Energy Technical Report

for the East San Fernando Valley Transit Corridor

April 2017

Metro

Prepared by the
U.S. Department of Transportation
Federal Transit Administration

and the Los Angeles County
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Acronyms and Abbreviations

AA	Alternatives Analysis
AB	Assembly Bill
ARB	California Air Resources Board
Basin	South Coast Air Basin
BMPs	best management practices
BRT	bus rapid transit
CAFE	Corporate Average Fuel Economy
CalEEMod	California Emissions Estimator Model™
CEC	California Energy Commission
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CNG	compressed natural gas
CO_2e	carbon dioxide equivalent
DEIR	Draft Environmental Impact Report
DEIS	Draft Environmental Impact Statement
ECMP	Energy Conservation and Management Plan
EO	Executive Order
EPCA	Energy Policy and Conservation Act of 1975
FTA	Federal Transit Administration
FY	fiscal year
GGE	gallons of gasoline equivalent
I	Interstate
kWh	kilowatt hours
LADWP	Los Angeles Department of Water and Power
LEED	Leadership in Energy and Environmental Design
LRT	light rail transit
LRTP	Long-Range Transportation Plan
MAP-21	Moving Ahead for Progress in the 21st Century Act
Metro	Los Angeles County Metropolitan Transportation Authority
MMBTUs	million British thermal units
MSF	maintenance and storage facility
NEPA	National Environmental Policy Act
OCS	overhead contact system

PEIR	Program Environmental Impact Report
RTP/SCS	Regional Transportation Plan/Sustainable Communities Strategy
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SR	State Route
TPSS	traction power substations
TSM	Transportation System Management
VMT	vehicle miles traveled

Chapter 1
Introduction

1.1 Study Background

What Is the East San Fernando Valley Transit Corridor?

The Federal Transit Administration (FTA) and Los Angeles County Metropolitan Transportation Authority (Metro) have initiated a Draft Environmental Impact Statement (DEIS)/Environmental Impact Report (DEIR) for the East San Fernando Valley Transit Corridor Project (project). The DEIS/DEIR is being prepared with the FTA as the Lead Agency under the National Environmental Policy Act (NEPA) and Metro as the Lead Agency under the California Environmental Quality Act (CEQA).

The DEIS/DEIR and related engineering are being undertaken by Metro, in close coordination with the Cities of Los Angeles and San Fernando. The DEIS/DEIR will be a combined document complying with the most recent state and federal environmental laws. The project's public/community outreach component is being undertaken as an integrated parallel effort to the DEIS/DEIR.

Prior to the initiation of the DEIS/DEIR, an Alternatives Analysis (AA) was received by the Metro Board in January 2013 to study the East San Fernando Valley Transit Corridor in order to define, screen, and recommend alternatives for future study.

This study enabled Metro, the City of Los Angeles, and the City of San Fernando to evaluate a range of new public transit service alternatives that can accommodate future population growth and transit demand, while being compatible with existing land uses and future development opportunities. The study considered the Sepulveda Pass Corridor, which is another Measure R project, and the proposed California High Speed Rail Project. Both of these projects may be directly served by a future transit project in the project study area. The Sepulveda Pass Corridor could eventually link the West Los Angeles area to the eastern San Fernando Valley and the California High Speed Rail Project via the project corridor. As part of the January 2013 Alternatives Analysis, most of Sepulveda Boulevard was eliminated as an alignment option, as well as the alignment extending to Lakeview Terrace. As a result of the Alternatives Analysis, modal recommendations were bus rapid transit (BRT) and light rail transit (LRT).

As a result of the alternatives screening process and feedback received during the public scoping period, a curb-running BRT, median-running BRT, median-running low-floor LRT/tram, and a median-running LRT, were identified as the four build alternatives, along with the Transportation Systems Management (TSM) and No-Build Alternatives to be carried forward for analysis in this DEIS/DEIR.

1.1.1 Study Area

Where Is the Study Area Located?

The East San Fernando Valley Transit Corridor Project study area is located in the San Fernando Valley in the County of Los Angeles. Generally, the project study area extends from the City of San Fernando and the Sylmar/San Fernando Metrolink Station in the north to the Van Nuys Metro Orange Line station within the City of Los Angeles in the south. However, the project study area used for the environmental issue described in this report could vary from this general project study area, depending on the needs of the analysis. For the purposes of the analysis contained in this report, the project study area coincides with the general project study area.

The eastern San Fernando Valley includes the two major north-south arterial roadways of Sepulveda and Van Nuys Boulevards, spanning approximately 10 to 12 miles and the major north/west arterial roadway of San Fernando Road.

Several freeways traverse or border the eastern San Fernando Valley. These include the Ventura Freeway (US-101), the San Diego Freeway (Interstate [I] 405), the Golden State Freeway (I-5), the Ronald Reagan Freeway (State Route [SR] 118), and the Foothill Freeway (I-210). The Hollywood Freeway SR-170 is located east of the project study area. In addition to Metro Local and Metro Rapid bus service, the Metro Orange Line (Orange Line) BRT service, the Metrolink Ventura Line commuter rail service, Amtrak inter-city rail service, and the Metrolink Antelope Valley Line commuter rail service are the major transit corridors that provide interregional trips in the project study area.

Land uses in the project study area include neighborhood and regional commercial land uses, as well as government and residential land uses. Specifically, land uses in the project study area include government services at the Van Nuys Civic Center, retail shopping along the project corridor, and medium- to high-density residential uses throughout the project study area. Notable land uses in the eastern San Fernando Valley include: The Village at Sherman Oaks, Panorama Mall, Whiteman Airport, Van Nuys Airport, Mission Community Hospital, Kaiser Permanente Hospital, Van Nuys Auto Row, and several schools, youth centers, and recreational centers.

1.1.2 Alternatives Considered

What Alternatives Are under Consideration?

The following six alternatives, including four build alternatives, a TSM Alternative, and the No-Build Alternative, are being evaluated as part of this study:

- No-Build Alternative
- TSM Alternative
- Build Alternative 1 – Curb-Running BRT Alternative
- Build Alternative 2 – Median-Running BRT Alternative
- Build Alternative 3 – Low-Floor LRT/Tram Alternative
- Build Alternative 4 –LRT Alternative

All build alternatives would operate over 9.2 miles, either in a dedicated bus lane or guideway (6.7 miles) and/or in mixed-flow traffic lanes (2.5 miles), from the Sylmar/San Fernando Metrolink Station to the north to the Van Nuys Metro Orange Line station to the south, with the exception of Build Alternative 4 which includes a 2.5-mile segment within Metro-owned railroad right-of-way adjacent to San Fernando Road and Truman Street and a 2.5-mile underground segment beneath portions of Panorama City and Van Nuys.

1.1.2.1 No-Build Alternative

The No-Build Alternative represents projected conditions in 2040 without implementation of the project. No new transportation infrastructure would be built within the project study area, aside from projects that are currently under construction or funded for construction and operation by 2040. These projects include highway and transit projects funded by Measure R and specified in the current constrained element of the Metro 2009 Long-Range Transportation Plan (LRTP) and the 2012 Southern California Association of Governments (SCAG) Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS). Existing infrastructure and future planned and funded projects assumed under the No-Build Alternative include:

- Existing Freeways – I-5, and I-105, SR-118, and US-101;
- Existing Transitway – Metro Orange Line;
- Existing Bus Service – Metro Rapid and Metro Local Shuttle;
- Los Angeles Department of Transportation Commuter Express, and DASH;
- Existing and Planned Bicycle Projects – Bicycle facilities on Van Nuys Boulevard and connecting east/west facilities; and
- Other Planned Projects – Various freeway and arterial roadway upgrades, expansion of the Metro Rapid bus system, upgrades to the Metrolink system, and the proposed California High Speed Rail project.

This alternative establishes a baseline for comparison to other alternatives in terms of potential environmental effects, including adverse and beneficial environmental effects.

1.1.2.2 TSM Alternative

The TSM Alternative enhances the No-Build Alternative and emphasizes transportation systems upgrades, which may include relatively low-cost transit service improvements. It represents efficient and feasible improvements to transit service, such as increased bus frequencies and minor modifications to the roadway network. Additional TSM Alternative transit improvements that may be considered include, but are not limited to, traffic signalization improvements, bus stop amenities/improvements, and bus schedule restructuring (Figure 1-1).

The TSM Alternative considers the existing bus network, enhanced operating hours, and increased bus frequencies for Metro Rapid Line 761 and Local Line 233. Under this alternative, the Metro Rapid Line 761 and Metro Local Line 233 bus routes would retain existing stop locations. This alternative would add 20 additional buses to the existing Metro Local 233 and Metro Rapid 761 bus routes. These buses would be similar to existing Metro 60-foot articulated buses, and each bus would have the capacity to serve up to 75 passengers (57 seats x 1.30 passenger loading standard). Buses would be equipped with transit signal priority equipment to allow for improved operations and on-time performance.

The existing Metro Division 15 maintenance and storage facility (MSF) located in Sun Valley would be able to accommodate the 20 additional buses with the implementation of the TSM Alternative. Operational changes would include reduced headway (elapsed time between buses) times for Metro Rapid Line 761 and Metro Local Line 233, as follows:

- Metro Rapid Line 761 would operate with headways reduced from 10 minutes to 8 minutes during peak hours (7 a.m. to 9 a.m. and 4 p.m. to 7 p.m. on weekdays) and from 17.5 minutes to 12 minutes during off-peak hours.
- Metro Local Line 233 would operate with headways reduced from 12 minutes to 8 minutes during peak hours and from 20 minutes to 16 minutes during off-peak hours.

Figure 1-1: TSM Alternative

Source: STV, 2014.

1.1.2.3 Build Alternative 1 – Curb-Running BRT Alternative

Under the Curb-Running BRT Alternative, the BRT guideway would incorporate 6.7 miles of existing curb lanes (i.e., lanes closest to the curb) along Van Nuys Boulevard between San Fernando Road and the Metro Orange Line. This alternative would be similar to the Metro Wilshire BRT project and would operate similarly. The lanes would be dedicated curb-running bus lanes for Metro Rapid Line 761 and Metro Local Line 233, and for other transit lines that operate on short segments of Van Nuys Boulevard. In addition, this alternative would incorporate 2.5 miles of mixed-flow lanes, where buses would operate in the curb lane along San Fernando Road and Truman Street between Van Nuys Boulevard and Hubbard Avenue for Metro Line 761. Metro Line 233 would continue north on Van Nuys Boulevard to Lakeview Terrace. These improvements would result in an improved Metro Rapid Line 761 (hereafter referred to as 761X) and an improved Metro Local Line 233 (hereafter referred to as 233X). The route of the Curb-Running BRT Alternative is illustrated in Figure 1-2.

From the Sylmar/San Fernando Metrolink Station:

- Metro Rapid Line 761X would operate within roadway travel lanes on Truman Street and San Fernando Road.
- At Van Nuys Boulevard, Metro Rapid Line 761X would turn southwest and travel south within a curb-running dedicated bus lane along Van Nuys Boulevard.
- Metro Line 761X would then continue south to Westwood as under existing conditions, though it should be noted that in December 2014 the Metro Rapid Line 761 was re-routed to travel from Van Nuys Boulevard to Ventura Boulevard, and then to Reseda Boulevard, while a new Metro Rapid Line 788 travels from Van Nuys Boulevard through the Sepulveda Pass to Westwood and provides peak period freeway express service as part of a Metro demonstration project.

Metro Local Line 233X would operate similar to how it currently operates between the intersections of Van Nuys and Glenoaks Boulevards to the north and Van Nuys and Ventura Boulevards to the south. However, Metro Local Line 233X would operate with improvements over existing service because it would utilize the BRT guideway where its route overlaps with the guideway along Van Nuys Boulevard.

Transit service would not be confined to only the dedicated curb lanes. Buses would still have the option to operate within the remaining mixed-flow lanes to bypass right-turning vehicles, a bicyclist, or another bus at a bus stop.

The Curb-Running BRT Alternative would operate in dedicated bus lanes, sharing the lanes with bicycles and right-turning vehicles. However, on San Fernando Road and Truman Street, no dedicated bus lanes would be provided. The Curb-Running BRT Alternative would include 18 bus stops.

Figure 1-2: Build Alternative 1 – Curb-Running BRT Alternative

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Source: KOA and ICF International, 2014.

1.1.2.4 Build Alternative 2 – Median-Running BRT Alternative

The Median-Running BRT Alternative consists of approximately 6.7 miles of dedicated median-running bus lanes between San Fernando Road and the Metro Orange Line, and would have operational standards similar to the Metro Orange Line. The remaining 2.5 miles would operate in mixed-flow traffic between the Sylmar/San Fernando Metrolink Station and San Fernando Road/ Van Nuys Boulevard. The Median-Running BRT Alternative is illustrated in Figure 1-3.

Similar to the Curb-Running BRT Alternative, the Median-Running BRT (Metro Rapid Line 761X) would operate as follows from the Sylmar/San Fernando Metrolink Station:

- Metro Rapid Line 761X would operate within mixed-flow lanes on Truman Street and San Fernando Road.
- At Van Nuys Boulevard, the route would turn southwest and travel south within the median of Van Nuys Boulevard in a new dedicated guideway.
- Upon reaching the Van Nuys Metro Orange Line Station, the dedicated guideway would end and Metro Rapid Line 761X service would then be integrated into mixed-flow traffic.
- The route would then continue south to Westwood, similar to the existing route. Similar to Build Alternative 1, it should be noted that in December 2014 the Metro Rapid Line 761 was re-routed to travel from Van Nuys Boulevard to Ventura Boulevard, and then to Reseda Boulevard, while a new Metro Rapid Line 788 travels from Van Nuys Boulevard through the Sepulveda Pass to Westwood as part of a Metro demonstration project.

Metro Local Line 233 would operate similar to existing conditions between the intersections of Van Nuys and Glenoaks Boulevards to the north and Van Nuys and Ventura Boulevards to the south. Metro Rapid bus stops that currently serve the 794 and 734 lines on the northern part of the alignment along Truman Street and San Fernando Road would be upgraded and have design enhancements that would be Americans with Disabilities Act (ADA) compliant. These stops would also serve the redirected 761X line:

1. Sylmar/San Fernando Metrolink Station
2. Hubbard Station
3. Maclay Station
4. Paxton Station
5. Van Nuys/San Fernando Station

Along the Van Nuys Boulevard segment, bus stop platforms would be constructed in the median. Seventeen new median bus stops would be included.

Figure 1-3: Build Alternative 2 – Median-Running BRT Alternative

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Source: KOA and ICF International, 2014.

1.1.2.5 Build Alternative 3 – Low-Floor LRT/Tram Alternative

The Low-Floor LRT/Tram Alternative would operate along a 9.2-mile route from the Sylmar/San Fernando Metrolink Station to the north, to the Van Nuys Metro Orange Line station to the south. The Low-Floor LRT/Tram Alternative would operate in a median dedicated guideway for approximately 6.7 miles along Van Nuys Boulevard between San Fernando Road and the Van Nuys Metro Orange Line station. The low-floor LRT/tram alternative would operate in mixed-flow traffic lanes on San Fernando Road between the intersection of San Fernando Road/Van Nuys Boulevard and just north of Wolfskill Street. Between Wolfskill Street and the Sylmar/San Fernando Metrolink Station, the low-floor LRT/tram would operate in a median dedicated guideway. It would include 28 stations. The route of the Low-Floor LRT/Tram Alternative is illustrated in Figure 1-4.

The Low-Floor LRT/Tram Alternative would operate along the following route:

- From the Sylmar/San Fernando Metrolink Station, the low-floor LRT/tram would operate within a median dedicated guideway on San Fernando Road.
- At Wolfskill Street, the low-floor LRT/tram would operate within mixed-flow travel lanes on San Fernando Road to Van Nuys Boulevard.
- At Van Nuys Boulevard, the low-floor LRT/tram would turn southwest and travel south within the median of Van Nuys Boulevard in a new dedicated guideway.
- The low-floor LRT/tram would continue to operate in the median along Van Nuys Boulevard until reaching its terminus at the Van Nuys Metro Orange Line Station.

Based on Metro's Operations Plan for the East San Fernando Valley Transit Corridor Project*,* the Low-Floor LRT/Tram Alternative would assume a similar travel speed as the Median-Running BRT Alternative, with speed improvements of 18% during peak hours/peak direction and 15% during off-peak hours.

The Low-Floor LRT/Tram Alternative would operate using low-floor articulated vehicles that would be electrically powered by overhead wires. This alternative would include supporting facilities, such as an overhead contact system (OCS), traction power substations (TPSS), signaling, and an MSF.

Because the Low-Floor LRT/Tram Alternative would fulfill the current functions of the existing Metro Rapid Line 761 and Metro Local Line 233, these bus routes would be modified to maintain service only to areas outside of the project corridor. Thus, Metro Rapid Line 761 (referred to as 761S with reduced service) would operate only between the Metro Orange Line and Westwood, and Metro Local Line 233 (referred to as 233S with reduced service) would operate only between San Fernando Road and Glenoaks Boulevard. It should be noted that in December 2014 the Metro Rapid Line 761 was re-routed to travel from Van Nuys Boulevard to Ventura Boulevard, and then to Reseda Boulevard, while a new Metro Rapid Line 788 travels from Van Nuys Boulevard through the Sepulveda Pass to Westwood as part of a Metro demonstration project.

Stations for the Low-Floor LRT/Tram Alternative would be constructed at various intervals along the entire route. There are portions of the route where stations are closer together and other portions where they are located further apart. Twenty-eight stations are proposed with the Low-Floor LRT/Tram Alternative. The 28 proposed low-floor LRT/tram stations would be ADA compliant.

Figure 1-4: Build Alternative 3 – Low-Floor LRT/Tram Alternative

Source: KOA and ICF International, 2014.

1.1.2.6 Build Alternative 4 – LRT Alternative

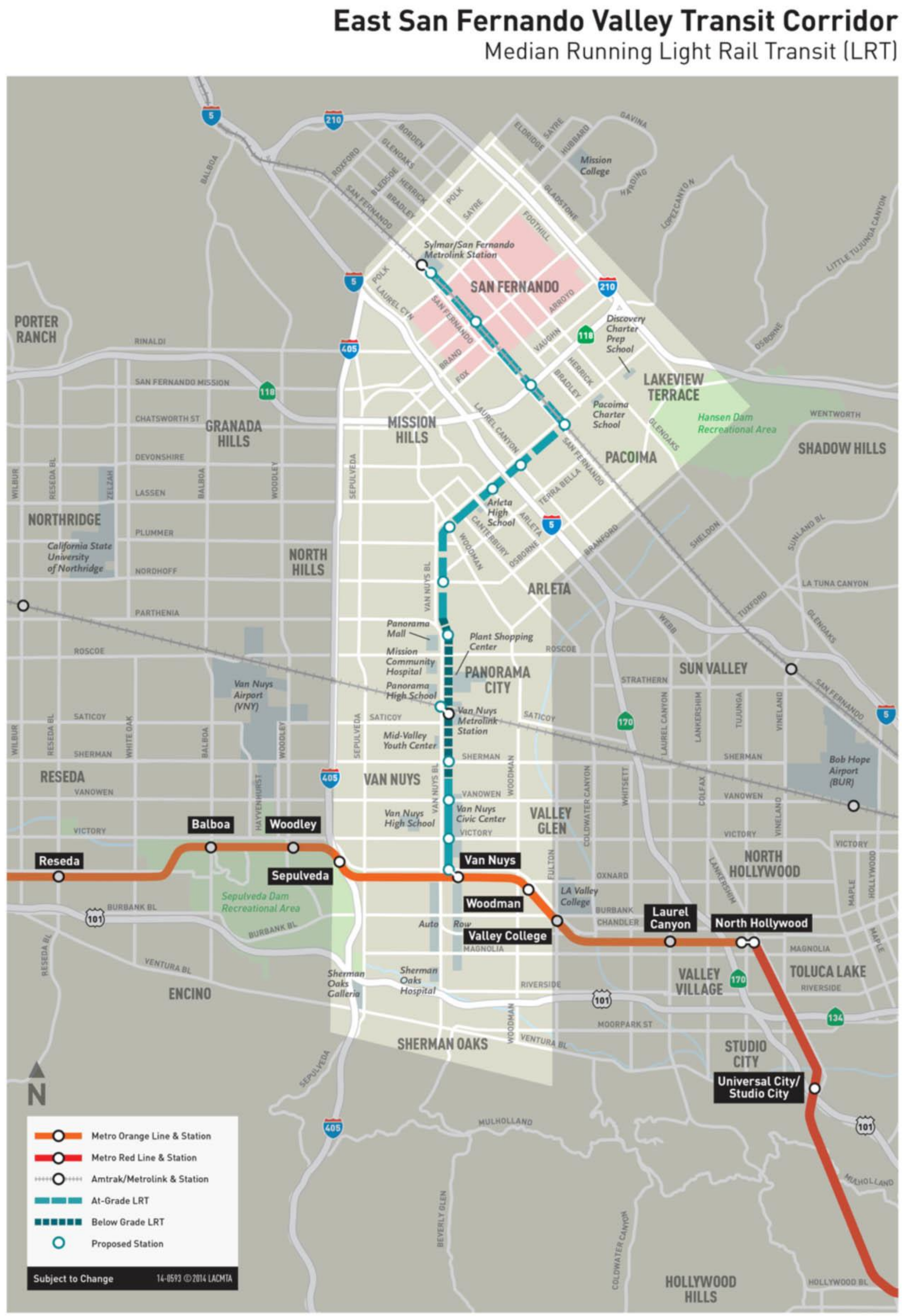
Similar to the Low-Floor LRT/Tram Alternative, the LRT would be powered by overhead electrical wires (Figure 1-5). Under Build Alternative 4, the LRT would travel in a dedicated guideway from the Sylmar/San Fernando Metrolink Station along San Fernando Road south to Van Nuys Boulevard, from San Fernando Road to the Van Nuys Metro Orange Line Station, over a distance of approximately 9.2 miles. The LRT Alternative includes a segment in exclusive right-of-way through the Antelope Valley Metrolink railroad corridor, a segment with semi-exclusive right-of-way in the middle of Van Nuys Boulevard, and an underground segment beneath Van Nuys Boulevard from just north of Parthenia Street to Hart Street.

The LRT Alternative would be similar to other street-running LRT lines that currently operate in the Los Angeles area, such as the Metro Blue Line, Metro Gold Line, and Metro Exposition Line. The LRT would travel along the median for most of the route, with a subway of approximately 2.5 miles in length between Vanowen Street and Nordhoff Street. On the surface-running segment, the LRT Alternative would operate at prevailing traffic speeds and would be controlled by standard traffic signals.

Stations would be constructed at approximately 1-mile intervals along the entire route. There would be 14 stations, three of which would be underground near Sherman Way, the Van Nuys Metrolink Station, and Roscoe Boulevard. Entry to the three underground stations would be provided from an entry plaza and portal. The entry portals would provide access to stairs, escalators, and elevators leading to an underground LRT station mezzanine level, which, in turn, would be connected via additional stairs, escalators, and elevators to the underground LRT station platforms

Similar to the Low-Floor LRT/Tram Alternative, the LRT Alternative would require a number of additional elements to support vehicle operations, including an OCS, TPSS, communications and signaling buildings, and an MSF.

Figure 1-5: Build Alternative 4 – LRT Alternative



Source: KOA and ICF International, 2014.

2.1 Regulatory Framework

2.1.1 Federal Regulations

Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] 1502.16(e)) for implementing NEPA state that proper consideration must be given to the energy requirements and conservation potential of various alternatives of a proposed project as well as mitigation measures. Some of the federal laws related to energy and energy use include:

- The Energy Policy and Conservation Act of 1975 (EPCA) was enacted to serve the nation's energy demands and calls for energy conservation when feasible. Among other provisions, EPCA directed the Secretary of the Department of Transportation to set and implement fuel economy standards for passenger cars and light trucks as part of the Corporate Average Fuel Economy (CAFE) program.
- Moving Ahead for Progress in the 21st Century Act (MAP-21) was passed in 2012 and funds surface transportation programs at over $105 billion for fiscal years (FY) 2013 and 2014 while building on and refining many of the highway, transit, bike, and pedestrian programs and policies established in 1991. It creates a streamlined, performance-based, and multimodal program to address the many challenges of the U.S. transportation system including improving safety, maintaining infrastructure condition, reducing traffic congestion, improving efficiency of the system and freight movement, protecting the environment, and reducing delays in project delivery.
- The Energy Independence and Security Act of 2007 was signed into law by President Bush on December 19, 2007, with the aim of moving the United States toward greater energy independence and security, increasing the production of clean renewable fuels, protecting consumers, increasing the efficiency of products, buildings and vehicles, promoting greenhouse gas research, improving the energy efficiency of the federal government, and improving vehicle fuel economy. The Act expanded the CAFE program to include standard-setting for medium- and heavy-duty vehicles.

2.1.2 State Regulations

2.1.2.1 California Energy Commission

Created by the Legislature in 1974, the California Energy Commission (CEC) is the state's primary energy policy and planning agency and is responsible for, among other things, forecasting future energy needs for the state. Senate Bill 1389 (Chapter 568, Statutes of 2002) requires the CEC to prepare a biennial *Integrated Energy Policy Report*. This report contains an integrated assessment of major energy trends and issues facing the state's electricity, natural gas, and transportation fuel sectors, and provides policy recommendations to conserve resources; protect the environment;

ensure reliable, secure, and diverse energy supplies; enhance the state's economy; and protect public health and safety. The commission published the *2011 Integrated Energy Policy Report* in February 2012.

2.1.2.2 Executive Order S-3-05

Executive Order (EO) S-3-05, enacted in June 2005, sets specific greenhouse gas emission reduction targets for the state and gives the Transportation and Housing Agency responsibility to help meet the targets. The EO sets 2050 greenhouse gas reduction targets at 80% below 1990 levels and envisions reduced vehicle miles traveled (VMT) and increased vehicle fuel efficiency as major factors in achieving greenhouse gas reductions.

2.1.2.3 AB 32: Global Warming Solutions Act

Governor Arnold Schwarzenegger signed Assembly Bill (AB) 32 (Global Warming Solutions Act) into law on September 27, 2006, requiring that the California Air Resources Board (ARB) reduce GHG emissions to 1990 levels by 2020, and maintain and continue reductions beyond 2020. The bill also provides the Governor the ability to invoke a safety valve and suspend the emissions caps for up to one year in the case of an emergency or significant economic harm. ARB prepared the AB 32 scoping plan that has been approved and contains a range of GHG reduction actions which include direct regulations, alternative compliance mechanisms, monetary and non-monetary incentives, voluntary actions, market-based mechanisms such as a cap-and-trade system, and an AB 32 program implementation regulation to fund the program.

2.1.2.4 AB 2076, Reducing Dependence on Petroleum

The CEC and ARB are directed by AB 2076 (passed in 2000, Shelley, Chapter 936, Statutes of 2000) to develop and adopt recommendations for reducing dependence on petroleum. A performance-based goal is to reduce petroleum demand to 15% below 2003 demand levels by 2020.

2.1.3 Local Regulations

2.1.3.1 Southern California Association of Governments

SCAG is a metropolitan planning organization, which represents six counties including Los Angeles County. It is responsible for the preparation of the *Regional Transportation Plan/Sustainable Communities Strategy* (RTP/SCS), the long-range regional transportation plan which aims for sustainable maintenance and improvement of the regional transportation system The recently adopted 2016-2040 RTP/SCS is based on an analysis of the current transportation system, the anticipated future growth in the region, and SCAG's vision for a sustainable future. It outlines a strategy for transportation infrastructure investments, and presents a vision that encompasses the principles of mobility, economy, and sustainability as key to the future of Southern California.

The SCAG region is the second-most populated metropolitan area in the United States. According to the 2010 census, the region has a population of 18 million and is expected to grow by four million new residents by 2035. Growth in population is expected to result in greater demands on the already-strained transportation system.[1]

The proposed project is located in the South Coast Air Basin (Basin), a sub-region of the South Coast Air Quality Management District (SCAQMD), the agency principally responsible for comprehensive air pollution control in the state, and covers 6,745 square miles. The 2016-2040 RTP/SCS and associated Program Environmental Impact Report (PEIR) describe energy consumption as fuel, electricity, and natural gas, throughout the Basin, and provide VMT by county. VMT is an indicator of the extent to which vehicles are used, providing a valuable factor in calculating the amount of energy consumed by transportation. The 2016-2040 RTP/SCS includes strategies to reduce VMT, and as a result, per capita energy consumption from the transportation sector. The PEIR also includes measures relating to energy designed to reduce consumption and increase the use and availability of renewable sources of energy in the region.

2.1.3.2 Metro

Metro adopted an Energy and Sustainability Policy in June 2007 to aid in controlling energy consumption and encouraging energy efficiency, conservation, and sustainability to prolong the useful life of fossil fuels by using resources more efficiently.[2] Metro's general long-term objectives include:

- Reduce, whenever possible, Metro's use of fossil fuels through the use of ambient and renewable energy sources.
- Buy fuels and electricity at the most economical cost.
- Use fuels and electricity as efficiently as possible.
- Reduce the amount of emissions, especially CO_2, caused by Metro's required consumption.

The Metro Board also adopted an Energy Conservation and Management Plan (ECMP) in September 2011, which is a strategic blueprint intended to proactively guide energy use for Metro in a sustainable, cost-effective, and efficient manner. The ECMP complements Metro's Energy and Sustainability Policy, focusing on electricity for rail vehicle propulsion, electricity for rail and bus facility purposes, natural gas for rail and bus facility purposes, and the application of renewable energy (e.g., solar and wind).

With the Metro Sustainability Implementation Plan, Metro has also committed to constructing all new facilities to Leadership in Energy and Environmental Design (LEED) Silver standards or better. Four buildings have received a LEED Gold rating, including the newly renovated and expanded El Monte Transit Center. Also, Metro has committed to assessing its existing facilities to determine the feasibility of achieving a LEED-Existing Building Operations and Maintenance (EBOM) Certification.

Additional Metro policies and programs that are related to energy sources and consumption levels include the Renewable Energy Policy, electric vehicle charging program, and the Green Construction

[1] Southern California Association of Governments. 2012. *2012–2035 Regional Transportation Plan/Sustainable Communities Strategy.* April. Available: <http://rtpscs.scag.ca.gov/Documents/2012/final/f2012RTPSCS.pdf>. Accessed: February 13, 2013.

[2] Los Angeles County Metropolitan Transportation Authority. 2007. *Energy and Sustainability Policy*. Available: <http://www.metro.net/about_us/sustainability/images/Energy-and-Sustainability-Policy.pdf>. Accessed: February 13, 2013.

Policy. The Renewable Energy Policy Outlines a goal for the agency to use 13% more renewable energy than the baseline amount (20%) by 2020. The electric vehicle charging program has installed chargers at five park-and-ride lots throughout Los Angeles County. Although its direct goals are to reduce pollutant emissions from construction equipment and vehicles, the Green Construction Policy encourages the use of construction equipment with technologies such as hybrid drives and specific fuel economy standards, both of which have implications for energy consumption during the construction period.

2.1.3.3 City of Los Angeles

Los Angeles Department of Water and Power: Power Integrated Resource Plan

Released to the public in December 2014, the Power Integrated Resource Plan identified a portfolio of power generation resources and power system assets that would meet the City of Los Angeles' future energy needs, with the lowest cost and risk possible, consistent with the Los Angeles Department of Water and Power's (LADWP's) environmental priorities and reliability standards.

Building Construction Standards

Title 24 of the California Code of Regulations establishes energy conservation standards for new construction within the state of California. These standards are related to insulation requirements, glazing, lighting, shading, and water and space heating systems. The Los Angeles Municipal Code incorporates these state requirements (Section 91.1300).

The Los Angeles Green Building Code is based on the 2013 California Green Building Standards Code, commonly known as "CALGreen," which was developed and mandated by the state to attain consistency among the various jurisdictions within the state and reduce energy and water use, waste, and the overall carbon footprint in buildings. As of January 2011, all new buildings, additions, and building alterations for buildings valued at more than $200,000 are subject to the Green Building Code.

2.2 Methodology

The energy impacts analysis considers energy consumption from construction and operation associated with the proposed project.

2.2.1.1 Construction

The estimate of construction-related energy use was calculated by applying the U.S. Environmental Protection Agency (USEPA)-derived carbon dioxide equivalent (CO_2e) emissions per gallon of fuel to the total CO_2e emissions estimated using the California Emissions Estimator Model™ (CalEEMod) in the air quality emissions analysis prepared for the proposed project. The Air Quality Technical Report includes details on construction equipment and activity assumptions that were used to estimate CO_2e emissions. Emissions were then converted to million British thermal units (MMBTU) using energy unit conversion factors.

2.2.1.2 Operation

To estimate operational automobile traffic energy consumption, future (2040) local VMT and roadway network travel speeds were calculated using traffic data (VMT apportioned into 5 mph speed bins) derived from a micro-simulation model that captures project effects. The VMT-by-speed-bin data were used as inputs in CT-EMFAC2014, which is Caltrans' tool for estimating pollutant emissions from on-road vehicles. The outputs for CO_2e were converted to MMBTU using conversion factors. The year 2040 was chosen for the definition of future baseline conditions, primarily due to the need to match the future baseline year of the Metro Travel Demand Model.

Each of the build alternatives was compared against existing conditions, which "normally constitute[s] the baseline physical conditions by which a lead agency determines whether an impact is significant," under Section 15125(a) of the CEQA Guidelines. Because Alternative 3 would have the greatest traffic impacts, the Existing (2012) with Alternative 3 scenario presents the worst-case relative to any of the other "Existing Plus Project" scenarios. Thus, in order to evaluate, analyze, and compare each of the alternatives, the qualitative analysis for the other build alternatives extrapolates from the quantitative analysis for the Existing (2012) with Alternative 3 scenario. In addition, the energy consumption of each of the build alternatives have been evaluated against the No-Build Alternative for a future baseline (2040) analysis.

Bus propulsion energy use was estimated by determining the number of round trips that would be completed under each of the build alternatives to meet the headway goals and multiplying that number by the length of the bus line. The resulting bus VMT was multiplied by the energy intensity of CNG buses per vehicle mile to determine the annual consumption.

For rail Alternatives 3 and 4, CalEEMod was used to estimate emissions from MSF operation that would result from trips made by workers and direct energy electricity and natural gas consumption. The CO_2e emissions were converted to MMBTU. Although three different locations are being considered for the MSF, all would operate in the same manner, and are therefore considered functional equivalents.

Energy estimates for rail vehicle propulsion and station operation under Alternatives 3 and 4 were calculated based on the 2014 energy consumption of Metro's existing LRT lines (the Blue, Gold, Green, and Expo lines). The average per-mile energy consumption was applied to the length of the proposed 9.2-mile alignment and converted to MMBTU. The figure was then increased by 10% to account for proposed 24-hour service.

Energy estimates provided herein are not intended to be used for energy planning purposes; they are used as a standard method to conservatively assess the relative impacts of each of the alternatives. Actual energy use would vary based on the age and efficiency of equipment, operational characteristics, technological changes, and other factors.

2.3 Significance Thresholds

Significance thresholds are used to determine whether a project may have a significant environmental effect. The significance thresholds, as defined by federal and state regulations and guidelines, are discussed below.

2.3.1 Federal – NEPA

NEPA does not include specific significance thresholds. According to the Council on Environmental Quality (CEQ) Regulations for Implementing NEPA, the determination of significance under NEPA is based on context and intensity.[3]

Context relates to the various levels of society where effects could result, such as society as a whole, the affected region, the affected interests, and the locality. The intensity of an effect relates to several factors, including the degree to which public health and safety would be affected; the proximity of a project to sensitive resources; and the degree to which effects on the quality of the human environment are likely to be highly controversial or involve unique or unknown risks.

Under NEPA, the context and intensity of the project's effects are discussed in this Land Use section regardless of any thresholds levels, and mitigation measures would be included where reasonable.

Although there are no specific NEPA criteria for analyzing impacts to energy resources, 40 CFR Section 1502.16(e) and (f) direct that EISs shall 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, if applicable, mitigation measures.

2.3.2 State and Local – CEQA

CEQA requires state and local government agencies to identify the significant environmental effects of proposed actions; however, CEQA does not describe specific significance thresholds. According to the Governor's Office of Planning and Research, significance thresholds for a given environmental effect are at the discretion of the Lead Agency and are at the levels at which the Lead Agency finds the effects of the project to be significant.[4]

2.3.2.1 State CEQA Guidelines

The State CEQA Guidelines define a significant effect on the environment as: "a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance" (State CEQA Guidelines, Section 15382).[5]

The State CEQA Guidelines do not describe specific significance thresholds. However, Appendix G of the State CEQA Guidelines lists a variety of potentially significant effects, which are often used as thresholds or guidance in developing thresholds for determining impact significance. Additionally, Section 15126.4(a)(1)[6] provides further guidance on determining the significance of energy

[3] Code of Federal Regulations. *CEQ – Regulations for Implementing NEPA, 40 CFR Part 1508, Terminology and Index*.

[4] OPR (State of California, Governor's Office of Planning and Research). 1994. *Thresholds of Significance: Criteria for Defining Environmental Significance*. September.

[5] AEP. 2012. *California Environmental Quality Act (CEQA) Statute and Guidelines.* Reproduced with permission from the California Resources Agency.

[6] California Public Resources Code, Title 14, Division 6, Chapter 3, California Environmental Quality Act Guidelines, Section 15126.4(a)(1).

impacts. Accordingly, for the purposes of this EIS/EIR, a project would normally have a significant energy impact under CEQA if it would:

- Result in the wasteful, inefficient, or unnecessary consumption of energy; or
- Result in a substantial increase in demand or transmission service, resulting in the need for new or expanded sources of energy supply or new or expanded energy delivery systems or infrastructure, the construction of which could cause significant impacts on the environment.

Additionally, Appendix F to the State CEQA Guidelines recommends consideration of the following impact possibilities and potential energy conservation measures when preparing an EIR:

- The project's energy requirements and its energy use efficiencies by amount and fuel type for each stage of the project, including construction, operation, maintenance, and/or removal. If appropriate, the energy intensiveness of materials may be discussed.
- The effects of the project on local and regional energy supplies and on requirements for additional capacity.
- The effects of the project on peak- and base-period demands for electricity and other forms of energy.
- The degree to which the project complies with existing energy standards.
- The effects of the project on energy resources.
- The project's projected transportation energy use requirements and its overall use of efficient transportation alternatives.

2.3.2.2 L.A. CEQA Thresholds Guide

The *L.A. CEQA Thresholds Guide* (2006) provides further guidance for determining the significance of impacts on utilities and service systems. With respect to energy, a determination of impacts would be made on a case-by-case basis by considering the following factors:

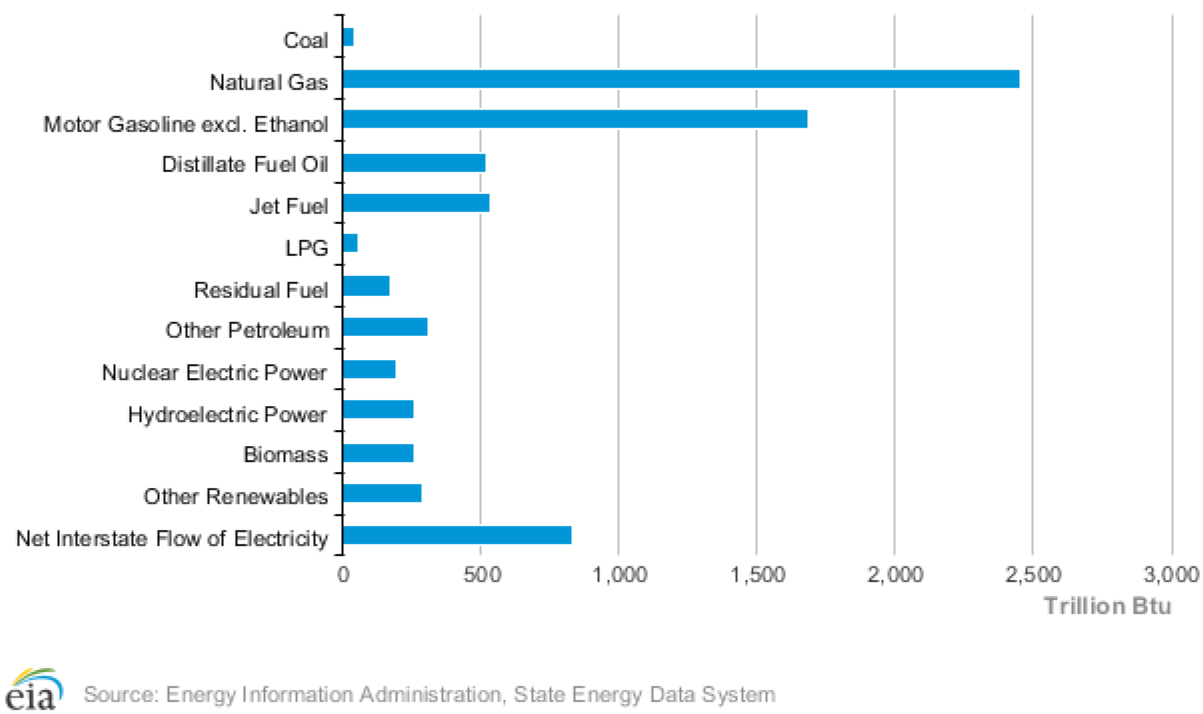
- The extent to which the project would require new (off-site) energy supply facilities and distribution infrastructure or capacity-enhancing alterations to existing facilities;
- Whether and when the needed infrastructure was anticipated by adopted plans; and
- The degree to which the project design and/or operations incorporate energy conservation measures, particularly those that go beyond City requirements.

3.1 Energy Consumption

3.1.1 Statewide Energy Consumption

Energy consumption can be accounted for in a number of ways, with fuel source (i.e. gasoline, natural gas, or coal) and end-use sector (i.e., transportation or residential energy use) being among the most common. As shown in Figure 3-1, California's most prevalent fuel source is natural gas, representing 32% of the state's energy consumption, and is the fuel source responsible for over 60% of in-state electricity generation.[7,8] Motor gasoline accounts for 22% of statewide energy consumption and petroleum-based fuels other than motor gasoline represent a combined 21% of California's energy use.

Figure 3-1: California Energy Consumption Estimates by Source, 2012



Source: U.S. Energy Information Administration. 2014a.

[7] U.S. Energy Information Administration. 2014a. *California Energy Consumption Estimates by Source, 2012.* Available: <http://www.eia.gov/state/?sid=CA#tabs-1>. Accessed: December 10, 2014.

[8] California Energy Commission. 2014. *California Energy Almanac: 2013 Total System Power in Gigawatt Hours.* Available: <http://energyalmanac.ca.gov/electricity/total_system_power.html >. Accessed: December 10, 2014.

Figure 3-2 shows California energy use by end-use sector. The transportation sector is responsible for largest share of the state's energy use, accounting for just under 40% of the California total. Residential, commercial, and industrial users are each responsible for roughly one-fifth of energy use.[9]

Energy resources for transportation include gasoline, natural gas, biofuels, and electricity, with petroleum-based fuels accounting for 96% of the state's transportation needs.[10]

In the 2011 Integrated Energy Policy Report, CEC staff forecasted that future gasoline consumption may range from a decline of 15.6% from 2009 levels to an increase of 3.6% by 2030, based respectively on low and high petroleum fuel demand scenarios. The CEC projects diesel consumption to increase by between 22% and 50% compared to 2009 levels, and expects an increase in the consumption of alternative fuels. CEC estimates the consumption of natural gas as a transportation fuel to increase at a compound annual rate of more than 3% with natural gas consumption by 2030, representing 87% to 96% above 2009 levels.[11] Presently, after ethanol, natural gas is the most consumed alternative fuel for transportation use in California, with electricity consumption ranked third.[12]

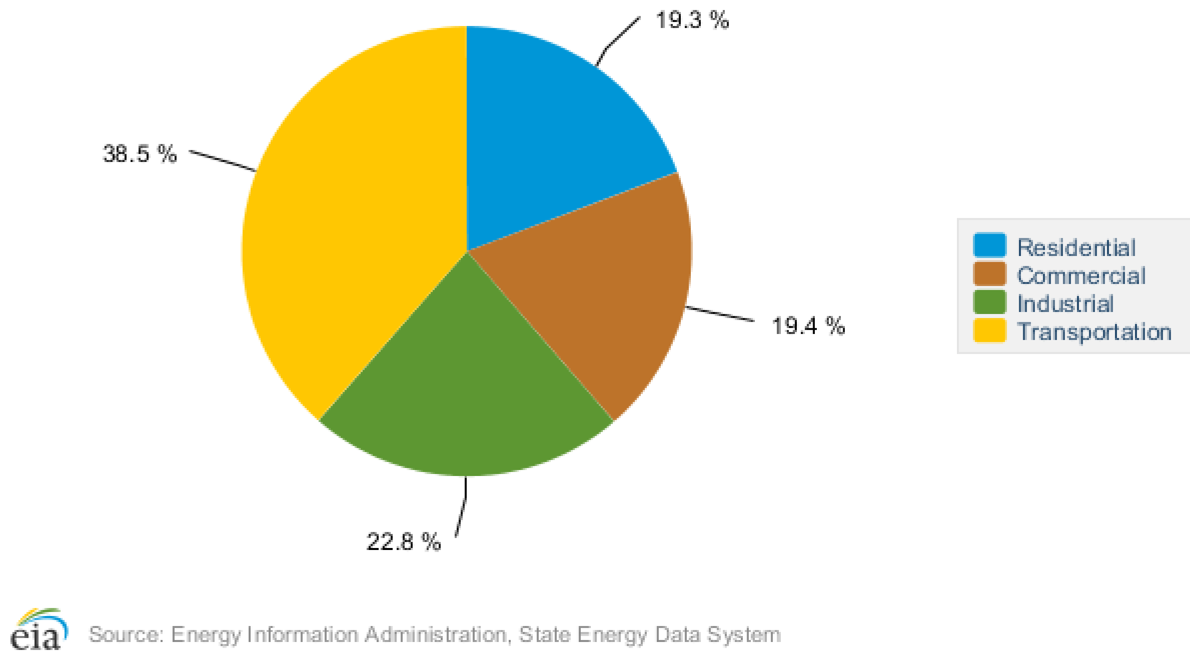
[9] U.S. Energy Information Administration. 2014b. *California Energy Consumption by End-Use Sector, 2012.* Available: <http://www.eia.gov/state/?sid=CA#tabs-1>. Accessed: December 10, 2014.

[10] California Energy Commission. 2013. *Energy Almanac*. California Petroleum Statistics and Data. Available: <http://energyalmanac.ca.gov/petroleum/index.html>. Accessed: February 14, 2013.

[11] California Energy Commission. 2012. *2011 Integrated Energy Policy Report.* February. Available: <http://www.energy.ca.gov/2011publications/CEC-100-2011-001/CEC-100-2011-001-CMF.pdf>. Accessed: February 14, 2013.

[12] California Energy Commission. 2011. *Transportation Energy Forecasts and Analyses for the 2011 Integrated Energy Policy Report.* Draft staff report. August. Report No. CEC-600-2011-007-SD. Available: <http://energy.ca.gov/2011publications/CEC-600-2011-007/CEC-600-2011-007-SD.pdf>. Accessed: February 17, 2013.

Figure 3-2: California Energy Consumption by End-Use Sector, 2012



Source: U.S. Energy Information Administration. 2014b.

3.1.2 Regional Energy Consumption

Southern California's energy consumption differs from the state as a whole in that a greater proportion of the energy consumed in the region is for the purposes of transportation, owing to the high density of population that relies on freeways and local roads for mobility, two major ports that serve as a hub for the movement of goods, as well as three large airports. As shown in Figure 3-3, approximately 60% of energy used in the South Coast Air Basin (which comprises all of Orange County and the non-desert portions of Los Angeles, San Bernardino, and Riverside counties) is transportation-related.[13]

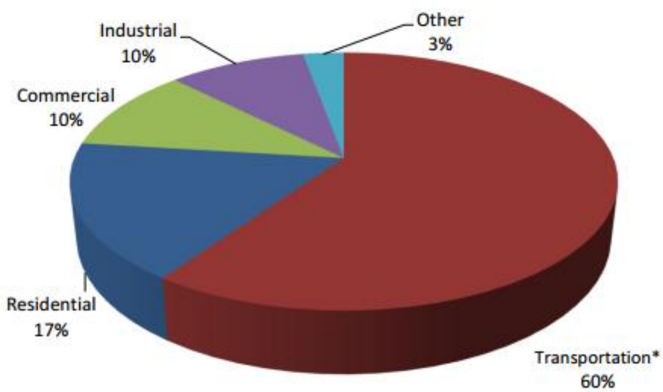
According to SCAG's 2016-2040 RTP/SCS, the six-county SCAG region (Ventura, Los Angeles, Orange, San Bernardino, Riverside, and Imperial counties) is expected to add approximately 3.8 million people by 2040.[14] This additional population growth is expected to pose transportation challenges for the region, as travel demand in California will likely increase.

Transportation energy consumption reflects the type and number of vehicles, the extent of their use, and their fuel economy. According to the SCAG 2012–2035 RTP/SCS, the six-county region's transportation network supports a daily total of approximately 445.8 million VMT, almost half of which occurs in Los Angeles County. Even with implementation of the 2012 RTP/SCS measures intended to reduce VMT, projections show that the Los Angeles region will experience a 16.3%

[13] South Coast Air Quality Management District. 2012. *2012 Air Quality Management Plan.* Chapter 10: Energy and Climate. Available: <http://www.aqmd.gov/aqmp/2012aqmp/Final/Ch10.pdf>. Accessed: February 18, 2013.
[14] Southern California Association of Governments. 2016. 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy. Available: <http://scagrtpscs.net/Documents/2016/final/f2016RTPSCS.pdf>. Accessed: July 20, 2016.

increase in VMT by 2035.[15] The addition of alternative modes of transportation could result in a change in the dynamics of all vehicle classes with regard to VMT. Changes in VMT, in turn, could affect regional energy consumption. A reduction in VMT through alternative modes of transportation could lower energy needs and reduce pollutant emissions.

Figure 3-3: Share of Energy Use in South Coast Basin in 2008 ("Transportation" includes off-road sources)



As stated in the SCAG 2012-2035 RTP/SCS, the daily total VMT in the SCAG transportation network is approximately 445.8 million VMT; of this six-county total, the daily total VMT in the Los Angeles County is approximately 225.6 million VMT.

Metro's contribution to regional energy consumption includes on-road vehicle fuel use (which is primarily compressed natural gas, or CNG) and electricity for rail vehicle propulsion and maintenance and administrative facility operation. Metro's bus fleet is now fueled by CNG. In 2011, Metro's fleet, excluding vanpool services, used over 41 million gallons of gasoline-equivalent (GGE) fuels. When accounting for gasoline used in vanpools, Metro's gasoline use accounts for 6% of all fuel use, when compared on a GGE basis. Metro's electric power comes from several sources including the Los Angeles Department of Water and Power (over 50% of all power), Southern California Edison, and Pasadena Water and Power. In 2011, Metro's rail lines consumed approximately 164 million kilowatt hours (kWh) of electricity and Metro facilities used 97 million kWh of electricity.[16]

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[15] Southern California Association of Governments. 2012. *2012–2035 Regional Transportation Plan/Sustainable Communities Strategy.* April. Available: <http://rtpscs.scag.ca.gov/Documents/2012/final/f2012RTPSCS.pdf>. Accessed: February 13, 2013.

[16] Los Angeles County Metropolitan Transportation Authority. 2012. *Moving Towards Sustainability, 2012 Metro Sustainability Report Using Operational Metrics.* Available: <http://www.metro.net/projects_studies/sustainability/ images/Sustainability_Report.pdf>. Accessed: February 21, 2013.

4.1 Operational Impacts

Energy consumption may be considered direct or indirect. Direct energy consumption is associated with an increase in fuel or electricity due to proposed project facilities, vehicles, or equipment. Indirect energy consumption occurs as a result of a project's change to its environment. For example, if a project encourages people to take alternative transportation instead of driving, it may contribute to a reduction of VMT and the associated fuel use of vehicles.

4.1.1 No-Build Alternative

Under the No-Build Alternative, no new project facilities, infrastructure, or development would be constructed as part of East San Fernando Valley Transit Corridor Project. The No-Build Alternative would not result in an increase in the consumption of energy and no energy infrastructure would be required to meet project demands. Consequently, no operational energy impacts or effects would occur. The projected conditions under the No-Build Alternative represent the existing and future baselines (for year 2012 and 2040, respectively) against which the proposed build alternatives are compared to determine project impacts. Existing and future (2040) baseline bus propulsion energy for the 233 and 761 bus lines is shown in Table 4-1.

Table 4-1: Existing (2012) and Future (2040) Baseline Operational Energy Consumption – Bus lines 233 and 761

Baseline Conditions	Operational (Annual MMBTU)
2012 Traffic Energy	927,114,152
2040 Traffic Energy	786,014,117
Bus Propulsion Energy (233 and 761 Bus Lines)	60,484

Source: ICF 2016.

It should be noted that over time, even without proposed project improvements, population growth is expected to occur and other planned and proposed projects would be constructed, which would lead to increased vehicle use, increased traffic congestion, and increased energy consumption in the project corridor. In the year 2040, under projected future 2040 baseline conditions (i.e., conditions without implementation of the East San Fernando Valley Transit Corridor Project), VMT would be approximately 538 million VMT within the SCAG region study area, which would result in an annual energy consumption of approximately 1 billion MMBTU.[17]

4.1.2 TSM Alternative

The TSM Alternative would result in both direct and indirect operational energy consumption impacts. Direct impacts could include electricity consumption and fuel consumption due to enhanced operating hours and increased bus frequencies for the existing Metro Rapid Line 761 and Local Line 233. Operation of the TSM Alternative would not result in a substantial increase in demand for electricity, as the additional buses would be accommodated at the existing Division 15 MSF and no new maintenance facilities would be required. The enhanced bus operating hours and increased bus frequencies would result in an estimated increase in consumption of approximately 12,000 MMBTU of CNG, or 570,000 GGE. This would represent a 20% increase in CNG consumption for the 233 and 761 bus lines due to the TSM Alternative, compared to existing baseline conditions for the 233 and 761 bus lines. This increase is not substantial relative to Metro's annual consumption of more than 40 million GGE (Metro 2014). Given that Metro has access to CNG fueling stations and non-transit vehicle drivers would maintain their access to the extensive network of fueling stations, no new or expanded infrastructure would be required to meet the energy demands. The TSM Alternative would not change the existing operations of buses along San Fernando Road or Truman Street, so there would not be any change to the existing energy demand along those corridors.

Indirect impacts due to the TSM Alternative would occur as a result of the changes to traffic circulation. As demonstrated for the 2012 Alternative 3 scenario in Table 4-5, there would be net reductions in fuel consumption by motor vehicles operating in the project vicinity relative to the 2012 No Build scenario. Because roadway capacity would be reduced by the greatest amount under Alternative 3 relative to the other build alternatives, Alternative 3 represents a worst-case with respect to traffic flow. By extension, operations under the TSM Alternative would result in less delay and more efficient operating speeds than Alternative 3, which would result in lower fuel consumption from motor vehicles operating in the project vicinity. On the basis of the less extensive traffic impacts relative to the 2012 Alternative 3 scenario, the reduction in energy consumption by traffic in the project vicinity would at least partially offset the energy consumption from enhanced and more frequent bus service.

Although net increases in overall operational energy consumption associated with the 2012 TSM Alternative scenario could occur, any increases would be minor, and would not constitute a wasteful, inefficient, or unnecessary consumption of energy. Furthermore, no new energy infrastructure would be required that would result in significant impacts on the environment. Therefore, impacts related to operational energy use that could occur under the 2012 TSM Alternative scenario would be less than significant under CEQA and minor adverse under NEPA.

In the longer term, the 2040 TSM Alternative would result in an annual 2,600-mile reduction in regional VMT relative to the 2040 No-Build Alternative. However, the speeds at which vehicles within the project vicinity would operate would be less efficient and result in a negligible net increase in fuel consumption (see Appendix A). As shown in Table 4-2, the TSM Alternative would

[17] This energy analysis assumes that 90% of VMT would be from gasoline-powered vehicles and the remaining 10% would be from diesel-powered vehicles. Although future conditions may differ, using this standard across all alternatives allows for direct comparison. See Appendix A for more information.

result in a projected increase of approximately 51,000 MMBTU or 0.006% compared to future (2040) baseline conditions. This increase would not be substantial.

Table 4-2: TSM Alternative – Operational Energy Consumption

Comparison to Future (2040) Baseline	Operational (Annual MMBTU)	Percent Change
Net Traffic Energy	64,276	0.01%
Net Bus Propulsion Energy (233 and 761 Bus Lines)	11,918	19.70%
Net Total	**76,194**	**0.01%**

Source: ICF 2016.

No new buildings subject to energy standards required by Title 24 of the California Code of Regulations would be constructed and operated under the TSM Alternative.

4.1.3 Alternative 1 – Curb-Running BRT Alternative

Alternative 1 would introduce BRT service in the curb lanes of existing corridor roadways. With improved bus travel times and headways, approximately 3,000 additional boardings per day are expected (KOA 2015). In order to maintain the desired peak period headways of 6 minutes for the 761X line and 8 minutes for the 233X line, 10 additional buses would be required. The use of additional buses on the 233X and 761X lines would increase the amount of CNG consumed by approximately 27,000 MMBTU (or 687,000 GGE), which is a 44% increase compared with existing conditions for 233 and 761 bus line operations. Given Metro's overall annual use of more than 40 million GGE of CNG, such increases would not adversely affect overall regional supplies or demand and no additional energy infrastructure is expected to be required due to implementation of Alternative 1.

As demonstrated for the 2012 Alternative 3 scenario in Table 4-5, there would be net reductions in fuel consumption by motor vehicles operating in the project vicinity relative to the 2012 No Build scenario. Because roadway capacity would be reduced by the greatest amount under Alternative 3 relative to the other build alternatives, Alternative 3 represents a worst-case with respect to traffic flow. By extension, operations under Alternative 1 would result in less delay and more efficient operating speeds than Alternative 3, which would result in lower fuel consumption from motor vehicles operating in the project vicinity. On the basis of the less extensive traffic impacts relative to the 2012 Alternative 3 scenario, the reduction in energy consumption by traffic in the project vicinity would at least partially offset the increase in energy consumption from enhanced and increased bus service.

Electricity consumption due to Alternative 1 would be associated with proposed lighting and other electrical facilities (e.g., electronic signage or ticketing machines) at new bus stops. No new MSF would be required, as the Division 15 MSF would accommodate the increased number of buses, and no other large structures that would consume electricity would be developed under this alternative.

The electricity consumed by bus stop infrastructure would be minimal and would not require new energy supplies or infrastructure.

No buildings or structures subject to energy standards required by Title 24 of the California Code of Regulations, CALGreen Building Code, or internal Metro policies related to LEED Silver accreditation would be constructed under Alternative 1.

Although net increases in overall operational energy consumption associated with the 2012 Alternative 1 scenario could occur, any increases would be minor, and would not constitute a wasteful, inefficient, or unnecessary consumption of energy. Furthermore, no new energy infrastructure would be required that would result in significant impacts on the environment. Therefore, impacts related to operational energy use that could occur under the 2012 Alternative 1 scenario would be less than significant under CEQA and minor adverse under NEPA.

In the longer term, although Alternative 1 would reduce regional VMT by 36,000 miles annually, the less efficient speeds at which vehicles would operate due to increased roadway congestion would result in a net increase in fuel consumption of approximately 36,000 MMBTU, an increase of 0.005% compared to the future (2040) baseline conditions (see Table 4-3 and Appendix A). Given the extensive network of fueling stations throughout the project vicinity and the slight increase in transportation-related energy consumption, operation of Alternative 1 would not substantially affect the regional supply of and demand for gasoline or require substantial new energy infrastructure.

Table 4-3: Alternative 1 – Operational Energy Consumption

Comparison to Future (2040) Baseline Conditions	Operational (Annual MMBTU)	Percent Change
Net Traffic Energy	76,613	0.01%
Net Bus Propulsion Energy (233 X and 761X Bus Lines)	26,816	44.33%
Net Total	**103,428**	**0.01%**

Source: ICF 2016.

4.1.4 Alternative 2 – Median-Running BRT Alternative

Alternative 2 would provide BRT service in the median of existing corridor roadways. With improved bus travel times and headways, approximately 3,000 additional boardings per day are expected (KOA 2015). In order to maintain the desired peak period headways of 6 minutes for the 761X line and 8 minutes for the 233 line, 10 additional buses would be required. The use of additional buses on the 233X and 761X lines would increase the amount of CNG used by approximately 27,000 MMBTU (or 687,000 GGE), which is 44% greater than existing baseline conditions for 233 and 761 bus line operations. Given Metro's overall annual use of more than 40 million GGE of CNG, such increases would not substantially affect regional supplies or demand and no additional energy infrastructure is expected to be required due to implementation of Alternative 2.

As demonstrated for the 2012 Alternative 3 scenario in Table 4-5, there would be net reductions in fuel consumption by motor vehicles operating in the project vicinity relative to the 2012 No Build scenario. Because roadway capacity would be reduced by the greatest amount under Alternative 3 relative to the other build alternatives, Alternative 3 represents a worst-case with respect to traffic flow. By extension, operations under Alternative 2 would have less delay and more efficient operating speeds than Alternative 3, which would result in lower fuel consumption from motor vehicles operating in the project vicinity. On the basis of the less extensive traffic impacts relative to the 2012 Alternative 3 scenario, the reduction in energy consumption by traffic in the project vicinity would at least partially offset the increase in energy consumption from enhanced and more frequent bus service. Although net increases in overall operational energy consumption associated with the 2012 Alternative 2 scenario could occur, any increases would be minor, and would not constitute a wasteful, inefficient, or unnecessary consumption of energy. Furthermore, no new energy infrastructure would be required that would result in significant impacts on the environment. Therefore, impacts related to operational energy use to the 2012 Alternative 2 scenario would be less than significant under CEQA and minor adverse under NEPA.

In the longer term, although implementation of Alternative 2 would reduce regional VMT by 36,000 miles annually, the less efficient speeds at which vehicles would operate due to increased roadway congestion would result in a net increase in fuel consumption of approximately 2,000 MMBTU per year, an increase of 0.0003% compared to the future (2040) baseline conditions (see Table 4-4 and Appendix A). Given the extensive network of fueling stations throughout the project vicinity and the slight increase in transportation-related energy consumption, operation of Alternative 2 would not substantially affect regional supply of and demand for, gasoline or require substantial new energy infrastructure.

Table 4-4: Alternative 2 – Operational Energy Consumption

Comparison to Future (2040) Baseline Conditions	Operational (Annual MMBTU)	Percent Change
Net Traffic Energy	2,121	0.0003%
Net Bus Propulsion Energy (233X and 761X Bus Lines)	26,816	44.33%
Net Total	**28,937**	**0.004%**

Source: ICF, 2016.

Similar to Alternative 1, electricity consumption due to Alternative 2 would be associated with proposed lighting and other electrical facilities (e.g., electronic signage or ticketing machines) at new bus stops. No new MSF would be required, as the Division 15 facility would accommodate the increased number of buses, and no other large structures that would consume electricity would be developed under this alternative. The electricity consumed by bus stop infrastructure would be minimal and would not require new energy supplies or infrastructure.

No buildings or structures subject to energy standards required by Title 24 of the California Code of Regulations, CALGreen Building Code, or internal Metro policies related to LEED Silver accreditation would be constructed under Alternative 2.

This alternative would not result in the wasteful, inefficient, or unnecessary consumption of energy and no new energy infrastructure that would result in significant impacts on the environment would be required. As a consequence and because Alternative 2 would result in relatively minor increases in energy, operational energy impacts/effects would be less than significant under CEQA and minor adverse under NEPA.

4.1.5 Alternative 3 – Low-Floor LRT/Tram Alternative

Under Alternative 3, Low-Floor LRT/Tram vehicles would operate within the median of an existing transportation right-of-way along Van Nuys Boulevard and in mixed-flow traffic along San Fernando Road. With improved transit travel times and headways, approximately 8,500 additional boardings per day are expected (KOA 2015).

As shown in the Table 4-5, under the 2012 Alternative 3 scenario, there would reductions in energy consumption from motor vehicle operating in the project vicinity (by approximately 10,000 MMBTU, or 0.001%) from mobile sources as well as from reduced bus service, which would shift to increases in energy consumption over time due to projected increases in congestion. Given the extensive network of fueling stations throughout the project vicinity and the slight increase in transportation-related energy consumption under the 2040 scenario, operation of Alternative 3 would not substantially affect regional supply of and demand for gasoline or required substantial new energy infrastructure.

Table 4-5: Alternative 3 – Operational Energy Consumption

Component	Operational (Annual MMBTU)	Percent Change
2012 Net Traffic Energy	(9,789)	(0.001%)
Net Bus Propulsion Energy (233S and 761S Bus Lines)	(24,107)	(39.86%)
MSF Energy	14,925	N/A
Low-Floor LRT/Tram/Station Energy	68,645	N/A
Net Total	**49,674**	**0.005%**

Source: ICF, 2016.

The MSF would result in the consumption of both fuels and electricity. Approximately 11,000 MMBTU would be consumed annually due to the fuels consumed by employee, supplier, and maintenance motor vehicle trips to and from the MSF. Annual MSF electricity consumption would total approximately 3,000 MMBTU. Operation of the MSF would also result in natural gas consumption. The total amount of energy consumed by the MSF is presented in Table 4-5, above. Although the MSF would result in the consumption of energy, it should be noted that proposed MSF buildings would be designed and constructed in compliance with mandatory Title 24 and the CALGreen Building Code requirements and would achieve a minimum of LEED Silver rating, as specified in the Metro Sustainability Implementation Plan.

Other components of Alternative 3 that would require energy in the form of electricity consumption include the Low-Floor LRT/Tram propulsion systems, and lighting and accessory equipment at station platforms. The electricity consumed by these facilities is included in Table 4-5 (see Appendix A for additional details).

Although Alternative 3 would introduce a new consumer of electricity in the LADWP service area, the 70,000 MMBTU (20 million kWh) represents an infinitesimally small portion of the 85.3 million MMBTU (25,000 GWh) of electricity that LADWP projects selling to customers in the year 2030 (LADWP 2014). As specified in Metro's January 2012 Climate Action and Adaptation Plan, Metro plans to include on-board storage of regenerative braking energy for all new rail cars. A study prepared for Bay Area Rapid Transit found that regenerative braking energy storage in combination with different propulsion systems and changes to lighting and ventilation could result in a per-mile reduction of electricity of 43% (Metro 2010).

A letter has been sent to LADWP on September 30, 2015 identifying the projected energy consumption required for Alternative 3 and requesting confirmation that there would be sufficient energy available to meet the proposed project's demands. Although a response was not received, Metro will continue to follow up with LADWP, and details of the correspondence will be included in the FEIR-FEIS. Although new electricity consumption for vehicle propulsion and station operation along a fixed guideway would be required, the increase in energy would be negligible and would not require new electricity infrastructure beyond that which is existing or has been previously planned.

MSF, tram vehicle propulsion, and station operation would result in net increases in energy consumption relative to the 2012 No Build Alternative, but overall energy consumption under the 2012 Alternative 3 scenario would increase by less than 0.01%. Therefore, impacts under the 2012 Alternative 3 scenario would be less than significant and minor adverse under NEPA.

In the longer term, the 2040 Alternative 3 scenario would reduce regional VMT by approximately 9,000 miles annually. However, traffic operations would be constrained by the frequency of Low-Floor LRT/Tram vehicles along the alignment and the decreased speeds at which automobile traffic would operate due to decreased roadway capacity, which would result in a net increase in fuel consumption of approximately 567,000 MMBTU per year, an increase of 0.07% compared to future (2040) baseline conditions (see Table 4.11-9 and the Energy Technical Report in Appendix R). This increase in fuel consumption from vehicle operation would not occur immediately, however.

4.1.6 Alternative 4 – LRT Alternative

Alternative 4 would introduce LRT service within and beneath an existing transportation right-of-way along Van Nuys Boulevard and along San Fernando Road/Metrolink railroad right-of-way. With improved transit travel times and headways, approximately 8,600 additional transit vehicle boardings per day are expected (KOA 2015).

It is anticipated that there would be a reduction in CNG fuel use by Metro buses, as Alternative 4 would involve the maintenance of service along the existing 233 line, and the 761 line would be modified to serve only areas south of the project limits. Relative to the baseline operations of the 233 and 761 bus lines, there would be a 1,600 MMBTU reduction in CNG consumption for bus propulsion resulting from the reduced service on the 761S bus line, which represents a 3% reduction.

The MSF would result in the consumption of both fuels and electricity. Approximately 11,000 MMBTU would be consumed annually due to the fuels consumed by employee, supplier, and maintenance vehicle trips to and from the MSF. Annual MSF electricity consumption would total approximately 3,000 MBTU. Operation of the MSF would also result in natural gas consumption. The total amount consumed by the MSF is presented in Table 4-6. Although the MSF would result in the consumption of energy, it should be noted that proposed MSF buildings would be designed and constructed in compliance with mandatory Title 24 and the CALGreen Building Code requirements and would achieve a minimum of LEED Silver rating, as specified in the Metro Sustainability Implementation Plan.

Other components of Alternative 4 that would require energy in the form of electricity consumption include the LRT propulsion systems, and lighting and accessory equipment at station platforms. The electricity consumed by these facilities is included in Table 4-6 (see Appendix A for additional details).

Table 4-6: Alternative 4 – Operational Energy Consumption

Component	Operational (Annual MMBTU)	Percent Change
Net Traffic Energy	(373,696)	(0.048%)
Net Bus Propulsion Energy (233 and 761S)	(1,625)	(2.69%)
MSF Energy	14,925	N/A
LRT/Station Energy	68,645	N/A
Net Total	**(291,752)**	**(0.037%)**

Source: ICF 2016.

Energy use for vehicle propulsion and station operation is based on the average per-mile 2014 energy consumption for existing Metro LRT lines applied to the proposed project. Approximately 70,000 MMBTU would be required annually to operate the 9.2-mile line. Although the LRT system under Alternative 4 would increase the consumption of electricity in the LADWP service area, the 70,000 MMBTU (20 million kWh) represents a infinitesimally small portion of the 85.3 million MMBTU (25,000 GWh) of electricity that LADWP projects selling to customers in 2030 (LADWP 2014). As specified in the January 2012 Climate Action and Adaptation, Metro plans to include on-board storage of regenerative braking energy for all new rail cars. A study prepared for Bay Area Rapid Transit found that regenerative braking energy storage in combination with different propulsion systems and changes to lighting and ventilation could result in a per-mile reduction of electricity of 43% (Metro 2010).

A letter has been sent to LADWP identifying the projected energy consumption required for Alternative 4 and requesting confirmation that there would be sufficient energy available to meet the proposed project's demands. Although new electricity consumptions for vehicle propulsion and station operation along a fixed guideway would be required, it is anticipated that the increase in energy would be negligible and would not require new electricity infrastructure beyond that which is existing or has been previously planned.

As demonstrated for the 2012 Alternative 3 scenario in Table 4-5, there would be net reductions in fuel consumption by motor vehicles operating in the project vicinity relative to the 2012 No Build scenario. Because roadway capacity would be reduced by the greatest amount under Alternative 3 relative to the other build alternatives, Alternative 3 represents a worst-case with respect to traffic flow. By extension, operations under Alternative 4 would result in less delay and more efficient operating speeds than Alternative 3, which would result in lower fuel consumption from motor vehicles operating in the project vicinity. On the basis of the less extensive traffic impacts relative to the 2012 Alternative 3 scenario, the reduction in energy consumption by traffic and bus service in the project vicinity would at least partially offset the increase in energy consumption from the operation of the new MSF, LRT vehicle propulsion, and stations.

Although net increases in overall operational energy consumption associated with the 2012 Alternative 3 scenario could occur, any increases would be minor, and would not constitute a wasteful, inefficient, or unnecessary consumption of energy. Furthermore, no new energy infrastructure would be required that would result in significant impacts on the environment. Therefore, impacts related to operational energy use to the 2012 Alternative 4 scenario would be less than significant under CEQA and minor adverse under NEPA.

In the longer term, the 2040 Alternative 4 scenario would reduce regional VMT by approximately 70,000 annually, which would result in fuel consumption reductions of approximately 374,000 MMBTU per year, a decrease of 0.05% compared to the future (2040) baseline condition under the No-Build Alternative (see Table 4-6 and Appendix A). Given the projected reduction in fuel consumption, Alternative 4 would not adversely affect the regional supply of, and demand for, gasoline.

As indicated in the table above, total annual operational energy consumption under the 2040 Alternative 4 scenario would be approximately 292,000 MMBTU less than the 2040 baseline conditions, much of which would be attributable to energy savings associated with the reduction of fuel use by private vehicles..

4.2 Construction Impacts

4.2.1 No-Build Alternative

The No-Build Alternative would not include construction of any project related facilities or infrastructure; therefore, no impacts or effects under CEQA and NEPA would occur.

4.2.2 TSM Alternative

The TSM Alternative would consist of relatively low-cost transit service improvements, such as increased bus frequencies, and minor physical improvements. Construction activities that would occur under the TSM Alternative would be limited to minor roadway modifications and bus stop enhancements. As such, construction would require minimal amounts of energy and construction activities would comply with the Metro Green Construction Policy. No buildings subject to energy standards required by Title 24 of the California Code of Regulations would be constructed under the TSM Alternative. Construction impacts on energy would be less than significant under CEQA and minor adverse under NEPA.

4.2.3 Alternative 1 – Curb-Running BRT Alternative

Under Alternative 1, modifications to roadways, sidewalks, and bus stops would be required. As shown in Appendix A and Table 4-7, approximately 18,000 MMBTU would be consumed during the construction of Alternative 1, most of which would be in the form of diesel fuel used by construction equipment and vehicles. Although an estimated 127,000 gallons of fuel would be consumed by construction vehicles and equipment, the fuel consumption would be temporary in nature and would represent a negligible increase in regional demand, and an insignificant amount relative to the more than 18 billion gallons of on-road fuels used in the state in 2013 (California Energy Commission 2014b). Given the extensive network of fueling stations throughout the project vicinity and the fact that construction would be short-term, it's anticipated that no new or expanded sources of energy or infrastructure would be required to meet the energy demands due to Alternative 1 construction activities. Additionally, construction activities would comply with the Metro Green Construction Policy and all construction equipment would be maintained in accordance with manufacturers' specifications so equipment performance would not be compromised. Therefore, Alternative 1 would not result in the wasteful or inefficient use of energy. Impacts related to regional energy supply, demand, and conservation during the construction period would be less than significant under CEQA and minor adverse under NEPA.

Table 4-7: Construction Energy Consumption of Build Alternative 1

Alternative	Construction (MMBTU)
Curb-Running BRT Alternative	17,618

Source: ICF, 2015.

4.2.4 Alternative 2 – Median-Running BRT Alternative

Under Build Alternative 2, modifications to roadways and sidewalks would be required in order to construct the dedicated median guideway and new median at-grade stations necessary for median-running BRT service along Van Nuys Boulevard, as well as infrastructure needed to operate in mixed-flow along San Fernando Road. As shown in Appendix A and Table 4-8, approximately 30,000 MMBTU would be consumed during the construction of Alternative 2, most of which would be in the form of diesel fuel used by construction equipment and vehicles. Although an estimated 215,000 gallons of fuel would be consumed by construction vehicles and equipment, the fuel consumption would be temporary in nature and would represent a negligible increase in regional demand, and an insignificant amount relative to the more than 18 billion gallons of on-road fuels used in the state in 2013 (California Energy Commission 2014b). Given the extensive network of fueling stations throughout the project vicinity and the fact that construction would be short-term, no new or expanded sources of energy or infrastructure are expected to be required to meet the energy demands due to Alternative 2 construction activities. Additionally, construction activities would comply with the Metro Green Construction Policy and all construction equipment would be maintained in accordance with manufacturers' specifications so equipment performance would not be compromised. Therefore, Alternative 2 would not result in the wasteful or inefficient use of energy. Impacts related to regional energy supply, demand, and conservation during the construction period would be less than significant under CEQA and minor adverse under NEPA.

Table 4-8: Construction Energy Consumption of Build Alternative 2

Alternative	Construction (MMBTU)
Median-Running BRT Alternative	29,816

Source: ICF, 2015.

4.2.5 Alternative 3 – Low-Floor LRT/Tram Alternative

Construction of Alternative 3 would provide a dedicated fixed guideway in the Van Nuys Boulevard median and a mixed-flow lane along San Fernando Road for Low-Floor LRT/Tram service. An MSF, new at-grade stations, a pedestrian bridge to the Sylmar Metrolink Station, modifications to sidewalks and roadways, and the installation of TPSS units would also be constructed. Diesel fuel for construction vehicles and equipment would be the primary source of energy used throughout the course of the construction period. In total, the four-year construction period would result in the consumption of approximately 55,000 MMBTU (see Table 4-9 and Appendix A). Although an estimated 400,000 gallons of fuel would be consumed, the fuel consumption would be temporary in nature and would represent a negligible increase in regional demand, and an insignificant amount relative to the more than 18 billion gallons of on-road fuels used in the state in 2013 (California Energy Commission 2014b). Given the extensive network of fueling stations throughout the project vicinity and the fact that construction would be short-term, no new or expanded sources of energy or infrastructure would be required to meet the energy demands due to Alternative 3 construction activities. Additionally, construction activities would comply with the Metro Green Construction Policy and all construction equipment would be maintained in accordance with manufacturers' specifications so equipment performance would not be compromised. Therefore, Alternative 3 would not result in the wasteful or inefficient use of energy. Impacts related to regional energy supply, demand, and conservation during the construction period would be less than significant under CEQA and minor adverse under NEPA.

Table 4-9: Construction Energy Consumption of Build Alternative 3

Alternative	Construction (MMBTU)
Median-Running Low-Floor LRT/Tram Alternative	55,366

Source: ICF, 2015.

4.2.6 Alternative 4 – LRT Alternative

Alternative 4 would involve the construction of a LRT system within a 9.2-mile corridor along Van Nuys Boulevard and San Fernando Road/Metrolink railroad right-of-way. The LRT alignment along Van Nuys Boulevard would include an underground segment 2.5 miles in length. Alternative 4 would also involve construction of an MSF, new stations, a pedestrian bridge to the Sylmar Metrolink Station, modifications to sidewalks and roadways, and the installation of approximately 10 TPSS units. For the purposes of estimating construction-related energy consumption, the plan for MSF Site 1 was assumed, as it would have the largest square footage and greatest demolition requirements. Also, the cut-and-cover construction method for the tunnel was assumed, as this would be the most energy-intensive construction method. If less energy-intensive options are carried forward, construction-related energy consumption for Build Alternative 4 would be less that what is identified below.

Diesel fuel for construction vehicles and equipment would be the primary source of energy used throughout the course of the construction period. In total, the five-year construction period would result in the consumption of approximately 274,000 MMBTU (see Table 4-10 and Appendix A). Although fuel would be consumed by construction vehicles and equipment, the estimated consumption would be limited to the construction period. An estimated 1.975 million gallons of fuel would be consumed, but the fuel consumption would be temporary in nature and would represent a negligible increase in regional demand, and an insignificant amount relative to the more than 18 billion gallons of on-road fuels used in the state in 2013 (California Energy Commission 2014b). Given the extensive network of fueling stations throughout the project vicinity and the fact that construction would be short-term, no new or expanded sources of energy or infrastructure would be required to meet the energy demands due to Alternative 4 construction activities. Additionally, construction activities would comply with the Metro Green Construction Policy and all construction equipment would be maintained in accordance with manufacturers' specifications so equipment performance would not be compromised. Therefore, Alternative 4 would not result in the wasteful or inefficient use of energy. Impacts related to regional energy supply, demand, and conservation during the construction period would be less than significant under CEQA and minor adverse under NEPA.

Table 4-10: Construction Energy Consumption of Build Alternative 4

Alternative	Construction (MMBTU)
Median-Running Low-Floor LRT/Tram Alternative	273,600

Source: ICF, 2015.

4.3 Cumulative Impacts

This cumulative impacts discussion is applicable to each of the proposed project build alternatives as well as the TSM Alternative. The study area for this cumulative energy impacts analysis is Los Angeles County, within which nearly all project-related electricity, fuel, and natural gas consumption would occur. Because each energy resource is managed by different entities, the specific approach to the cumulative analysis is identified below.

With the exception of instances in which projects require the physical development of new power generation, transmission, or fueling facilities, energy use impacts are cumulative impacts in that all energy consumed comes from a common resource pool. No new power generation, transmission, or fueling facilities would be required for implementation of the proposed project.

4.3.1 Electricity

For the purposes of electricity consumption, this cumulative impact discussion uses the projections/plans approach identified in CEQA Guideline 15130 (b)(1), specifically the projections contained within the LADWP 2014 Power Integrated Resource Plan.

Electricity consumption would be required for operational lighting and accessory features at stops/stations, MSF operation, fixed guideway vehicle propulsion (for Alternatives 3 and 4), and may be necessary for a minority of the components of construction.

The LADWP 2014 Power Integrated Resource Plan was used for this cumulative electricity impact analysis. The resource study area is the LADWP service area covered by the plan, which includes the City of Los Angeles and surrounding areas.[18] The LADWP 2014 Power Integrated Resource Plan projects future energy demand in the LADWP service area. LADWP sales, net energy for load forecasting, peak demand forecast, and hourly allocation are based on:

- An economic forecast of Los Angeles County from the Los Angeles Modeling Group of the University of California, Los Angeles (Anderson Forecast Project);
- Demographic information from the California Department of Finance, Demographic Research Unit; and
- A construction forecast from McGraw-Hill construction services.

[18] LADWP's overall service area includes parts of the Owens Valley, but because of the limited developable land and slow rates of growth, energy forecasts are not considered in the *2012 Power Integrated Resource Plan* (LADWP 2012:A-2).

LADWP has been contacted, via mailed letter, regarding the energy requirements of fixed guideway vehicle service for rail Alternatives 3 and 4. It is anticipated that forecasting efforts have allowed for new energy consumption levels sufficient to meet the demands of fixed guideway transit vehicle propulsion. However, increased electricity consumption associated with the proposed project in combination with future projects within LADWP's service area may require new electricity transmission infrastructure or the rehabilitation of existing electricity infrastructure to meet that increased demand and maintain adequate levels of service, notwithstanding future savings resulting from increased energy efficiencies. Although regional utility providers have planned for long-term increases in demand, new supply and delivery infrastructure facilities could be required to meet increased regional demands, the construction of which could result in impacts to the environment. However, the project's contribution to such impacts would not be substantial enough to affect potential increases in energy demand, and therefore, impacts related to electricity would not be cumulatively considerable.

4.3.2 Gasoline and Diesel Fuel

For the purposes of fuel consumption, this cumulative impact discussion uses the list of past, present, and reasonably foreseeable projects list approach identified in CEQA Guideline 15130 (b)(1). The proposed project, in combination with the projects identified in Table 2-2 and numerous other projects, require the use of gasoline and diesel fuel for construction and for vehicles associated with operation.

Direct diesel and gasoline consumption would result from the use of construction vehicles and equipment as well as from employee and maintenance trips during operation. Indirect fuel consumption would result from redistribution of trips that would occur from capacity changes along the proposed alignment. All alternatives except for Alternative 4 would result in increased fuel use compared to the No-Build Alternative. The proposed project, in combination with regional population growth, and more people traveling by motor vehicles, additional gasoline and diesel fuel infrastructure may be required to meet motor vehicle fuel demands in the future. Such increases may be at least partially offset by increasing fuel economy standards for vehicles, but new supply and delivery infrastructure facilities could be required to meet increased regional demand, the construction of which could result in impacts to the environment. However, the project's contribution to such impacts would not be substantial, as the project's gasoline and diesel fuel requirements would be small and could be met by the extensive network of fueling stations found throughout Los Angeles County. Therefore, impacts related to gasoline and diesel fuel would not be cumulatively considerable.

4.3.3 Natural Gas

For the purposes of natural gas consumption, this cumulative impact uses the list of past, present, and reasonably foreseeable projects list approach identified in CEQA Guideline 15130 (b)(1). The proposed project, in combination with the cumulative projects identified in Table 2-2 and numerous other projects, require the use of natural gas, primarily for building operation, but also for some construction equipment and vehicles.

Natural gas would be consumed by Metro buses during and following construction and may be consumed by some construction equipment and during operation of the MSF. Net increases in natural gas consumption would occur under the TSM Alternative and Alternatives 1 and 2. The proposed project, in combination with increasing demand for natural gas due to projected regional population growth, may require new or expanded natural gas infrastructure. Such increases in demand may be at least partially offset by increased energy efficiency of buses, buildings, and other users of natural gas, but new supply and delivery infrastructure facilities could be required to meet increased regional demand, the construction of which could result in impacts to the environment. The project's contribution to such impacts would not be substantial, as the project's natural gas requirements would be small and could be met by existing natural gas resources. Therefore, impacts related to natural gas would not be cumulatively considerable.

Chapter 5 Mitigation Measures

5.1 Compliance Requirements and Design Features

Per the Metro Sustainability Implementation Plan, the MSF under Alternatives 3 and 4 would be required to meet LEED Silver requirements at a minimum. Also for Alternatives 3 and 4, as specified in the 2012 Metro Climate Action and Adaptation Plan, regenerative braking on all fixed guideway vehicles would be implemented by 2020 in order to achieve energy and GHG reduction goals.

In addition, in order to minimize energy consumption, the construction contractor would implement energy conserving best management practices (BMPs), as feasible, in accordance with Metro's Energy and Sustainability Policy. BMPs would include, but would not be limited to the following: implementing a construction energy conservation plan; using energy-efficient equipment; consolidating material delivery to ensure efficient vehicle use; scheduling delivery of materials during non-rush hours to maximize vehicle fuel efficiency; encouraging construction workers to carpool; and maintaining equipment and machinery in good working condition. With the implementation of these measures, the build alternatives would not lead to a wasteful, inefficient, or unnecessary usage of fuel or energy.

5.2 Construction and Operational Mitigation Measures

No significant impacts would occur and mitigation measures would not be necessary.

Chapter 6
Impacts Remaining After Mitigation

No mitigation measures would be required. Energy-related impacts resulting from project implementation would be less than significant.

Energy-related impacts would be less than significant under CEQA.

References

California Energy Commission. 2011. *Transportation Energy Forecasts and Analyses for the 2011 Integrated Energy Policy Report.* Draft staff report. August. Report No. CEC-600-2011-007-SD. Available: <http://energy.ca.gov/2011publications/CEC-600-2011-007/CEC-600-2011-007-SD.pdf>. Accessed: February 17, 2013.

California Energy Commission. 2012. *2011 Integrated Energy Policy Report.* February. Available: <http://www.energy.ca.gov/2011publications/CEC-100-2011-001/CEC-100-2011-001-CMF.pdf>. Accessed: February 14, 2013.

California Energy Commission. 2013. *Energy Almanac.* California Petroleum Statistics and Data. Available: <http://energyalmanac.ca.gov/petroleum/index.html>. Accessed: February 14, 2013.

California Energy Commission. 2014. *California Energy Almanac: 2013 Total System Power in Gigawatt Hours*. Available: <http://energyalmanac.ca.gov/electricity/total_system_power.html >. Accessed: December 10, 2014.

California Energy Commission. 2014b. 2014 Integrated Energy Policy Report. Available: <http://www.energy.ca.gov/2014publications/CEC-100-2014-001/CEC-100-2014-001-CMF.pdf>. Accessed: April 3, 2015.

California Environmental Resources Evaluation System. 2012. *2012 California Environmental Quality Act Statute and Guidelines.* Appendix F: Energy Conservation. Available: <http://ceres.ca.gov/ceqa/docs/CEQA_Handbook_2012_wo_covers.pdf>. Accessed: February 13, 2013.

City of Los Angeles. 2006. *L.A. CEQA Thresholds Guide*. Available: <http://www.ci.la.ca.us/ead/programs/table_of_contents.htm>. Accessed: February 13, 2013.

KOA. 2015. Transportation Impact Report. March.

Los Angeles County Metropolitan Transportation Authority. 2007. *Energy and Sustainability Policy*. Available: <http://www.metro.net/about_us/sustainability/images/Energy-and-Sustainability-Policy.pdf>. Accessed: February 13, 2013.

Los Angeles County Metropolitan Transportation Authority. 2010. *Greenhouse Gas Emissions Cost Effectiveness Study.* Available: <http://media.metro.net/projects_studies/sustainability/images/GHGCE_2010_0818.pdf>. Accessed: April 22, 2015.

Los Angeles County Metropolitan Transportation Authority. 2012. *Moving Towards Sustainability, 2012 Metro Sustainability Report Using Operational Metrics*. Available: <http://www.metro.net/projects_studies/sustainability/images/Sustainability_Report.pdf>. Accessed: February 21, 2013.

Los Angeles County Metropolitan Transportation Authority. 2014. 2014 Metro Energy and Resource Report. Available: <http://media.metro.net/projects_studies/sustainability/images/report_ecsd_2014-0624.pdf>. Accessed: May 19, 2015.

Los Angeles Department of Water and Power. 2012. *2012 Power Integrated Resource Plan.*

Los Angeles Department of Water and Power. 2014. *2014 Power Integrated Resource Plan.*

South Coast Air Quality Management District. 2012. *2012 Air Quality Management Plan.* Chapter 10: Energy and Climate. Available: <http://www.aqmd.gov/aqmp/2012aqmp/Final/Ch10.pdf>. Accessed: February 18, 2013.

Southern California Association of Governments. 2012. *2012–2035 Regional Transportation Plan/Sustainable Communities Strategy*. April. Available: <http://rtpscs.scag.ca.gov/Documents/2012/final/f2012RTPSCS.pdf>. Accessed: February 13, 2013.

U.S. Energy Information Administration. 2014a. *California Energy Consumption Estimates by Source, 2012.* Available: <http://www.eia.gov/state/?sid=CA#tabs-1>. Accessed: December 10, 2014.

U.S. Energy Information Administration. 2014b. *California Energy Consumption by End-Use Sector, 2012.* Available: <http://www.eia.gov/state/?sid=CA#tabs-1>. Accessed: December 10, 2014.

Appendix A

Energy Consumption Calculations

No-Build Alternative

Operational

Traffic (2040)

CO2e 60,993,074 metric tons

1	2	3
metric tons of CO2 per year	**pounds CO2 per metric ton**	**pounds CO2**
60,993,074	2204.62262	134,466,710,026
		=Col 1* Col 2

AQ

4	5	5	6
pounds of CO2 for 90% gas/10% diesel trips	**gallons of gasoline**	**Btu/gal (gross)**	**BTU**
19.86	6,770,730,615.58	116,090	786,014,117,163,227
19.6 lbs CO2/gal gas 22.2 lbs CO2/gal diesel	=Col 3/ Col 4	Argonne National Lab GREET Model, v1. 2013	= Col 5 * Col 6

7
MMBTU
786,014,117.16
= Col 6/1,000,000

Annual MMBTU	**786,014,117**

No-Build Alternative

Traffic (2012)

CO2e 60,993,074 metric tons

1	2	3
metric tons of CO2 per year	**pounds CO2 per metric ton**	**pounds CO2**
71,942,145	2204.62262	158,605,280,903
		=Col 1* Col 2

AQ

4	5	5	6
pounds of CO2 for 90% gas/10% diesel trips	**gallons of gasoline**	**Btu/gal (gross)**	**BTU**
19.86	7,986,167,215.68	116,090	927,114,152,068,291
19.6 lbs CO2/gal gas	=Col 3/ Col 4		= Col 5 * Col 6
22.2 lbs CO2/gal diesel		Argonne National Lab	
		GREET Model, v1. 2013	

7
MMBTU
927,114,152.07
= Col 6/1,000,000

Annual MMBTU	**927,114,152**

No-Build Alternative

Bus

1	2	3	4	5
Vehicle Miles per Day	**BTU per Vehicle-Mile**	**Daily Energy Use (MMBTU)**	**Annual Energy Use (MMBTU)**	**Annual Energy Use (cf)**
4,466	37,105	165.71	60,484.49	58,837,052
=(67*22+68*44)		=Col 1 * Col 2	=Col 3*365	=Col 4 *1 mill/1028

To achieve the specified headways, 67 round trips on the 233 line (22 miles) and 68 round trips on the 761 line (44 miles) would be required

BTU per vehicle-mile: 2012 Transit Bus Energy Intensity, Table 2-13, Transportation Energy Data Book, Oak Ridge National Laboratory

1,028 BTU = 1 cf based on US Energy Information Administration (2014) http://www.eia.gov/tools/faqs/faq.cfm?id=45&t=8

6
Gasoline Gallon Equivalent
476,143
=Col 5 /123.57

Alternative Fuels Data Center: http://www.afdc.energy.gov/fuels/fuel_comparison_chart.pdf

Annual MMBTU	**60,484**

TSM Alternative

Operational

Traffic (2040)

CO2e 60,996,107 metric tons

1	2	3
metric tons of CO2 per year	**pounds CO2 per metric ton**	**pounds CO2**
60,996,107	2204.62262	134,473,396,827
		=Col 1* Col 2

AQ

4	5	5	6
pounds of CO2 for 90% gas/10% diesel trips	**gallons of gasoline**	**Btu/gal (gross)**	**BTU**
19.86	6,771,067,312.56	116,090	786,053,204,314,981
19.6 lbs CO2/gal gas	=Col 3/ Col 4		= Col 5 * Col 6
22.2 lbs CO2/gal diesel		Argonne National Lab	
		GREET Model, v1. 2013	

7
MMBTU
786,053,204.31
= Col 6/1,000,000

		Increase over No-Build	
Annual MMBTU	**786,053,204**	**39,087**	0.005%

Bus

1	2	3	4	5
Vehicle Miles per Day	**BTU per Vehicle-Mile**	**Daily Energy Use (MMBTU)**	**Annual Energy Use (MMBTU)**	**Annual Energy Use (cf)**
5,346	37,105	198.36	72,402.62	70,430,560
=(83*22+80*44)		=Col 1 * Col 2	=Col 3*365	=Col 4 *1 mill/1028
To achieve the desired headways, 16 additional round trips on 233 line (22 miles) and 12 additional round trips on 761 line (44 miles) would be required	2012 Transit Bus Energy Intensity, Table 2-13, Transportation Energy Data Book, Oak Ridge National Laboratory			1,028 BTU = 1 cf based on US Energy Information Administration (2014) http://www.eia.gov/tools/faqs/faq.cfm?id=45&t=8

6
Net Gasoline Gallon Equivalent
569,965
=Col 5 /123.57
Alternative Fuels Data Center: http://www.afdc.energy.gov/fuels/fuel_comparison_chart.pdf

Annual MMBTU Change from No-Build	**11,918**	19.70%

Alternative 1: Curb-Running BRT

Operational

Traffic (2040)

CO2e 60,995,897 metric tons

1	2	3
metric tons of CO2 per year	**pounds CO2 per metric ton**	**pounds CO2**
60,995,897	2204.62262	134,472,933,277
		=Col 1* Col 2

AQ

4	5	5	6
pounds of CO2 for 90% gas/10% diesel trips	**gallons of gasoline**	**Btu/gal (gross)**	**BTU**
19.86	6,771,043,972	116,090	786,050,494,670,727
19.6 lbs CO2/gal gas	=Col 3/ Col 4		= Col 5 * Col 6
22.2 lbs CO2/gal diesel		Argonne National Lab	
		GREET Model, v1. 2013	

7
MMBTU
786,050,494.67
= Col 6/1,000,000

		Increase over No-Build	
Annual MMBTU	**786,050,495**	**36,378**	0.005%

Bus

1	2	3	4	5
Net Vehicle Miles per Day	**BTU per Vehicle-Mile**	**Net Daily Energy Use (MMBTU)**	**Net Annual Energy Use (MMBTU)**	**Net Annual Energy Use (cf)**
6,446	37,105	239.18	87,300.27	84,922,445
=(83*22+105*44)		=Col 1 * Col 2	=Col 3*365	=Col 4 *1 mill/1028
headways, 16 additional	2-13, Transportation Energy Data Book,			Administration (2014)

6
Gasoline Gallon Equivalent
687,242
=Col 5 /123.57
http://www.afdc.energy.gov/fuels/fuel_

Annual MMBTU Change from No-Build	**26,816**	44.33%

Alternative 1

Construction

Roadway, Sidewalks/Stations

1	2	3	4	5	6
C02e (MT)	**pounds CO2 per metric ton**	**pounds CO2**	**pounds of CO2 per gallon diesel**	**gallons diesel**	**Btu/gal (gross)**
1280.99	2204.62262	2,824,100	22.2	127,211.69	138,490
		=Col 1* Col 2		=Col 3 / Col 4	Argonne National Lab

7
MMBTU
17,617.55
=Col 5*Col6/1 mill

Total MMBTU	**17,618**

Alternative 2: Median-Running BRT

Operational

Traffic (2040)

CO2e 60,993,238 metric tons

1	2	3
metric tons of CO2 per year	**pounds CO2 per metric ton**	**pounds CO2**
60,993,238	2204.62262	134,467,072,836
		=Col 1* Col 2

AQ

4	5	5	6
pounds of CO2 for 90% gas/10% diesel trips	**gallons of gasoline**	**Btu/gal (gross)**	**BTU**
19.86	6,770,748,883.97	116,090	786,016,237,939,911
19.6 lbs CO2/gal gas 22.2 lbs CO2/gal diesel	=Col 3/ Col 4	Argonne National Lab GREET Model, v1. 2013	= Col 5 * Col 6

7
MMBTU
786,016,237.94
= Col 6/1,000,000

		Increase over No-Build	
Annual MMBTU	**786,016,238**	**2,121**	0.0003%

Alternative 2: Median-Running BRT

Bus

1	2	3	4	5
Total Vehicle Miles per Day	**BTU per Vehicle-Mile**	**Daily Energy Use (MMBTU)**	**Annual Energy Use (MMBTU)**	**Annual Energy Use (cf)**
6,446	37,105	239.18	87,300.27	84,922,445
=(83*22+105*44)		=Col 1 * Col 2	=Col 3*365	=Col 4 *1 mill/1028
To achieve the desired headways, 16 additional round trips on 233X line (22 miles) and 37 additional round trips on 761X line (44 miles) would be required	2012 Transit Bus Energy Intensity, Table 2-13, Transportation Energy Data Book, Oak Ridge National Laboratory			1,028 BTU = 1 cf based on US Energy Information Administration (2014) http://www.eia.gov/tools/faqs/faq.cfm?id=45&t=8

6
Net Gasoline Gallon Equivalent
687,242
=Col 5 /123.57
Alternative Fuels Data Center: http://www.afdc.energy.gov/fuels/fuel_comparison_chart.pdf

Annual MMBTU Change from No-Build	**26,816**	44.33%

Alternative 2: Median-Running BRT

Construction

Roadway, Sidewalks/Stations

1	2	3	4	5	6
C02e (MT)	**pounds CO2 per metric ton**	**pounds CO2**	**pounds of CO2 per gallon diesel**	**gallons diesel**	**Btu/gal (gross)**
2167.95	2204.62262	4,779,512	22.2	215,293.32	138,490
		=Col 1* Col 2		=Col 3 / Col 4	

Argonne National Lab

7
MMBTU
29,815.97

=Col 5*Col6/1 mill

Total MMBTU	**29,816**

Alternative 3: Low-Floor Tram/LRT (2040)

Operational

Traffic

CO2e 61,037,093 metric tons

1	2	3
metric tons of CO2 per year	**pounds CO2 per metric ton**	**pounds CO2**
61,037,093	2204.62262	134,563,755,523
		=Col 1* Col 2

AQ

4	5	5	6
pounds of CO2 for 90% gas/10% diesel trips	**gallons of gasoline**	**Btu/gal (gross)**	**BTU**
19.86	6,775,617,095.83	116,090	786,581,388,655,257
19.6 lbs CO2/gal gas 22.2 lbs CO2/gal diesel	=Col 3/ Col 4	Argonne National Lab GREET Model, v1. 2013	= Col 5 * Col 6

7
MMBTU
786,581,388.66
= Col 6/1,000,000

		Increase over No-Build	
Annual MMBTU	**786,581,389**	**567,271**	0.072%

Alternative 3: Low-Floor Tram/LRT (2040)

Maintenance Facility

	1	2	3	4	5	6
				kWh	**BTU/kWh**	**MMBTU/yr**
Electricity				843,500	3,412	2,878
				CalEEMod		=Col 5 * Col 6/1M
					kBTU	**MMBTU/yr**
Natural Gas					1,316,700	1,316.70
					CalEEMod	= Col 5/1,000
	MT/CO2e per year	**pounds/MT**	**pounds of CO2 for 90% gas/10% diesel trips**	**gallons of diesel**	**Btu/gal (gross)**	**MMBTU/yr**
Mobile	696.91	2204.6	19.86	77,363	138,700	10,730
	CalEEMod		19.6 lbs CO2/gal gas	= Col 1 * Col 2/Col 3		=Col 4 * Col 5/1,000,000
			22.2 lbs CO2/gal diesel			
			Annual MMBTU	**14,925**		

Vehicle Propulsion and Stations

Fiscal Year 2014 Propulsion Power and Station Consumption

LRT Energy for FY 2014 **139,376,756** kWh Source: Metro 2014

Increase - 24-Hr Ops* **153,314,432** **KWh**

Assumptions: Depending on the line and current timetables, Metro would need to operate from 5 to 12% more trains to operate 24 hours per day with 20-minute headways during late-night hours. A 10% increase in energy is assumed to be conservative. Actual energy consumption required for 24-hour operation may be less.

LRT Lines	**Distance**	
Blue Line	22.17	miles
Expo Line	8.83	miles
Green Line	19.64	miles
Gold Line	19.51	miles
Total	**70.15**	**miles**
LRT Energy/Mile/Yr (24 hour operation)	2,185,523	KWh
ESFV Tram/LRT D	**9.2**	**miles**
Projected Annua	**20,106,811**	**KWh**

1	2	3
kWh	**BTU/kWh**	**MMBTU/yr**
20,106,811	3,414	68,645
CalEEMod		=Col 1 * Col 2/1M
	Argonne National Lab GREET Model, v1. 2013	

Annual MMBTU	**68,645**

Alternative 3: Low-Floor Tram/LRT (2040)

Bus

1	2	3	4	5
Total Vehicle Miles per Day	**BTU per Vehicle-Mile**	**Daily Energy Use (MMBTU)**	**Annual Energy Use (MMBTU)**	**Annual Energy Use (cf)**
2,686	37,105	99.66	36,377.37	35,386,548
=(83*2+105*24)		=Col 1 * Col 2	=Col 3*365	=Col 4 *1 mill/1028
To achieve the desired headways, 16 additional round trips on 233S line (2 miles) and 12 additional round trips on 761S line (24 miles) would be required	2012 Transit Bus Energy Intensity, Table 2-13, Transportation Energy Data Book, Oak Ridge National Laboratory			1,028 BTU = 1 cf based on US Energy Information Administration (2014) http://www.eia.gov/tools/faqs/faq.cfm?id=45&t=8

6
Gasoline Gallon Equivalent
286,368
=Col 5 /123.57
Alternative Fuels Data Center: http://www.afdc.energy.gov/fuels/fuel_comparison_chart.pdf

Annual MMBTU Change from No-Build	**(24,107)**	-39.86%

Alternative 3: Low-Floor Tram/LRT (2040)
Construction

Roadway/Track, Sidewalks/Stations

1	2	3	4	5	6
C02e (MT)	**pounds CO2 per metric ton**	**pounds CO2**	**pounds of CO2 per gallon diesel**	**gallons diesel**	**Btu/gal (gross)**
3116.22	2204.62262	6,870,089	22.2	309,463.47	138,490
		=Col 1* Col 2		=Col 3 / Col 4	Argonne National Lab

7
MMBTU
42,857.60
=Col 5*Col6/1 mill

Maintenance Facility

1	2	3	4	5	6
C02e (MT)	**pounds CO2 per metric ton**	**pounds CO2**	**pounds of CO2 per gallon diesel**	**gallons diesel**	**Btu/gal (gross)**
562.47	2204.62262	1,240,034	22.2	55,857.39	138,490
		=Col 1* Col 2		=Col 3 / Col 4	Argonne National Lab

7
MMBTU
7,735.69
=Col 5*Col6/1 mill

TPSS/Bridges/Misc.

1	2	3	4	5	6
C02e (MT)	**pounds CO2 per metric ton**	**pounds CO2**	**pounds of CO2 per gallon diesel**	**gallons diesel**	**Btu/gal (gross)**
347.01	2204.62262	765,026	22.2	34,460.63	138,490
		=Col 1* Col 2		=Col 3 / Col 4	Argonne National Lab

7
MMBTU
4,772.45
=Col 5*Col6/1 mill

Total MMBTU	**55,366**

Alternative 3: Low-Floor Tram/LRT (2012)

Operational

Traffic

CO2e **71,941,386** metric tons

1	2	3
metric tons of CO2 per year	**pounds CO2 per metric ton**	**pounds CO2**
71,941,386	2204.62262	158,603,606,283
		=Col 1* Col 2

AQ

4	5	5	6
pounds of CO2 for 90% gas/10% diesel trips	**gallons of gasoline**	**Btu/gal (gross)**	**BTU**
19.86	7,986,082,894.41	116,090	927,104,363,211,728
19.6 lbs CO2/gal gas 22.2 lbs CO2/gal diesel	=Col 3/ Col 4	Argonne National Lab GREET Model, v1. 2013	= Col 5 * Col 6

2012 No Build

71,942,145	MT CO2e
927,114,152	MMBTU

7
MMBTU
927,104,363.21
= Col 6/1,000,000

		Increase over No-Build	
Annual MMBTU	**927,104,363**	**(9,789)**	-0.001%

Alternative 3: Low-Floor Tram/LRT (2012)

Maintenance Facility

	1	2	3	4	5	6
				kWh	**BTU/kWh**	**MMBTU/yr**
Electricity				843,500	3,412	2,878
				CalEEMod		=Col 5 * Col 6/1M
					kBTU	**MMBTU/yr**
Natural Gas					1,316,700	1,316.70
					CalEEMod	= Col 5/1,000
	MT/CO2e per year	**pounds/MT**	**pounds of CO2 for 90% gas/10% diesel trips**	**gallons of diesel**	**Btu/gal (gross)**	**MMBTU/yr**
Mobile	696.91	2204.6	19.86	77,363	138,700	10,730
	CalEEMod		19.6 lbs CO2/gal gas	= Col 1 * Col 2/Col 3		=Col 4 * Col 5/1,000,000
			22.2 lbs CO2/gal diesel			
			Annual MMBTU	**14,925**		

Vehicle Propulsion and Stations

Fiscal Year 2014 Propulsion Power and Station Consumption

LRT Energy for FY 2014 **139,376,756** kWh Source: Metro 2014

Increase - 24-Hr Ops* **153,314,432 KWh**

Assumptions: Depending on the line and current timetables, Metro would need to operate from 5 to 12% more trains to operate 24 hours per day with 20-minute headways during late-night hours. A 10% increase in energy is assumed to be conservative. Actual energy consumption required for 24-hour operation may be less.

LRT Lines	**Distance**	
Blue Line	22.17	miles
Expo Line	8.83	miles
Green Line	19.64	miles
Gold Line	19.51	miles
Total	**70.15**	**miles**
LRT Energy/Mile/Yr (24 hour operation)	2,185,523	KWh
ESFV Tram/LRT I	**9.2**	**miles**
Projected Annua	**20,106,811**	**KWh**

1	2	3
kWh	**BTU/kWh**	**MMBTU/yr**
20,106,811	3,414	68,645
CalEEMod		=Col 1 * Col 2/1M
	Argonne National Lab GREET Model, v1. 2013	

Annual MMBTU	**68,645**

Alternative 3: Low-Floor Tram/LRT (2012)

Bus

1	2	3	4	5
Total Vehicle Miles per Day	**BTU per Vehicle-Mile**	**Daily Energy Use (MMBTU)**	**Annual Energy Use (MMBTU)**	**Annual Energy Use (cf)**
2,686	37,105	99.66	36,377.37	35,386,548
=(83*2+105*24)		=Col 1 * Col 2	=Col 3*365	=Col 4 *1 mill/1028

To achieve the desired headways, 16 additional round trips on 233S line (2 miles) and 12 additional round trips on 761S line (24 miles) would be required

2012 Transit Bus Energy Intensity, Table 2-13, Transportation Energy Data Book, Oak Ridge National Laboratory

1,028 BTU = 1 cf based on US Energy Information Administration (2014) http://www.eia.gov/tools/faqs/faq.cfm?id=45&t=8

6
Gasoline Gallon Equivalent
286,368
=Col 5 /123.57

Alternative Fuels Data Center: http://www.afdc.energy.gov/fuels/fuel_comparison_chart.pdf

Annual MMBTU Change from No-Build	**(24,107)**	-39.86%

Alternative 3: Low-Floor Tram/LRT (2012)

Construction

Roadway/Track, Sidewalks/Stations

1	2	3	4	5	6
C02e (MT)	**pounds CO2 per metric ton**	**pounds CO2**	**pounds of CO2 per gallon diesel**	**gallons diesel**	**Btu/gal (gross)**
3116.22	2204.62262	6,870,089	22.2	309,463.47	138,490
		=Col 1* Col 2		=Col 3 / Col 4	
					Argonne National Lab

7
MMBTU
42,857.60
=Col 5*Col6/1 mill

Maintenance Facility

1	2	3	4	5	6
C02e (MT)	**pounds CO2 per metric ton**	**pounds CO2**	**pounds of CO2 per gallon diesel**	**gallons diesel**	**Btu/gal (gross)**
562.47	2204.62262	1,240,034	22.2	55,857.39	138,490
		=Col 1* Col 2		=Col 3 / Col 4	
					Argonne National Lab

7
MMBTU
7,735.69
=Col 5*Col6/1 mill

TPSS/Bridges/Misc.

1	2	3	4	5	6
C02e (MT)	**pounds CO2 per metric ton**	**pounds CO2**	**pounds of CO2 per gallon diesel**	**gallons diesel**	**Btu/gal (gross)**
347.01	2204.62262	765,026	22.2	34,460.63	138,490
		=Col 1* Col 2		=Col 3 / Col 4	
					Argonne National Lab

7
MMBTU
4,772.45
=Col 5*Col6/1 mill

Total MMBTU	**55,366**

Alternative 4: LRT

Operational

Traffic (2040)

CO2e 60,964,076 metric tons

1	2	3
metric tons of CO2 per year	**pounds CO2 per metric ton**	**pounds CO2**
60,964,076	2204.62262	134,402,780,257
		=Col 1* Col 2

AQ

4	5	5	6
pounds of CO2 for 90% gas/10% diesel trips	**gallons of gasoline**	**Btu/gal (gross)**	**BTU**
19.86	6,767,511,594.02	116,090	785,640,420,949,818
19.6 lbs CO2/gal gas 22.2 lbs CO2/gal diesel	=Col 3/ Col 4	Argonne National Lab GREET Model, v1. 2013	= Col 5 * Col 6

7
MMBTU
785,640,420.95
= Col 6/1,000,000

		Increase over No-Build	
Annual MMBTU	**785,640,421**	**(373,696)**	-0.048%

Alternative 4: LRT

Maintenance Facility

	1	2	3	4	5	6
				kWh	BTU/kWh	MMBTU/yr
Electricity				843,500	3,412	2,878
				CalEEMod		=Col 5 * Col 6/1M
					kBTU	MMBTU/yr
Natural Gas					1,316,700	1,316.70
					CalEEMod	= Col 5/1,000
	MT/CO2e per year	pounds/MT	pounds of CO2 for 90% gas/10% diesel trips	gallons of diesel	Btu/gal (gross)	MMBTU/yr
Mobile	696.91	2204.6	19.86	77,363	138,700	10,730
	CalEEMod		19.6 lbs CO2/gal gas	= Col 1 * Col 2/Col 3		=Col 4 * Col 5/1,000,000
			22.2 lbs CO2/gal diesel			
			Annual MMBTU	**14,925**		

Alternative 4: LRT

Vehicle Propulsion and Stations

<u>Fiscal Year 2014 Propulsion Power and Station Consumption</u>

LRT Energy for FY 2014 **139,376,756** kWh Source: Metro 2014

Increase - 24-Hr Ops* **153,314,432** **KWh**

Assumptions: Depending on the line and current timetables, Metro would need to operate from 5 to 12% more trains to operate 24 hours per day with 20-minute headways during late-night hours. A 10% increase in energy is assumed to be conservative. Actual energy consumption required for 24-hour operation may be less.

LRT Lines	**Distance**	
Blue Line	22.17	miles
Expo Line	8.83	miles
Green Line	19.64	miles
Gold Line	19.51	miles
Total	**70.15**	**miles**
LRT Energy/Mile/Yr	2,185,523	KWh
(24 hour operation)		
ESFV Tram/L	**9.2**	**miles**
Projected An	**20,106,811**	**KWh**

1	2	3
kWh	**BTU/kWh**	**MMBTU/yr**
20,106,811	3,414	68,645
CalEEMod		=Col 1 * Col 2/1M
	Argonne National Lab GREET Model, v1. 2013	

Annual MMBTU **68,645**

Bus

1	2	3	4	5
Total Average Vehicle Miles per Day	**BTU per Vehicle-Mile**	**Daily Energy Use (MMBTU)**	**Annual Energy Use (MMBTU)**	**Annual Energy Use (cf)**
4,346	37,105	161.26	58,859.29	57,256,119
=(83*22+105*24)		=Col 1 * Col 2	=Col 3*365	=Col 4 *1 mill/1028
To achieve the desired headways, 16 additional round trips on 233 line (22 miles) and 12 additional round trips on 761S line (24 miles) would be required	2012 Transit Bus Energy Intensity, Table 2-13, Transportation Energy Data Book, Oak Ridge National Laboratory			1,028 BTU = 1 cf based on US Energy Information Administration (2014) http://www.eia.gov/tools/faqs/faq.cfm?id=45&t=8

6
Gasoline Gallon Equivalent
463,350
=Col 5 /123.57
Alternative Fuels Data Center: http://www.afdc.energy.gov/fuels/fuel_comparison_chart.pdf

Annual MMBTU Change from No-Build **(1,625)** -2.69%

Alternative 4: LRT

Construction

Roadway/Track, Sidewalks/Aboveground Stations

1	2	3	4	5	6
C02e (MT)	pounds CO2 per metric ton	pounds CO2	pounds of CO2 per gallon diesel	gallons diesel	Btu/gal (gross)
3,618.35	2204.623	7,977,096	22.2	359,328.66	138,490
		=Col 1* Col 2		=Col 3 / Col 4	
					Argonne National Lab

7
MMBTU
49,763.43
=Col 5*Col6/1 mill

Maintenance Facility

1	2	3	4	5	6
C02e (MT)	pounds CO2 per metric ton	pounds CO2	pounds of CO2 per gallon diesel	gallons diesel	Btu/gal (gross)
562.47	2204.623	1,240,034	22.2	55,857.39	138,490
		=Col 1* Col 2		=Col 3 / Col 4	
					Argonne National Lab

7
MMBTU
7,735.69
=Col 5*Col6/1 mill

TPSS/Bridges/Misc.

1	2	3	4	5	6
C02e (MT)	pounds CO2 per metric ton	pounds CO2	pounds of CO2 per gallon diesel	gallons diesel	Btu/gal (gross)
347.01	2204.623	765,026	22.2	34,460.63	138,490
		=Col 1* Col 2		=Col 3 / Col 4	
					Argonne National Lab

7
MMBTU
4,772.45
=Col 5*Col6/1 mill

Underground Stations/Rail (Cut and Cover for Alternative 4b)

1	2	3	4	5	6
C02e (MT)	pounds CO2 per metric ton	pounds CO2	pounds of CO2 per gallon diesel	gallons diesel	Btu/gal (gross)
15,365.89	2204.623	33,875,989	22.2	1,525,945.44	138,490
		=Col 1* Col 2		=Col 3 / Col 4	
					Argonne National Lab

7
MMBTU
211,328.18
=Col 5*Col6/1 mill

Total MMBTU	**273,600**

Appendix B

Metro Letter, September 30, 2015

Los Angeles County
Metropolitan Transportation Authority

One Gateway Plaza
Los Angeles, CA 90012-2952

213.922.2000 Tel
metro.net

Metro

September 30, 2015

Mr. Kevin M. Garrity
Power Engineering Manager
LADWP
111 N. Hope Street
Los Angeles, CA 90012

Subject: East San Fernando Valley Transit Corridor Project

Dear Mr. Garrity:

The purpose of this letter is to inform LADWP that the Los Angeles County Metropolitan Transportation Authority (Metro) is currently conducting environmental studies for the East San Fernando Valley Transit Corridor Project and also to request a determination from LADWP as to whether the estimated electricity requirements for the proposed project could be accommodated by current total load growth forecasts. The proposed project would introduce a new transit service with a north-south orientation in the San Fernando Valley (Project map attached). The following alternatives are being evaluated as part of the Environmental Impact Statement/Environmental Impact Report:

- No-Build Alternative
- Transportation Systems Management (TSM) Alternative
- Build Alternative 1 – Curb-Running Bus Rapid Transit (BRT) Alternative
- Build Alternative 2 – Median-Running BRT Alternative
- Build Alternative 3 – Low-Floor Light Rail Transit (LRT)/Tram Alternative
- Build Alternative 4 – LRT Alternative

The vehicles for Build Alternatives 1 and 2 are rubber tire buses propelled by an internal combustion engine. The vehicles for Build Alternatives 3 and 4 are electrically propelled rail cars operating singly or in a train set. All build alternatives would operate over 9.2 miles, in a dedicated bus lane or on a fixed guideway (6.7 miles) and/or in mixed-flow traffic lanes (2.5 miles), from the Sylmar/San Fernando Metrolink station in the north to the Van Nuys Metro Orange Line station in the south. Build Alternative 4 would differ from the other alternatives in that it would include a 2.5-mile segment within Metro-owned railroad right-of-way adjacent to San Fernando Road and Truman Street and a 2.5-mile underground segment beneath portions of Panorama City and Van Nuys.

With the exception of possible electricity requirements for lighting and accessory needs at bus stops for the TSM and BRT alternatives, only Alternatives 3 and 4 would require expanded energy service for vehicle propulsion and a supporting maintenance and storage facility. Although the transit service and vehicle types would differ slightly between Alternatives 3 and 4, estimates are based on the LRT service, which is expected to have larger vehicles and higher ridership, and therefore, greater energy requirements.

Alternatives 3 and 4 would operate 24 hours per day, with the greatest energy use occurring during peak commuting times in which fixed guideway transit vehicles would operate with 4-minute headways,[1] which would occur on weekdays from approximately 6:00 a.m. to 9:00 a.m. and 3:00 p.m. to 6:00 p.m.

In addition to the electricity required for vehicle propulsion, Alternatives 3 and 4 would each involve the construction and operation of a maintenance and storage facility on sites currently occupied by existing industrial businesses. Assuming that all businesses displaced by the proposed maintenance facility would relocate within the LADWP service area and would resume operation at their current capacities, the project would result in an annual net electricity consumption of approximately **850,000 kWh.** Energy estimates are based on the square footages of structures planned for the proposed maintenance facility California Emissions Estimator Model (CalEEMod version 2013.2.2).

We appreciate your cooperation and look forward to your determination as to whether LADWP has the estimated electricity requirements for the above described project with current load growth forecasts. If you should have any questions, please do not hesitate to contact me at daviswa@metro.net or by telephone at 213-922-3079.

Sincerely,

Walt Davis
Project Manager
East San Fernando Valley Transit Corridor

[1] Headway is the average interval of time between vehicles moving in the same direction on the same route. A 4-minute headway would mean that northbound fixed guideway vehicle would arrive at a particular station once every 4 minutes. In addition, a southbound fixed guideway vehicle would arrive at a particular station once every 4 minutes.

East San Fernando Valley Transit Corridor
Project Map