases, there is likely to be an excess availability of gasoline and diesel. Implementation of the 2012 AQMP is expected to result in an overall reduction in the use of petroleum fuels (see Table 4.3-6). Therefore, no significant adverse impacts on petroleum fuels are expected due to implementation of the 2012 AQMP.

Emissions from mobile sources are the largest contributors to emissions in the district. Overall, implementation of the 2012 AQMP is expected to result in a large reduction in emissions from mobile sources. Many of the emission reductions associated with the 2012 AQMP are expected to come from mobile sources. In order to achieve the necessary emission reductions, it is expected that a reduction in the use of petroleum fuels would be necessary. Therefore, overall the 2012 AQMP is expected to result in a reduction in the use of gasoline and diesel fuels, because of requirements resulting in higher energy efficiencies or displacement by alternative clean fuels. The largest reductions in use of petroleum-based fuels are expected from the on-road mobile source sector switching to electricity or 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 (see Tables 4.3-4 and 4.3-6). Therefore, implementation of the 2012 AQMP is not expected to result in a significant increase on petroleum fuel use.

**Project Specific Mitigation Measure:** No significant impacts on petroleum fuels associated with the 2012 AQMP were identified because of anticipated reduction in future demand so that no mitigation measures are required.

**Remaining Petroleum Fuel Impacts:** Since potential petroleum fuel energy demand impacts are expected to be less than significant and no mitigation measures are required, impacts remain less than significant.4.3.4.4 Alternative Fuels

General growth in the district is expected to result in a substantial increase in the use of petroleum fuels between current conditions and 2035. Table 4.3-5 summarizes the expected increases in fuel usage, as predicted by SCAG's transportation and air quality model, between 2011 and 2035 with the investments in the RTP and without the RTP.

The 2012 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 such as CNG and hydrogen. (Please note that the impacts associated with reformulated petroleum fuels (e.g., emulsified diesel fuels and reformulated fuels) are included under the discussion of petroleum fuels as they are predominately comprised of petroleum-based fuels). Control measures that may increase the use of alternative fuels include IND-04, ONRD-03, ONRD-05, OFFRD-01, OFFRD-03, ADV-01, ADV-02, ADV-03, ADV-04, ADV-05, ADV-06, and ADV-07.

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.

*4.3.4.4.1 Electricity and Natural Gas*

The use of electricity and natural gas as alternative fuels for mobile vehicles was discussed in the previous subsections 4.3.4.1 Electricity and 4.3.4.2 Natural Gas.

#### *4.3.4.4.2 Biodiesel*

The advantages of biodiesel include decreased net carbon dioxide, hydrocarbon, carbon monoxide, and particulate matter emissions, and fuel properties similar to petroleum diesel for ease of use in diesel engines. Its disadvantages include poorer cold flow characteristics, lower heating values, and mostly reported higher NOx emissions. There are 16 biodiesel production facilities in California with an annual production capacity of 84.5 million gallons. This production capacity is sufficient to supply California's total "proportional share" of biodiesel under the 2007 Renewable Fuel Standard (RFS2) under EISA of 2007. The CEC states that demand for biodiesel may be necessary by obligated parties in California to help achieve compliance with the California Low Carbon Fuel Standard (LCFS) requirements (CEC, 2011). However, to the extent that low and zero emission technologies are implemented as a result of implementing 2012 AQMP control measures, it is likely that biodiesel demand would decline similar to any declines in demand for diesel fuel.

#### *4.3.4.4.3 Ethanol and E85*

There are a number of 2012 AQMP control measures that identify alternative fuels as a potential compliance option. Since many of the control measures ultimately call for low or zero emitting equipment it is unclear whether or not ethanol or ethanol blends would be used as a compliance option, but it is assumed that there could be increased demand for ethanol and ethanol blends as combustion fuels.

Currently, most of the ethanol used in California is imported from corn based ethanol plants in the Midwest. There are two facilities in Southern California (one in Carson and one in Colton) that are capable of receiving unit trains of ethanol. Together, they import 672,000 gallons per year of ethanol (CEC, 2011). In addition, there are five corn-based ethanol facilities in California. Three of the five California corn-based ethanol facilities are operating with a collective production capacity of nearly 170 million gallons per year (CEC, 2011). Two of the California facilities remain idle, because of poor economic conditions, with a combined capacity of 71 million gallons per year. All California facilities that are currently idle are assumed to be fully operational at their rated nameplate capacity of nearly 71 million gallons per year beginning January 2013 (CEC, 2011). The potential production capacity, including future ethanol production facilities, for advanced biofuels ethanol production in California is estimated by CEC staff at approximately 502 million gallons per year (CEC, 2011). Based on this information, it is likely that there is sufficient ethanol production capacity to meet any increased demands by 2012 AQMP control measures.

#### *4.3.4.4.4 Methanol and M85*

Since M85 is no longer sold in California, M85 is not expected to be affected by AQMP control measures.

#### *4.3.4.4.5 Hydrogen*

There is growing interest and financial support for the use of hydrogen-powered fuel cells to power cars, trucks, homes and business. Hydrogen vehicles in California consist of

demonstration fuel cell passenger cars, internal combustion engine passenger cars, fuel cell buses, and hybrid fuel cell buses. The California Fuel Cell Partnership, a public-private partnership between interested industry and state and local government agencies, has been leading the coordination of fuel cell vehicle demonstrations in California. To date, 250 hydrogen fuel cell vehicles have been placed on California's roads in demonstration projects (CEC, 2011).

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. California has been developing the infrastructure of a hydrogen highway, the California Hydrogen Highway Network (CaH2Net). The mission of CaH2Net is to assure that hydrogen fueling stations are in place to meet the demands of fuel cell and other hydrogen vehicle technologies. The first hydrogen station was opened on April 20, 2004 and there are now 23 hydrogen fueling stations in California. Although the specific station numbers originally called for 50 to 100 stations by 2010, there has been a strategic refocusing on putting additional emphasis on creating clusters of hydrogen fueling stations in key urban areas such as Los Angeles and Orange counties, Sacramento, and the San Francisco Bay area (CARB, 2011).

One of the goals of the 2012 AQMP is to shift from conventional petroleum based fuels to less polluting alternative transportation fuels, including hydrogen. Although the 2012 AQMP does not mandate hydrogen fuel use by fleet operators, it does call for further technology demonstration and deployment. Therefore, without regulatory requirements or market incentives, the use of hydrogen fuel in the 2020 timeframe attributable to the 2012 AQMP, increased demand impacts for hydrogen fuel is not expected to be significant.

#### *4.3.4.4.6 Propane (LPG)*

There are a number of 2012 AQMP control measures that identify alternative fuels as a potential compliance option. Since many of the control measures ultimately call for low or zero emitting equipment it is unclear whether or not LPG would be used as a compliance option, but it is assumed that there could be increased demand for LPG as combustion fuels. Propane is an unregulated fuel in California (except for storage and safety issues), no data is collected by the state on LPG sales or usage.

Propane vehicle conversions were negatively affected by the EPA's addendum to Memorandum 1A, which led to decreases in the number of vehicle conversions. The supply of propane used in transportation is expected to be sufficient in the near future, both worldwide and in the United States (U.S. DOE, 2010), should LPG-fueled vehicles meet the applicable vehicle tailpipe standards.

**Project Specific Mitigation:** Based on the above information, potential alternative energy demand impacts are expected to be less than significant so that no mitigation measures are required.

**Remaining Alternative Energy Impacts:** Since potential alternative energy demand impacts are expected to be less than significant and no mitigation measures are required, impacts remain less than significant.

#### 4.3.4.5 Renewable Energy

A number of 2012 AQMP control measures would encourage the use of clean fuels and alternative fuels or electrification of equipment. For example, Control Measures INC-01, ONRD-01, ONRD-02, ONRD-03, ONRD-05, OFFRD-04, ADV-01, ADV-02, ADV-03, ADV-04, ADV-05, and ADV-06 may result in the use of more electric or hybrid vehicles or equipment.

There are number of different types of renewable energy sources such as wind turbines, windmills, windpumps, or sails; hydroelectric; geothermal; and solar thermal and photovoltaic. No 2012 AQMP control measures were identified that would directly or indirectly adversely affect these renewable sources of electricity. With regard to potential electricity impacts from the 2012 AQMP, refer to subsection 4.3.4.1.

Two control measures may affect biomass/biogas sources: CMB-02 and MCS-02. CMB-02 would require the replacement of existing biogas flares with new biogas flares. The new biogas flares would be more efficient, but would not alter the amount of biogas combusted in the flares. MCS-02 would require that chipped or ground greenwaste be covered to the extent possible. MCS-02 may also require additional best management practices or controls, but is not expected to affect the amount of biomass processed.

California's Renewables Portfolio Standard requires the use of 33 percent renewable energy by 2020. No control measures in the 2012 AQMP would interfere with complying with the renewable energy requirement. Control measures in the 2012 may increase demand for electricity, but this would have no effect on electricity generating sources, either renewable or conventional energy generating sources.

**Project Specific Mitigation:** Based on the above information, potential renewable energy impacts are expected to be less than significant so that no mitigation measures are required.

**Remaining Renewable Energy Impacts:** Since potential renewable energy demand impacts are expected to be less than significant and no mitigation measures are required, impacts remain less than significant.

### 4.3.5 Summary of Energy Impacts

The following is the summary of the conclusions of the analysis of energy impacts associated with implementation of the 2012 AQMP.

- Electricity: Implementation of the 2012 AQMP control measures is expected to result in an overall increase. While this increase is expected to be within the electric generating capacity of the region, an increase in electricity of greater than one percent represents a substantial increase in electricity use. Thus, the energy impacts associated with electricity demand from the implementation of the 2012 AQMP are considered to be significant.
- Natural Gas: The energy impacts associated with implementation of the control measures and strategies in the 2012 AQMP are expected to result in an increase in

natural gas demand. The increased demand for natural gas is considered to be significant.

- Petroleum Fuels: The energy impacts associated with implementation of the control measures and strategies in the 2012 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 demand for hydrogen as a transportation fuel is expected due to implementation of the control measures and strategies in the 2012 AQMP, this increase is not expected to be significant since hydrogen is not widely available and its use is currently limited. Hydrogen is available or the feedstock that produces it is generally available. Future demand is expected be met through increased production. The energy impacts associated with the future use of hydrogen is expected to be less than the current strategy that uses predominately petroleum based fuels so that no significant hydrogen demand impacts on are expected.
- Renewable Energy: No 2012 AQMP control measures were identified that would adversely affect renewable energy production or interfere with the goals and requirements of the Renewables Portfolio Standard.

Summary of PM2.5 Control Measure Impacts: Energy impacts associated with PM2.5 control measures were evaluated and determined to be less than significant for electricity, natural gas, petroleum fuels, and alternative fuels impacts.

Summary of Ozone Control Measure Impacts: Energy impacts associated with the ozone control measures (22 control measures, see Table 4.3-1) were evaluated and determined to be significant for electricity and natural gas; and less than significant for petroleum fuels, and alternative fuels impacts.