Regional Connector Transit Corridor
Draft Environmental Impact Statement/
Draft Environmental Impact Report

APPENDIX W

ENERGY RESOURCES

State Clearinghouse Number: 2009031043

Regional Connector Transit Corridor
Energy Resources
Technical Memorandum

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Prepared for

Los Angeles County Metropolitan Transportation Authority

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Los Angeles, CA 90012

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ACRONYMS

BTU	British Thermal Units
CALTRANS	California Department of Transportation
CEC	California Energy Commission
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CNG	Compressed Natural Gas
DOE	Department of Energy
LADWP	Los Angeles Department of Water and Power
Muni	San Francisco Municipal Railway
NEPA	National Environmental Policy Act
OCS	Overhead Catenary System
SAFTEA-LU	Safe, Accountable, Flexible, and Efficient Transportation Act: A Legacy for Users
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCE	Southern California Edison
SCoAB	South Coast Air Basin
SIP	State Implementation Plans
VMT	Vehicle Miles Traveled

1.0 SUMMARY

Provision of new rail services is anticipated to result in decreased highway vehicle miles traveled (VMT) and a corresponding decrease in the consumption of fossil fuels throughout the project area. While construction of the proposed alternatives would require energy expenditures, projected horizon year (2035) decreases in VMT and corresponding energy savings outweigh the one-time energy costs required for construction.

The following section describes existing energy supplies as well as existing and forecasted demand for energy resources in the project area. Estimated energy requirements for each of the proposed alternatives were compared to baseline conditions (year 2009) to analyze impacts under the California Environmental Quality Act (CEQA) and to horizon year conditions (year 2035) to analyze impacts under the National Environmental Policy Act (NEPA). Potential energy impacts for each alternative were broken down into construction energy use and operational energy use.

For operational energy impacts, the analysis looked at changes in regional VMT, added bus routes, added light rail lines, and added light rail stations. In order to compare impacts for CEQA and NEPA analysis, energy use is expressed in British Thermal Units (BTUs) and equivalent barrels of oil. Since other units of energy can all be converted into equivalent BTU units (Table 3-1) the BTU is used as the basis for comparing energy consumption associated with different resources.

Construction and operational energy usage was compared to CEQA and NEPA significance thresholds in Section 3.1 to determine the significance of potential impacts for each of the proposed alternatives. Predicted energy usage for each alternative is greater than energy usage in 2009 because of a forecasted increase in regional VMT. Increased VMT, and a corresponding increase in energy use, would result predominantly from projected regional population growth and other factors unrelated to the proposed project. Reasons for this increase are further described in the *Climate Change Impacts Technical Memorandum* written for this project.

Compared to the No Build Alternative, operational energy use under the TSM and build alternatives would decrease. Thus, the project would have a beneficial impact on energy resources and fossil fuel consumption in the project area. As described previously, each of the build alternatives would result in a one-time, non-recoverable expenditure of energy during the construction phase.

Energy needed for construction would be supplied by the Los Angeles Department of Water and Power (LADWP) and would not result in the need for new off-site energy supply facilities. Operation of the Transit System Management Alternative and the build alternatives would reduce automobile VMT throughout the project area by more than 100 million vehicle miles annually. Additionally, operational energy use under the build alternatives would result in a decrease in total annual BTUs in the region of 0.054 to 0.063 percent compared to the No Build Alternative.

2.0 INTRODUCTION

This section characterizes energy resources, usage associated with the proposed Regional Connector Project alternatives, and the net energy demand associated with changes to the regional transportation network under each of the proposed alternatives. Energy resources and the consumption of energy are integral considerations for this project. Construction activities would consume differing amounts of energy, and it is necessary to analyze the impacts these energy needs could have on the current generation capacity of the Los Angeles Department of Water and Power (LADWP) as well as petroleum resources. The operation of each alternative would consume energy in two main ways:

- Operational energy needs of new Metro stations, light rail trains, and buses; and
- Changes in regional automobile VMT and corresponding changes in regional fuel use

Overall energy demand in Los Angeles County for transportation and non-transportation uses will continue to increase as the County's population grows. Congestion on freeways in the County and region, combined with long commuting distances of the region's workforce, results in proportionally higher transportation-related energy use compared to the rest of the state (Los Angeles County 2008).

The following sections describe existing conditions for energy use at the regional and local level. Section 5 analyzes potential energy impacts for both the construction and operation stages of the project alternatives. The increment between a proposed future alternative (2035) and existing conditions (2009) was determined to evaluate project significance under CEQA, whereas the increment between a proposed future alternative (2035) and the No Build Alternative (2035) was used to evaluate project significance under NEPA.

3.0 METHODOLOGY FOR IMPACT EVALUATION

3.1 Regulatory Framework

3.1.1 Federal

The Energy Policy and Conservation Act of 1975 calls for energy conservation, when feasible. The Alternative Fuels Act of 1988 amends a portion of the Energy Policy and Conservation Act to encourage the use of alternative fuels including electricity. The Safe, Accountable, Flexible, and Efficient Transportation Act: A Legacy for Users (SAFETEA-LU), passed in 2005, focuses on reducing traffic congestion, increasing intermodal connectivity, and protecting the environment. SAFETEA-LU gives state and local transportation decision makers more flexibility for solving transportation problems in their communities (Federal Highway Administration 2005).

3.1.2 State

3.1.2.1 California Energy Commission

The California Energy Commission is responsible for, among other things, forecasting future energy needs for the state. Senate Bill 1389 (Chapter 568, Statutes of 2002) requires the commission to prepare a biennial integrated energy policy report assessing major energy trends and issues facing the state's electricity, natural gas, and transportation fuel sectors. The report also provides policy recommendations to conserve resources, protect the environment, and ensure reliable, secure, and diverse energy supplies (California Energy Commission 2009). The most recent report was issued in December 2009.

3.1.2.2 Executive Order S-3-05

Executive Order S-3-05 was enacted in June 2005. The order sets specific greenhouse gas emission reduction targets for the state and gives the Transportation and Housing Agency responsibility to help meet the targets. The executive order sets 2050 greenhouse gas reduction targets at 80 percent below 1990 levels (California Energy Commission 2009). The order envisions reduced VMT and increased vehicle fuel efficiency as major factors in achieving greenhouse gas reductions.

3.1.2.3 Southern California Association of Governments (SCAG)

The SCAG is required by state and federal mandates to prepare a regional transportation plan (RTP) every 3 years. The 2008 RTP provides a long-range vision for regional transportation goals and policies and predicts transportation challenges and the region's future transportation strategy.

The SCAG region is the second-most populated metropolitan area in the United States. Population estimates from 2007 were approximately 19 million for the region with an expected increase to 24 million by 2035. Growth in population is expected to result in greater demands on the region's transportation system (SCAG 2008). The proposed project is located in the South Coast Air Basin (SCoAB), a sub-region of the South Coast Air Quality Management District (SCAQMD).

The SCAG 2008 report describes energy production and consumption throughout the SCoAB and provides VMT by county. VMT data indicates the extent of vehicle usage throughout the region and is a valuable factor in calculating the amount of energy consumed by transportation.

The RTP establishes the following goals relevant to the proposed project:

- Preserve and ensure a sustainable transportation system
- Protect the environment, improve air quality, and promote energy efficiency

These goals are implemented through the five policies established by SCAG in the RTP. Policies include balancing safety, maintenance, and efficiency of the existing transportation system with the need for system expansion (SCAG 2008).

3.1.3 Regional

3.1.3.1 Air Quality Management Districts

As described in the Air Quality Technical Memorandum, the SCAQMD has the primary responsibility for developing the plans and regulations that will improve air quality in the SCoAB. The SCAQMD has set daily and quarterly emission thresholds for construction and operational sources. In addition, the SCAQMD is responsible for contributing to the development of State Implementation Plans (SIPs) in compliance with federal and state Clean Air Act regulations to reduce unhealthy levels of air pollutants. The SCoAB contributes to the SIPs by indicating how air quality standards will be met through the development of air quality management plans. Among other strategies, these plans promote reductions in VMT through the development of transportation alternatives (Los Angeles County 2008).

3.1.3.2 Metro Energy and Sustainability Policy

Metro adopted an Energy and Sustainability Policy in June 2007 to aid in controlling energy consumption and encouraging energy efficiency, conservation, and sustainability. Metro's long-term objectives include:

- Reducing the use of fossil fuels through the use of ambient and renewable energy sources
- Using fuels and electricity as efficiently as possible
- Reducing the amount of carbon dioxide emissions caused by Metro's consumption

3.1.3.3 Los Angeles County General Plan

The Mineral and Energy Resources Section of the County's General Plan addresses the use and management of valuable energy and mineral resources in Los Angeles County. (Los Angeles County 2008). The County recognizes that there is a high demand for energy resources and projected growth in the region will continue to strain these supplies. The General Plan seeks to promote efficient and sustainable use of energy resources and combat the stress placed on finite energy resources by patterns of low-density, automobile-dependent communities.

The County's policies promote the development of rail and bus transportation alternatives. Policy C/OS 9.1, *Expand the Production and Use of Alternative Energy Resources*, would relate specifically to construction of the proposed alternatives since there would be the potential to decrease petroleum use and increase electricity-powered rail lines.

The Mobility Element of the General Plan includes policy guidance and strategies to reach the County's long-term transportation goals. Specific policies include the following:

- Policy M1.1: Expand the availability of transportation options throughout the County.
- Policy M1.2: Encourage a range of transportation services at both the regional and local levels, especially for transit dependent populations.
- Policy M1.7: Maintain, upgrade, and create new transit facilities.
- Policy M2.2: Expand transportation options throughout the County that reduce automobile dependence.
- Policy M2.3: Reduce Vehicle Miles Traveled (VMT) and vehicle trips through the use of alternative modes of transportation.

SCAG reported a 6 percent (44 million boardings) increase in transit use in the region from July 2005 to July 2006. Such increases align with the County's General Plan goals and have potentially significant implications for countywide energy savings. Policies in the Mobility Element of the General Plan are consistent with and supportive of policy directives of the SCAG, Metro, and other agencies charged with transportation planning in Los Angeles County.

3.1.3.4 City of Los Angeles General Plan

The purpose of the City's Transportation Element (City of Los Angeles 1999) is to guide the future development of a citywide transportation system. Primary emphasis is placed on maximized efficiency and reducing vehicle trips.

The following policy in the Transportation Element relates to the proposed alternatives:

- Policy 2.2: Promote the development of transportation facilities and services that encourage transit ridership such as enhanced transit services and improved transit safety

3.2 Standards of Significance

3.2.1 NEPA Guidance

The Council on Environmental Quality (CEQ) dictates requirements for reporting environmental consequences under NEPA. While there are no specific NEPA criteria for analyzing impacts to energy resources, 40 CFR § 1502.16(e) directs that EISs include a discussion of the "energy requirements and conservation potential of various alternatives," "natural or depletable resource requirements and conservation potential of various alternatives," and potential mitigation measures.

3.2.2 CEQA Guidance

The following significance criteria are based on Appendix G of the state CEQA Guidelines (CERES 2005) and the *City of Los Angeles CEQA Thresholds Guide* (2006). The proposed project alternatives would result in a significant impact to energy resources if they would:

- Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state;
- Require new (off-site) energy supply facilities and distribution infrastructure, or capacity enhancing alterations to existing facilities;
- Conflict with adopted energy conservation plans;
- Use non-renewable resources in a wasteful and inefficient manner; or
- Result in a need for new systems or substantial alterations to power or natural gas.

It is possible to determine whether the alternatives would have a significant effect on energy supplies by comparing the energy demands of the alternatives to current and anticipated energy supplies.

Appendix F, Energy Conservation, of the state CEQA Guidelines describes the specific requirements for EIRs to include a discussion of potential energy impacts for proposed projects. CEQA energy conservation goals include decreasing overall per capita energy consumption and decreasing reliance on natural gas and oil. Particular emphasis is given to reducing inefficient, wasteful and unnecessary consumption of energy, and alternatives should be compared based on these criteria.

In addition to the above significance thresholds, the City of Los Angeles CEQA Guide (2006) describes appropriate considerations for cumulative impact analysis to energy resources. These guidelines state that cumulative projects relying on the same energy distribution infrastructure as the proposed project should be analyzed for their cumulative impact on energy supply and distribution. In addition, it should be determined whether new energy supply and distribution infrastructure would be required as a result of the cumulative effect of all relevant projects.

3.3 Evaluation Methodology

Analysis of potential energy resource impacts included consideration of the following elements:

- Construction-related energy
- Energy operating costs
- Direct energy consumption (measured in British thermal units (BTU) per vehicle mile for cars, trucks, buses, and light rail operating in the project area)
- Net project operating energy savings or costs

The area of potential impact for energy resources is defined by the LADWP's service area for short-term construction and station operation energy demands. Changes in regional VMT were assessed using data generated in the Transportation/Traffic technical report; therefore, the area of potential impact used to compare changes in VMT and corresponding energy use between alternatives aligns with that used in the Transportation technical report.

Detailed explanations of how each of the above was determined are given in the following section.

3.3.1 Construction and Operations Energy Analysis

3.3.1.1 Construction

Energy consumption during construction was determined by analyzing the energy requirements of construction equipment and construction processes. Energy requirements would differ for the construction phase of at-grade alternatives versus underground alternatives. The use of earthmoving equipment for excavating tunnels would be the primary source of additional energy consumption during construction of underground alternatives.

Construction-related impacts were estimated by applying a highway construction energy factor to the total estimated construction cost of the Regional Connector project. The California Department of Transportation (CALTRANS) derived energy consumption for different light rail transit facilities in *Energy and Transportation Systems,* and these factors are still widely used in the industry today (CALTRANS 1983).

Consumption factors are reported in BTUs per dollar of construction spending. Given the date of this data source, the energy consumption factors were adjusted to account for the change in construction costs. The California Construction Cost Index was used to adjust the factors to 2009 dollars.

The following energy consumption factors were used to estimate the energy consumed during project construction:

- Track elements: 6,012 BTU/2009$
- Site work and special conditions: 6,012 BTU/2009$
- Systems (including signaling and power supply and distribution): 9,240 BTU/2009$
- Stations, stops, terminals: 6,012 BTU/2009$
- Maintenance facilities: 7,394 BTU/2009$

Only direct construction costs related to this project were used to calculate energy consumption during construction. Professional engineering and right-of-way costs were not considered in the analysis.

3.3.1.2 Operations

Operational energy requirements would differ between at-grade and underground alternatives due to the need for escalators, elevators, and heating, cooling, and ventilation systems in underground stations. Each alternative would require the installation of an overhead catenary system (OCS) above the track-way to supply electricity to the trains.

Analysis of the operational energy impact of proposed stations for the At-Grade Emphasis LRT Alternative, the Underground Emphasis LRT Alternative, the Fully Underground LRT Alternative – Little Tokyo Variation 1 and Little Tokyo Variation 2 was determined following the same methodology used in the Climate Change Technical Memorandum, following Chester and Horvath's electricity usage factors used for the San Francisco Municipal Railway (Muni) in San Francisco (Chester and Horvath 2008).

3.3.2 VMT and Fuel Consumption Energy Analysis

The project area in downtown Los Angeles has a relatively low population density compared to its employment base. This disparity results in heavy commuter traffic in the morning and afternoon peak hours. The project area has the highest levels of mass transit ridership in the four-county region (Los Angeles, Orange, Riverside, and San Bernardino), and the transit system alleviates traffic congestion on freeways and arterial streets in the vicinity of downtown Los Angeles. Potential energy impacts related to VMT and vehicle fuel consumption are described and analyzed for a four-county region since the Regional Connector is intended to affect commuters and ridership from surrounding counties.

Energy needs for the proposed alternatives are measured in BTUs and equivalent barrels of oil. A BTU is defined as the quantity of heat required to raise the temperature of water one degree Fahrenheit at sea level. Table 3-1 compares various types of energy and their equivalent BTU units.

Table 3-1. Energy Comparisons

Energy Type	Energy Unit	Equivalent BTU Units
Electrical	Kilowatt-Hour (kWh)	3,412
Natural Gas	Cubic Foot	1,034
Crude Oil	Barrel (42 Gallons)	5,800,000
Gasoline	Gallon	125,000

Source: California Energy Commission 2007.

The United States Department of Energy's (DOE) *Transportation Data Book* was used to identify BTUs for each vehicle type in the project area and determine energy consumption factors for different modes of transportation. Table 3-2 summarizes these energy consumption factors. For transit buses, the DOE provides only one level of energy intensity regardless of fuel type (e.g., compressed natural gas or diesel). Light rail transit mode energy intensity accounts for electric use. Change in VMT was calculated based on the BTU per vehicle-mile rate shown in Table 3-2. Passenger miles for each alternative were obtained from the transportation model.

Table 3-2. Energy Consumption Factors	
Mode	**Factor (BTU/Vehicle Mile)**
Cars/Light Trucks[1]	6,213
Buses[2]	6,255
Light Rail[2]	77,327

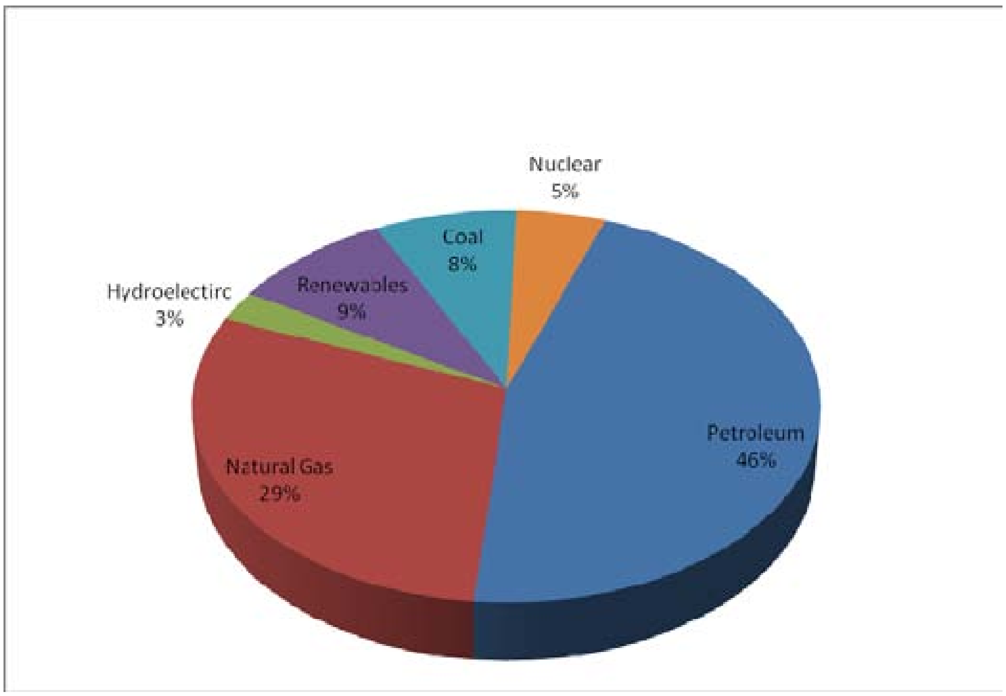
Sources: [1] RY2007 Database: http://www.ntdprogram.gov/ntdprogram/data.htm; [2] DOE 2008;

4.0 AFFECTED ENVIRONMENT

4. 1 California's Energy

Existing conditions of the state's energy and electricity supply and demand were developed from the two most recent California Energy Commission (CEC) Integrated Energy Policy Reports (2007 and 2009).

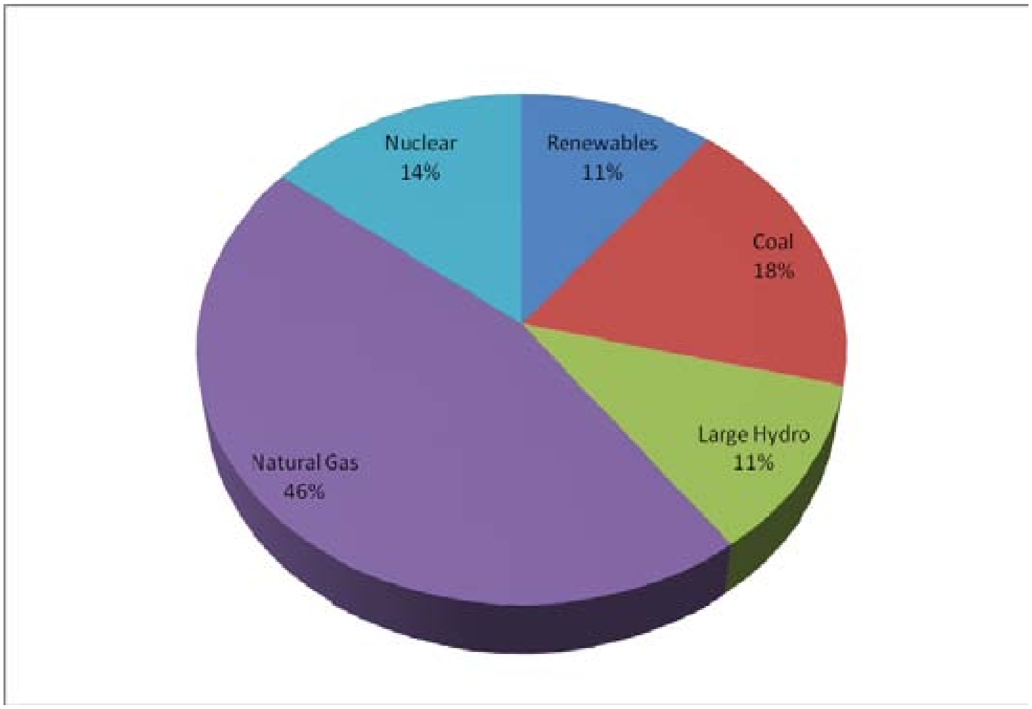
Currently, the state's energy infrastructure is over-burdened. Population growth is expected to increase demand for energy throughout the state (CEC 2009). Figure 4-1 depicts the makeup of California's energy sources in 2006.



Source: California Energy Commission 2007a.

Figure 4-1. California's Energy Sources - 2006

Electricity and transportation are the major energy use sectors analyzed by the CEC. Federal and state policies and regulations are gradually transforming electricity generation to cleaner sources and away from reliance on petroleum sources (CEC 2007a). Figure 4-2 depicts the state's electricity generation supply mix in 2008 (CEC 2009).



Source: CEC 2009.

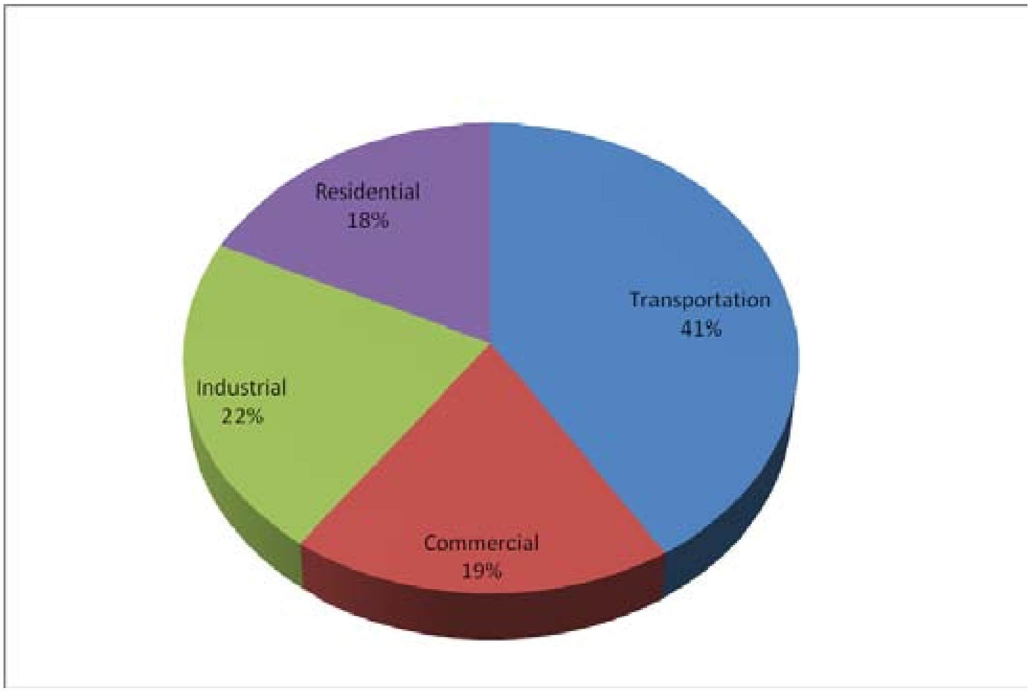
Figure 4-2. California's Electricity Generation Mix – 2008

4.2.2 Energy and the Transportation Sector

As shown in Figure 4-3, the transportation sector in California consumes a relatively large amount of energy. There has been a dramatic increase in the number of vehicles operated and the number of vehicle miles traveled in the state since the early 1970s. The California Energy Commission reports that Californians consumed approximately 20 billion gallons of gasoline and diesel fuel due to transportation in 2007. This amount represents an increase of nearly 50 percent over the last 20 years.

Registered vehicles operating in the state produce about 40 percent of the state's greenhouse gas emissions (CEC 2007b). Current projected growth rates from the Department of Finance and Moody's Economy.com indicate that population and real personal income will continue to increase between 2009 and 2030. Based on these projections, travel demand in California would likely increase during the same period (CEC 2009).

In 2006, the state's nearly 26 million vehicles consumed almost 16 billion gallons of gasoline and 4 billion gallons of diesel. California is the third largest consumer of gasoline in the world, behind the rest of United States and China (CEC 2007a). Figure 4-3 shows how over 40 percent of all energy consumed in the state is used for transportation.



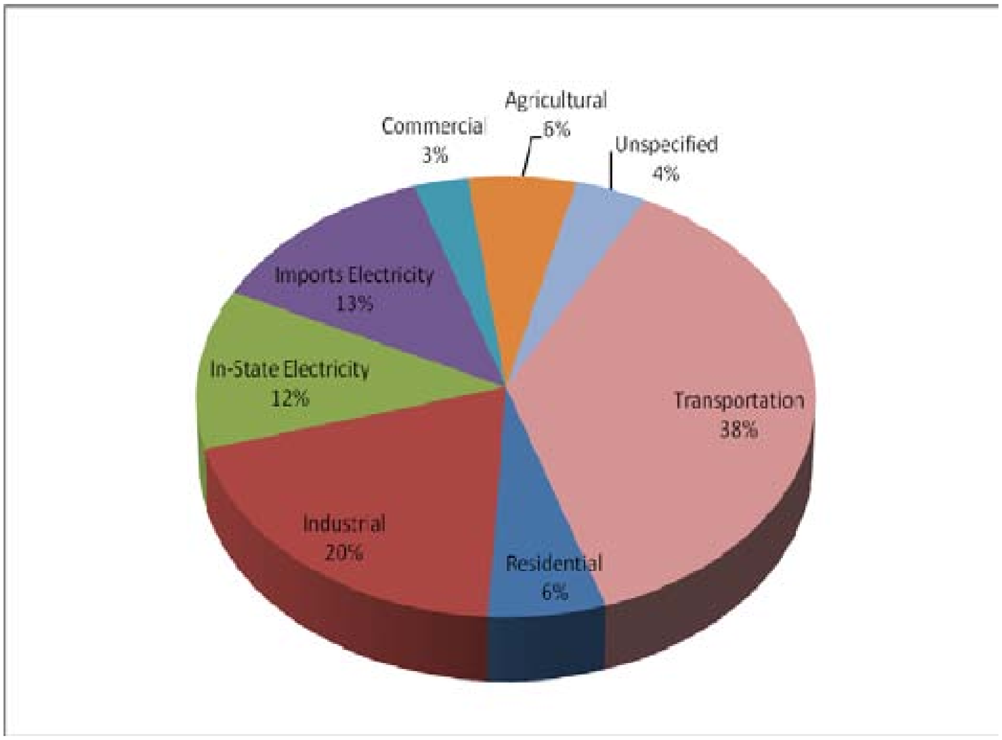
Source: California Energy Commission 2007a.

Figure 4-3. California Energy Use by Sector – 2006

The CEC's 2009 *Integrated Energy Policy Report* presents gasoline and diesel demand forecasts for both a low petroleum price case (high demand) scenario and a high petroleum price case (low demand) scenario. The high-demand scenario projects peak gasoline demand to be 16.4 billion gallons in 2014 and 14.32 billion gallons in 2030 (4 percent below 2008 levels). The low-demand scenario projects a peak demand of 15.69 billion gallons in 2014 and 13.57 billion gallons in 2030 (a decrease of 9 percent below 2008 levels).

The low demand scenario projects that total diesel demand will increase to 5.14 billion gallons, an increase in 49.8 percent between 2008 and 2030. Under the high-demand scenario, diesel demand would increase 57.4 percent to 5.4 billion gallons.

Transportation in Los Angeles County continues to be dominated by single-occupancy automobiles. In 2005, 74.7 percent of all people in the Southern California region drove alone to work (Los Angeles County 2008). High percentages of single-occupancy vehicles result in higher VMT throughout the state. In turn, high VMT translate into high energy use and increased air quality pollutants in the SCAG region. The CEC's *Integrated Energy Policy Report* concludes that the transportation sector is the largest polluter of greenhouse gases in the state (CEC 2007a). Figure 4-4 shows the role the transportation sector plays in greenhouse gas emissions.



Source: California Air Resources Board 2007, as cited in CEC 2007a.

Figure 4-4. Sources of Greenhouse Gas Emissions – 2004

The most recent available data for Metro bus and light rail energy consumption in the project region are from 2007. In that year, light rail and buses consumed approximately 900 billion BTUs, the equivalent of approximately 160,000 barrels of oil. The most recent data for annual automobile energy consumption in the region comes from the transportation model. Automobiles in the region consumed approximately 700,000 billion BTUs in 2009, the equivalent of over 118 million barrels of oil. Table 4-1 summarizes baseline (2009) annual energy usage in the region.

Metro Fuel Consumption

Metro's 2009 *Baseline Sustainability Report* describes that Metro ridership outpaced population growth by 14 percent between 1997 and 2008. While ridership grew by approximately 23 percent, the County's population grew by only nine percent (LACMTA 2009a). The report notes the role that increasing ridership can play in reducing regional VMT.

Table 4-1. Regional Annual Transportation Energy Usage, Existing Conditions [a]				
Vehicle Class	Consumption Factors1. 2 (BTU/mi)	Miles Travelled (Annual)	Total BTU Consumption (Billions)	Total Barrels of Oil
Light Rail[2]	77,327	3,925,583	304	52,400
Bus[2]	6,255	101,930,386	638	110,000
Automobiles[3]	6,213	111,037,526,000	689,876	118,944,100
Annual Total	N/A	111,143,381,969	690,818	119,106,600

Source: [1] DOE, 2008;
[2] RY2007 (Database: http://www.ntdprogram.gov/ntdprogram/data.htm);
[3] CDM, 2009.
Notes: [a] Existing conditions are reported from data sources dated 2007 and 2009. The 2007 data are the most recent available data from the National Transportation Data Program for Metro-reported light rail and bus miles travelled annually.

Metro uses two types of fuel to power its bus fleet, compressed natural gas (CNG) and diesel. With a total fleet of 2,635 buses, Metro currently operates 129 diesel-powered buses, 2,506 CNG buses. In addition, 173 buses are leased to independent contractors who provide service on Metro routes (LACMTA 2009a). Contract-operated buses currently run on a mix CNG, propane, and other fuels; however, Metro is moving towards transitioning all buses to run on CNG. Petroleum fuels are currently purchased through a variety of commercial sources. CNG is purchased through the Southern California Gas Company. Since 2002, Metro's fuel use has increased 3 percent annually, but it continues to work to reduce the use of diesel and gasoline in favor of cheaper and cleaner CNG.

As of June 2009, Metro operates six fixed guideways (rail and transitways) that run on electricity and CNG (LACMTA 2009a). Metro's electricity use is split between powering the rail system and transit facilities (LACMTA 2009b). For both rail and facility electricity requirements, Metro buys power from LADWP, Southern California Edison (SCE), and Pasadena Water and Power (LACMTA 2009b).

Electricity usage for both facilities and rail operations increased between 2005 and 2008. In 2008, Metro rail consumed 175 million kWh of electricity (approximately 597 billion BTUs) and Metro facilities consumed 69 million kWh (approximately 235 thousand BTUs) (LACMTA 2009b). In addition, Metro is currently electrifying all of the CNG facilities at the various divisions. Metro's *2009 Baseline Sustainability Report* presents goals and recommendations for tracking and improving performance measures. Metro would purchase additional electricity from its current providers to operate the proposed project.

4.2.3 Los Angeles Department of Water and Power

The LADWP provides electricity to the project area. The LADWP's *2007 Integrated Resource Plan* and the CEC staff revised forecast, *California Energy Demand 2008-2018*, were used to determine current total electricity generation and consumption in the LADWP planning area (California Energy Commission 2007c; LADWP 2007. The most recent data used came from 2006, and current production and consumption were projected for 2009.

Total electricity generation in 2006 was 29 billion kilowatt hours (KWh) (LADWP 2007). Total electricty consumption was 25.6 billion KWh (87,300 billion BTUs). The 2007 LADWP *Integrated Resource Plan* forecasts loads from 2007 to 2027. The base case load forecast for 2009 is 49.6 billion KWh (169,000 billion BTUs). The CEC's demand forecast report predicts total consumption in the LADWP service area for 2009 equal to 26.1 billion KWh (89,100 billion BTUs).

5.0 IMPACTS

Located in downtown Los Angeles, the proposed project would be served by the LADWP. As discussed in Section 4.0, the transportation sector consumes much of the energy produced in California and is one of the largest contributors of greenhouse gases. However, public transit contributes to VMT reduction resulting in overall reductions in greenhouse gas emissions. The following sections address potential impacts to energy resources and energy usage from the proposed project alternatives.

Table 5-1 summarizes annual changes in energy consumption for each of the action alternatives compared to the No Build Alternative. Calculations were based on data from the transportation model that projected changes in daily VMT throughout the region. Table 5-2 summarizes total operational energy demands under all of the proposed alternatives. Table 5-2 compares BTUs and barrels of oil under each alternative as well as the percent change in BTUs between each build alternative and the No Build Alternative.

Table 5-1. Estimated Regional Highway VMT and Energy Consumption Comparisons

Scenario	Annual Change in Automobile VMT	Annual Change in Energy Consumption (BTU in billions)	Annual Change in Barrels of Oil
TSM Alternative vs. No Build Alternative	(100,083,000)	(622)	(107,200)
At-Grade Emphasis LRT Alternative vs. No Build Alternative	(110,157,000)	(684)	(118,000)
Underground Emphasis LRT Alternative vs. No Build Alternative	(113,989,500)	(708)	(122,100)
Fully Underground LRT Alternative – Little Tokyo Variation 1 vs. No Build Alternative	(117,384,000)	(729)	(125,700)
Fully Underground LRT Alternative – Little Tokyo Variation 2 vs. No Build Alternative	(117,384,000)	(729)	(125,700)

Note: Parentheses indicate a reduction compared to the No Build Alternative.

Table 5-2. Estimated Annual Operational Energy Consumption for Each Alternative

VMT1 (billions)	BTU2 (billions)	Barrels of Oil	Total BTU (billions)	Percent Change in BTU from No Build	Total Barrels of Oil
Baseline (2009)					
Highway – 111.04	689,876	118,944,100	689,876	--	118,944,100
No Build (2035)					
Highway – 184.19	1,144,378	197,306,600	1,144,378	--	197,306,600
TSM					
Highway – 184.09	1,143,751	197,198,400	1,143,757	(0.054)	197,199,500
Bus – .000994	6.2	1,100			
At-Grade Emphasis LRT					
Highway – 184.08	1,143,698	197,189,300	1,143,731	(0.057)	197,195,000
Light Rail – .000383	29.7	5,100			
Stations – --	3.1	500			
Underground Emphasis LRT					
Highway – 184.08	1,143,698	197,189,300	1,143,731	(0.057)	197,195,000

Table 5-2. Estimated Annual Operational Energy Consumption for Each Alternative

VMT1 (billions)	BTU2 (billions)	Barrels of Oil	Total BTU (billions)	Percent Change in BTU from No Build	Total Barrels of Oil
Light Rail – .000380	29.4	5,000			
Stations – --	3.4	600			
Fully Underground LRT – Little Tokyo Variation 1					
Highway – 184.07	1,143,626	197,176,900	1,143,659	(0.063)	197,182,500
Light Rail – .000362	28.0	4,800			
Stations – --	4.5	800			
Fully Underground LRT – Little Tokyo Variation 2					
Highway – 184.07	1,143,626	197,176,900	1,143,659	(0.063)	197,182,500
Light Rail – .000362	28.0	4,800			
Stations – --	4.5	800			

Notes: [1] – Calculation of VMT describes changes in highway VMT within the project area projected by the transportation model for the 2035 horizon year under each alternative. Added bus VMT are included in the TSM Alternative and added light rail VMT are included in the four LRT build alternatives. Operations of buses and light rail outside of the proposed alternatives are assumed to remain unchanged.
[2] – Operational BTUs include the energy required to operate additional stations under the LRT build alternatives.
[3] – This percentage represents percent change in operational BTUs and does not include construction.

Potential energy impacts from construction and operation of the alternatives, as well as the significance of these impacts, are described in further detail in the following sections.

5.1 No Build Alternative

Under the No Build Alternative, no transportation improvements would be made beyond those listed in Metro's Long Range Transportation Plan (LRTP). By the projection year 2035 it is expected that the Metro Expo Line to Santa Monica, the Metro Gold Line to Azusa, the Metro Gold Line to the San Gabriel Valley, the Metro Purple Line to Westwood, and the Metro Crenshaw Line would be operational. While it is anticipated that bus service in the project area would predominantly remain the same, there may be some service adjustments in order to provide connections to the Metro Expo and Gold Lines service areas. The No Build Alternative would not involve new construction of rail lines or other transportation improvements.

5.1.1 Construction

The No Build Alternative would not include any construction of new light rail lines in the project area. The No Build Alternative would not result in construction-related impacts to energy use or resources in the project area or region.

5.1.2 Operations

Under the No Build Alternative, no energy consumption would be associated with the operation of new light rail lines or stations. Increased energy consumption that would occur under the No Build Alternative represents predicted increases in VMT unrelated to the proposed project. Annual highway VMT in the region would increase from 111,037,526,000 (2009) to 184,190,899,000 (2035). Correspondingly, energy consumption throughout the region would increase by approximately 500,000 billion BTUs (Table 5-2). Since the No Build Alternative assumes that the Regional Connector Transit Corridor project would not be built, this increase in BTUs is a result of projected growth in traffic that is expected to occur in the region without the project. There would be no direct impact to energy resources as a result of this alternative.

5.1.3 Cumulative

There would be no construction-related impacts under the No Build Alternative. Consequently, this alternative would not result in energy-related impacts when considered cumulatively with renovation, new construction, and transportation projects in the region.

Development of the Regional Connector Transit Corridor would not occur under the No Build Alternative. As a result, there would be no project-level changes in energy consumption associated with the No Build Alternative. Increases in energy consumption would result from regional traffic growth and projects already approved under Metro's LRTP. Therefore, the No

Build Alternative would not contribute to cumulative impacts with respect to energy resources.

5.2 Transportation System Management (TSM) Alternative

The TSM Alternative focuses on enhancements to and restructuring of the existing transit service in the project area. In addition to provisions in Metro's LRTP, two new shuttle bus routes would link the 7th Street/Metro Center Station to Union Station. The TSM Alternative would not involve construction of additional tracks or stations outside of projects already approved in the LRTP. Creation of peak hour bus-only lanes would not require new construction. Rather, the lanes could be created by restricting parking on streets that do not already have dedicated all-day bus lanes.

5.2.1 Construction

The TSM Alternative would have no construction impact on energy resources or energy use in the project area or region because there would be no construction outside of that previously approved in Metro's LRTP.

5.2.2 Operations

To determine operational energy use of the TSM Alternative, the analysis evaluated energy use of the potential new bus lines and regional traffic.

5.2.2.1 Light Rail Operations

LRT facilities are not proposed under the TSM Alternative. Light rail operations energy use is assumed to remain unchanged from the No Build Alternative and is not estimated in this section.

5.2.2.2 Regional Traffic

Compared to the No Build Alternative, operation of the TSM Alternative would reduce highway VMT in the project area by over 100 million vehicle miles per year. Correspondingly, automobile energy consumption would decrease by over 620 billion BTUs (over 107,000 barrels of oil) (Table 5-1). These potential impacts would be beneficial to energy and vehicle fuel resources in the project area.

5.2.2.3 Bus Operation

Under the TSM Alternative, two additional bus lines would travel a total of approximately 994,000 vehicle miles annually. The new buses would consume energy totaling 6 billion BTUs annually (approximately 1,000 barrels of oil).

5.2.2.4 Total Operational Energy Consumption

Total operational energy use under the TSM Alternative would equal approximately 1,143,757 billion BTUs. This figure is compared to current total energy usage of 689,876 (2009) to determine significance under CEQA. Total energy use is compared to the No Build Alternative (2035) to determine significance under NEPA.

Total operational energy under the TSM Alternative is greater than existing (2009) consumption. However, this increase is largely due to an increase in VMT in the region unrelated to the project. Compared to year 2035 under the No Build Alternative, VMT in the region would decrease by over 100 million, and energy consumption would decline by 622 billion BTUs. Given the reduction in BTUs associated with reduction in highway VMT, total net savings from operations of the TSM Alternative would be greater than 600 billion BTUs annually. Therefore, operations of the TSM Alternative would result in potential beneficial impacts.

5.2.3 Cumulative

There would be no construction-related impacts under the TSM Alternative. Considered cumulatively with relevant identified renovation, new construction, and transportation projects, this alternative would not have significant adverse energy impacts. Operation of two added bus routes under the TSM Alternative would result in a less than significant impact to energy use and energy resources.

Projects considered for cumulative impact would comply with federal, state, and local regulations to conserve and reduce energy usage. Additionally, the TSM Alternative would result in a reduction in automobile VMT and BTUs compared to No Build Alternative. This would result in a potential beneficial impact.

5.3 At-Grade Emphasis LRT Alternative

The At-Grade Emphasis LRT Alternative includes both underground and at-grade configurations. Depending on the final configuration, approximately 38 to 46 percent of the route would run underground. A direct connection would link the 7th Street/Metro Center Station to the Metro Gold Line at Temple and Alameda Streets. This Alternative would involve the construction of three new stations (two underground and a one-way couplet at street level).

5.3.1 Construction

To determine construction-related energy consumption, the analysis used capital cost data per the methodology described in Section 3.3. Construction energy impacts are summarized in Table 5-3.

Table 5-3. Estimated Energy Consumption from Construction – At-Grade Emphasis LRT Alternative			
Project Component	Base Year Dollars (thousands)	Energy Consumption Factor (BTU/2009$)	Total BTU Consumption (billions)
Track Elements	105,506	6,012	634
Stations, Stops, Terminals	230,850	6,012	1,388
Maintenance Facilities	8,625	7,394	63
Site work	165,378	6,012	994
Systems	40,950	9,240	378
Total	**551,308**	**N/A**	**3,457**

Construction of the At-Grade Emphasis LRT Alternative would result in a temporary energy demand of 3,457 billion BTUs. This impact would be temporary, and the project would result in long-term, beneficial decreases in energy use in the region. LADWP is committed to increasing electricity generation from renewable energy sources and ensuring a reliable flow of electricity to users in its service area. Given the long-term, beneficial decreases in energy use associated with this alternative, potential construction-related impacts would be less-than-significant.

5.3.2 Operations

Operational energy use for the At-Grade Emphasis LRT Alternative includes the energy use of new light rail vehicles, new stations and regional traffic.

5.3.2.1 Light Rail and Station Operations

Annual operations of light rail under this alternative would consume approximately 30 billion BTUs (approximately 5,000 barrels of oil) (Table 5-2). Stations would consume 3.1 billion BTUs annually.

5.3.2.2 Regional Traffic

Operation of the At-Grade Emphasis LRT Alternative would result in an annual decrease of highway VMT within the region by over 110 million vehicle miles when compared to the No

Build Alternative. This decrease would result in annual reductions of 684 billion BTUs (118,000 barrels of oil). Reduction in vehicle energy consumption would result in a beneficial potential impact to energy resources in the region.

5.3.2.3 Bus Operations

Since additional bus routes are not part of this alternative, changes in energy use related to bus operations would not occur.

5.3.2.4 Total Operational Energy Consumption

Total annual BTU consumption associated with the At-Grade Emphasis LRT alternative would be approximately 1,143,731 billion BTUs. This figure is compared to current total energy usage (2009) to determine significance under CEQA. Total energy use is compared to the No Build Alternative (2035) to determine significance under NEPA.

Total operational energy consumption under the At-Grade Emphasis LRT Alternative would be greater than baseline 2009 levels. However, this increase would be largely due to an increase in VMT in the region unrelated to the project. This alternative would reduce VMT and result in an annual 684 billion BTU decrease (118,000 barrels of oil) in energy consumption compared to the No Build Alternative. Total annual net savings from operations under this alternative would be greater than 600 billion BTUs (113,000 barrels of oil). Since this alternative would result in reduced energy consumption (compared to the 2035 No Build Alternative), the potential impact to energy resources in the region would be beneficial.

5.3.3 Cumulative

Construction of the At-Grade Emphasis LRT Alternative would result in less-than-significant impacts to energy resources. The proposed project, as well as renovation, new construction, and transportation projects in the vicinity of the proposed project, would comply with federal, state, and local regulations to conserve and reduce energy usage. Construction would require energy from both transportation fuels and LADWP's electricity supply.

The LADWP is working to develop new renewable energy and energy efficient resources. This project alternative, and other potential projects in the area, would comply with applicable energy efficiency guidance set by the LADWP. Potential cumulative impacts related to construction would be less-than-significant.

LADWP predicts increases in electricity demand over the next decade. LADWP has increased its ability to serve the area by adding new facilities and increasing and diversifying its energy supplies. Given that operation of the At-Grade Emphasis LRT Alternative would result in a beneficial energy impact, potential cumulative impacts related to operation would be less-than-significant.

5.4 Underground Emphasis LRT Alternative

The Underground Emphasis LRT Alternative would run underground except for a single, at-grade crossing at the intersection of 1st and Alameda Streets. Newly constructed light rail right of way would consist of at-grade double tracks near 1st and Alameda Streets and underground double tracks running beneath Flower and 2nd Streets. Additionally, three new underground stations are proposed under this alternative.

5.4.1 Construction

The analysis used capital cost data per the methodology described in Section 3 to determine construction-related energy consumption. Construction energy impacts are summarized in Table 5-4.

Table 5-4. Estimated Energy Consumption from Construction – Underground Emphasis LRT Alternative

Project Component	Base Year Dollars (thousands)	Energy Consumption Factor (BTU/2009$)	Total BTU Consumption (billions)
Track Elements	161,921	6,012	973
Stations, Stops, Terminals	388,140	6,012	2,333
Maintenance Facilities	8,625	7,394	63
Site work	201,937	6,012	1,214
Systems	40,285	9,240	372
Total	**800,908**	**N/A**	**4,957**

Construction of the Underground Emphasis LRT Alternative would consume a one-time amount of approximately 5,000 billion BTUs. LADWP is committed to increasing electricity generation from renewable energy sources and ensuring a reliable flow of electricity to users in its service area. The one-time energy use required to construct this alternative would be offset by the project's long-term, beneficial operational impacts. Given the long-term, beneficial decreases in energy use, potential construction-related impacts would be less than significant.

5.4.2 Operations

Operational energy use for the Underground Emphasis LRT Alternative includes the energy use of new light rail vehicles, new stations, and regional traffic.

5.4.2.1 Light Rail Operations

Annual operations of the light rail under this alternative would consume approximately 30 billion BTUs (approximately 5,000 barrels of oil). Stations would consume 3.4 billion BTUs annually (Table 5-2).

5.4.2.2 Regional Traffic

Operation of the Underground Emphasis LRT Alternative would result in an annual decrease of approximately 114 million vehicle miles when compared to the No Build Alternative (Table 5-1). This decrease would result in annual reductions of 700 billion BTUs (122,000 equivalent barrels of oil). Reduction in vehicle energy consumption would result in a potential beneficial impact to energy resources in the region.

5.4.2.3 Bus Operations

Since bus operations are not part of this alternative, changes in energy usage would not occur.

5.4.2.4 Total Operational Energy Consumption

Annual operation of this alternative would require approximately 1,143,698 billion BTUs (Table 5-2). This figure is compared to current total energy usage (2009) to determine significance under CEQA. Total energy use is compared to the No Build Alternative (2035) to determine significance under NEPA.

Total operational energy consumption related to this alternative is greater than baseline 2009 conditions. This increase would result from increases in regional VMT unrelated to the project. This alternative would reduce VMT and result in an annual 700 billion BTU decrease (equivalent to approximately 122,000 barrels of oil) in energy consumption compared to the No Build Alternative. Total annual net savings from operations under this alternative would be greater than 650 billion BTUs (equivalent to 115,000 barrels of oil). Since this alternative would result in reduced energy consumption (compared to the 2035 No Build Alternative), the potential impact to energy resources in the region would be beneficial.

5.4.3 Cumulative

Construction of the Underground Emphasis LRT Alternative would result in less than significant impacts to energy resources. The proposed project, as well as renovation, new construction, and transportation projects in the vicinity of the proposed project would comply with federal, state, and local regulations to conserve and reduce energy usage. Construction would require energy from both transportation fuels and LADWP's electricity supply.

The LADWP is working to develop new renewable energy and energy efficient resources. This project alternative, and other potential projects in the area, would comply with applicable energy efficiency guidance set by the LADWP. Potential cumulative impacts related to construction would be less than significant.

LADWP predicts increases in electricity demand over the next decade and has increased its ability to serve the area by adding new facilities and increasing and diversifying its energy supplies. Given that operation of the Underground Emphasis LRT Alternative would result in a beneficial energy impact, potential cumulative impacts related to operation would be less than significant.

5.5 Fully Underground LRT Alternative – Little Tokyo Variation 1

The Fully Underground LRT Alternative – Little Tokyo Variation 1 would be identical to the Underground Emphasis LRT Alternative 2nd Street station – Broadway Option for all areas west of 2nd Street and Central Avenue. East of Central Avenue, this alternative would include an underground station just southwest of the intersection of 1st and Alameda Streets. In addition to this station, this alternative would include a new, underground, three-way junction.

From the junction, one set of tracks would continue north, travel under Temple Street, and surface in the LADWP maintenance yard just east of and adjacent to Alameda Street. The other set of tracks would rise to street level to the east within 1st Street in order to accommodate a new portal and connect to the existing Metro Gold line tracks. This alternative would include construction of four new underground stations.

5.5.1 Construction

To determine construction-related energy consumption, the analysis used capital cost data per the methodology described in Section 3.1. Construction energy impacts are summarized in Table 5-5.

Construction of the Fully Underground LRT Alternative – Little Tokyo Variation 1 would result in a temporary energy demand of approximately 6,000 billion BTUs. This impact would be temporary, and the project would result in long-term, beneficial decreases in energy use in the region. LADWP is committed to increasing electricity generation from renewable energy sources and ensuring a reliable flow of electricity to users in its service area. Given the long-term, beneficial decreases in energy use associated with this alternative; potential construction-related impacts would be less than significant.

Table 5-5. Estimated Energy Consumption from Construction – Fully Underground LRT Alternative – Little Tokyo Variation 1			
Project Component	**Base Year Dollars (thousands)**	**Energy Consumption Factor (BTU/2009$)**	**Total BTU Consumption (billions)**
Track Elements	229,148	6,012	1,377
Stations, Stops, Terminals	457,640	6,012	2,759
Maintenance Facilities	8,825	7,394	65
Site work	188,060	6,012	1,130
Systems	49,124	9,240	453
Total	**932,797**	**N/A**	**5,886**

5.5.2 Operations

Operational energy use for the Fully Underground Alternative – Little Tokyo Variation 1 includes the energy use of new light rail vehicles, new stations, and regional traffic.

5.5.2.1 Light Rail Operations

Annual operations of light rail under this alternative would consume approximately 28 billion BTUs (approximately 4,800 barrels of oil) (Table 5-2). Stations would consume 4.5 billion BTUs annually.

5.5.2.2 Regional Traffic

Operation of the Fully Underground LRT Alternative – Little Tokyo Variation 1 would result in an annual decrease of 117 million vehicle miles when compared to the No Build Alternative. This decrease would result in annual reductions of 730 billion BTUs (125,000 barrels of oil). Reduction in vehicle energy consumption would result in a beneficial potential impact to energy resources in the region.

5.5.2.3 Bus Operations

Since bus operations are not part of this alternative, changes in energy usage would not occur.

5.5.2.4 Total Operational Energy Consumption

Total annual BTU consumption associated with the Fully Underground LRT Alternative – Little Tokyo Variation 1 would be approximately 1,143,659 billion BTUs (Table 5-2). This figure is compared to current total energy usage (2009) to determine significance under CEQA. Total energy use is compared to the No Build Alternative (2035) to determine significance under NEPA.

Total operational energy consumption under the Fully Underground LRT Alternative – Little Tokyo Variation 1 would be greater than baseline 2009 levels. However, this increase would be largely due to an increase in VMT in the region unrelated to the project. This alternative would reduce VMT and result in an annual 730 billion BTU decrease (equivalent to 125, 000 barrels of oil) in energy consumption compared to the No Build Alternative. Total annual net savings from operations under this alternative would be greater than 700 billion BTUs (120,000 barrels of oil). Since this alternative would result in reduced energy consumption (compared to the 2035 No Build Alternative), the potential impact to energy resources in the region would be beneficial.

5.5.3 Cumulative

Cumulative impacts would be similar to those described for the Underground Emphasis LRT Alternative; thus, potential cumulative impacts from construction and operations of the Fully Underground LRT Alternative – Little Tokyo Variation 1 would be less than significant.

5.6 Fully Underground LRT Alternative – Little Tokyo Variation 2

The Fully Underground LRT Alternative - Little Tokyo Variation 2 would be identical to the Underground Emphasis LRT Alternative 2nd Street station – Broadway Option for all areas west of 2nd Street and Central Avenue. This alternative would include a new underground station on the block bounded by 2nd, 1st, and Alameda Streets, Central Avenue. This proposed station would have two underground levels, each with a single-track platform.

This alternative would create an underground junction similar to that described for the Fully Underground LRT Alternative - Little Tokyo Variation 1. Under this alternative, however, the junction would have two underground levels. In addition, 1st Street would contain two portals instead of one as described for the Fully Underground LRT Alternative - Little Tokyo Variation 1. This alternative would also require construction of four new underground stations.

5.6.1 Construction

The analysis used capital cost data per the methodology to determine construction-related energy consumption. Construction energy impacts are summarized in Table 5-6.

Construction of the Fully Underground LRT Alternative – Little Tokyo Variation 2 would result in a temporary energy demand of approximately 6,300 billion BTUs. This impact would be temporary, and the project would result in long-term, beneficial decreases in energy use in the region. LADWP is committed to increasing electricity generation from renewable energy sources and ensuring a reliable flow of electricity to users in its service area. Given the long-term, beneficial decreases in energy use associated with this alternative; potential construction-related impacts would not be significant.

Table 5-6. Estimated Energy Consumption from Construction – Fully Underground LRT Alternative – Little Tokyo Variation 2

Project Component	Base Year Dollars (thousands)	Energy Consumption Factor (BTU/2009$)	Total BTU Consumption (billions)
Track Elements	230,895	6,012	1,388
Stations, Stops, Terminals	538,830	6,012	3,239
Maintenance Facilities	8,625	7,394	64
Site work	192,128	6,012	1,155
Systems	48,154	9,240	445
Total	**1,018,632**	**N/A**	**6,291**

5.6.2 Operations

Operational energy use for Fully Underground Alternative – Little Tokyo Variation 2 includes the energy use of new light rail vehicles, new stations, and regional traffic.

5.6.2.1 Light Rail Operations

Annual operations of light rail under this alternative would consume approximately 28 billion BTUs (approximately 4,800 barrels of oil) (Table 5-2). Stations would consume 4.5 billion BTUs annually.

5.6.2.2 Regional Traffic

Operation of the Fully Underground LRT Alternative – Little Tokyo Variation 2 would result in an annual decrease of 117 million vehicle miles when compared to the No Build Alternative. This decrease would result in annual reductions of 730 billion BTUs (125,000 barrels of oil).

Reduction in vehicle energy consumption would result in a beneficial potential impact to energy resources in the region.

5.6.2.3 Bus Operations

Since bus operations are not part of this alternative, changes in energy usage would not occur.

5.6.2.4 Total Operational Energy Consumption

Total operational energy consumption under this alternative would mirror that of the Fully Underground LRT Alternative – Little Tokyo Variation 1, described in Section 5.5.2.4. Since this alternative would result in reduced energy consumption (compared to the 2035 No Build Alternative), the potential impact to energy resources in the region would be beneficial.

5.6.3 Cumulative

Cumulative impacts from construction and operation of the Fully Underground LRT Alternative – Little Tokyo Variation 2 would be the same as those described for the Fully Underground LRT Alternative – Little Tokyo Variation 1. Thus, potential cumulative impacts from construction and operation of this alternative would be less than significant.

6.0 POTENTIAL MITIGATION MEASURES

No mitigation measures would be required because potential impacts to energy resources under the TSM and build alternatives would be beneficial.

7.0 CONCLUSIONS

7.1 No Build Alternative

7.1.1 NEPA Findings

There would be no adverse impacts from the No Build Alternative with respect to energy resources in the region.

7.1.2 CEQA Determinations

The No Build Alternative would have no impact on energy resource availability or energy use in the region.

7.2 Transportation System Management (TSM) Alternative

7.2.1 NEPA Findings

There would be no adverse impacts from the TSM Alternative with respect to energy resources.

7.2.2 CEQA Determinations

The TSM Alternative would not result in significant impacts to the availability of energy resources in the region. The TSM Alternative would not require new offsite energy supplies or conflict with regional energy conservation plans. Additionally, the TSM Alternative would not result in an inefficient or wasteful use of resources or the need for new systems for power or natural gas. Thus, potential impacts to energy resources would be less than significant.

7.3 At-Grade Emphasis LRT Alternative

7.3.1 NEPA Findings

Construction of the At-Grade Emphasis LRT Alternative would result in a one-time, non-recoverable energy use in the project area. However, operations would result in net energy resource savings of approximately 600 billion BTUs (113,000 equivalent barrels of oil) in the region. Given long-term, beneficial decreases in energy use under this alternative, construction-related impacts would be less than significant. The At-Grade Emphasis LRT Alternative would result in a long-term, beneficial impact to energy resources in the region when compared to the No Build Alternative.

7.3.2 CEQA Determinations

Total operational energy consumption under the At-Grade Emphasis LRT Alternative would be greater than that of existing conditions. However, this increase results from increased regional traffic unrelated to this alternative. Operation of this alternative would result in a net decrease in energy consumption. Thus, this alternative would have a beneficial potential impact to energy resources and would offset the one-time, non-recoverable energy use associated with construction. Construction and operation of the At-Grade Emphasis Alternative would not exceed CEQA significance thresholds.

7.4 Underground Emphasis LRT Alternative

7.4.1 NEPA Findings

Construction impacts from the Underground Emphasis LRT Alternative would result in a one-time, non-recoverable energy use in the project area. However, operation of the Underground Emphasis LRT Alternative would result in a decrease in energy consumption in the project area. Given the long-term beneficial decreases in energy use under this alternative, potential construction-related impacts would be less than significant. The Underground Emphasis LRT Alternative would result in a long-term beneficial impact to energy resources in the region when compared to the No Build Alternative.

7.4.2 CEQA Determinations

Total operational energy consumption under the Underground Emphasis LRT Alternative would be greater than that of existing conditions. However, this increase results from increased regional traffic unrelated to this alternative. Operation of this alternative would result in a net decrease in energy consumption. Thus, this alternative would have a beneficial potential impact to energy resources and would offset the one-time, non-recoverable energy use associated with construction. Construction and operation of the Underground Emphasis LRT Alternative would not exceed CEQA significance thresholds.

7.5 Fully Underground LRT Alternative – Little Tokyo Variation 1

7.5.1 NEPA Findings

Construction impacts from the Fully Underground LRT Alternative – Little Tokyo Variation 1 would result in a one-time, non-recoverable energy use in the project area. However, operation of this alternative would result in a decrease in energy consumption in the project area. Given the long-term beneficial decreases in energy use under this alternative, potential construction-related impacts would be less than significant. The Fully Underground LRT Alternative – Little Tokyo Variation 1 would result in a long-term beneficial impact to energy resources in the region when compared to the No Build Alternative.

7.5.2 CEQA Determinations

Total operational energy consumption under the Fully Underground Emphasis LRT Alternative – Little Tokyo Variation 1 would be greater than that of existing conditions. However, this increase results from increased regional traffic unrelated to this alternative. Operation of this alternative would result in a net decrease in energy consumption. Thus, this alternative would have a beneficial potential impact to energy resources and would offset the one-time, non-recoverable energy use associated with construction. Construction and operation of the Fully Underground LRT Alternative – Little Tokyo Variation 1 would not exceed CEQA significance thresholds.

7.6 Fully Underground LRT Alternative – Little Tokyo Variation 2

7.6.1 NEPA Findings

NEPA findings mirror those described for the Fully Underground LRT Alternative – Little Tokyo Variation 1. Operation of the Fully Underground LRT Alternative – Little Tokyo Variation 2 would reduce energy consumption in the project area, and would have a beneficial impact to energy resources.

7.6.2 CEQA Determinations

Construction and operational impacts associated with this alternative would mirror those described for the Fully Underground LRT Alternative – Little Tokyo Variation 1. Construction and operation of the Fully Underground LRT Alternative – Little Tokyo Variation 2 would not exceed CEQA significance thresholds. Long-term potential impacts from operation of this alternative would be beneficial to regional energy resources.

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