MEMORANDUM

April 4, 2024

To:
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District Branch Chief of Environmental Analysis

From:
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Psomas

Subject: Energy Analysis Technical Memorandum

EA Number: 07-33880
District-County-Route-Post Miles: District 07-LA-001, (PM 30.16/30.74)
Project Name: State Route 1 (SR-1/Lincoln Boulevard) Multimodal Improvements Project

Approved by: ________________________________

INTRODUCTION

The National Environmental Policy Act (NEPA) (42 U.S. Code Part 4332) requires the identification of all potentially significant impacts on the environment, including impacts on energy resources. Guidance for evaluating energy impacts of transportation projects subject to NEPA is outlined in FHWA's Technical Advisory T 6640.8A (Technical Advisory). The Technical Advisory energy analysis requirement applies to projects for which an Environmental Impact Statement (EIS) is prepared. The Technical Advisory indicates that documentation should discuss energy requirements for construction and operation, and the overall conservation potential for each of the project alternatives. The relationship of the project alternatives to applicable state or regional energy plan should also be documented. Additional conservation measures, such as use of high-occupancy vehicle incentives and other measures to improve traffic flow should also be identified.

Other measures to improve energy efficiency in the transportation sector have been implemented at the federal level. In recent years, the United States Environmental Protection Agency (U.S. EPA) and the National Highway Traffic Safety Administration (NHTSA) issued Final Rules governing Corporate Average Fuel Economy (CAFE) standards and other improvements to fuel economy to new vehicles.

On December 28, 2018, the Governor's Office of Planning and Research and the California Natural Resources Agency updated the California Environmental Quality Act (CEQA) Guidelines to require that an environmental document include an analysis of a project's potential for significant environmental effects resulting from wasteful, inefficient, or unnecessary use of energy; or wasteful use of energy resources (Guidelines § 15126.2(b)). The Initial Study/Negative Declaration/Mitigated Negative Declaration (IS/ND/MND) or Environmental Impact Report shall describe feasible measures which could minimize inefficient and unnecessary consumption of energy (Guidelines § 15126.4) and examples of energy conservation measures are provided in the Guidelines Appendix F.

Assembly Bill (AB) 32 codified the 2020 greenhouse gas (GHG) emissions reduction goals outlined in Executive Order (EO) S-3-05. Senate Bill 32 codified the GHG reduction targets established in EO B-30-15 to achieve a mid-range goal of 40 percent below 1990 levels by 2030. The California Air Resources Board (ARB) is required to create a scoping plan and implement rules to achieve "real, quantifiable, cost-effective reductions of greenhouse gases." The law requires ARB to adopt rules and regulations to achieve the maximum technologically feasible and cost-effective GHG reductions. Energy use and efficiency are important considerations for achieving state goals to reduce greenhouse gas emissions.

PROJECT DESCRIPTION

Caltrans, in cooperation with the City of Los Angeles, proposes to improve circulation and safety along Lincoln Boulevard by constructing an additional southbound lane, installing sidewalks and protected bicycle lanes, and implementing complete streets and other related improvements along an approximate 0.61-mile segment of Lincoln Boulevard between Jefferson Boulevard (PM 30.16) and just south of Fiji Way (PM 30.74). The Project primarily occurs in the City of Los Angeles, with potential temporary construction easements and partial right-of-way acquisitions needed in the north and northwest within parcels that are located within unincorporated Los Angeles County.

The project would increase vehicle capacity, therefore a quantitative energy analysis has been provided to comply with CEQA and will be included in the NEPA document.

AFFECTED ENVIRONMENT

Energy is currently consumed within the project site by automobiles, trucks, motorcycles, and busses. Energy usage also occurs within the project site to power streetlights and traffic signals.

STUDY METHODS

Activities that consume energy also contribute to other related impacts. Greenhouse gas emissions, for example, are linked to energy consumption. In transportation, carbon dioxide (CO2) is the primary GHG pollutant due to its abundance when compared with other vehicle emitted GHGs, including methane (CH4), nitrous oxide (N20), hydrofluorocarbon (HFC), and black carbon (BC).

Therefore, direct energy consumption can be quantified by using an approved version of the emissions modeling tool CT-EMFAC or EMFAC and construction energy consumption can be estimated using the Caltrans Construction Emission Tool (CAL-CET), or the CalEEMod emissions model. If energy consumption is not quantified in the emissions modeling tool used, gasoline and diesel consumption can be estimated from CO2 using U.S. EPA’s GHG equivalencies formulas for diesel and gasoline1.

To determine direct energy use during construction,off-road construction equipment use for Alternative 2 was calculated based on the equipment data (vehicle types, hours per day, horsepower, load factor) provided in the Roadway Construction Emissions Model output files that are included in Appendix Q, Air Quality Appendices. The total horsepower hours for construction equipment used for Alternative 2 was then multiplied by fuel usage rates to obtain the total fuel usage for off-road equipment. Information was also utilized from CalEEMod and Offroad.

To determine direct energy use during operation of the Project, transportation related energy consumption of gasoline and diesel fuel was calculated based on the quantity of vehicles, average travel distance, vehicle class, and fuel efficiency of each vehicle class as provided by the EMFAC model. Energy used for lighting for Alternative 2 is not anticipated to change substantially from existing conditions.

[1] https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references

ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Build Alternative

Construction Effects

Alternative 1 would involve no construction activities; therefore, this alternative would result in no usage of energy by construction vehicles or other energy-related impacts.

Operational Effects

Alternative 1 would maintain operation of the existing roadway; therefore, vehicle miles traveled (VMT) reductions and associated transportation fuel reductions would not occur under this alternative.

Cumulative Effects

Alternative 1 would result in no construction or operational energy effects. Alternative 1 would not result in reductions in VMT and the improvement of bicycle and pedestrian infrastructure. Therefore, Alternative 1 would not result in any cumulative effects related to energy.

Alternative 2 – Base Alternative

Construction Effects

Direct Energy Use During Construction

Construction of Alternative 2 would require the use of construction equipment for grading, hauling, and building activities. Construction of Alternative 2 would also involve the use of vehicles of construction workers and vendors traveling to and from the project site and on-road haul trucks for the import of soil for grading and for the export of demolition materials.

Off-road construction equipment use for Alternative 2 was calculated based on the equipment data (vehicle types, hours per day, horsepower, load factor) provided in the Roadway Construction Emissions Model output files included in Appendix Q, Air Quality Appendices. The total horsepower hours for construction equipment used for Alternative 2 was then multiplied by fuel usage rates to obtain the total fuel usage for off-road equipment.

Fuel consumption from construction worker, vendor, and delivery/haul trucks was calculated using the trip rates and distances provided in the Roadway Construction Emissions Model output files. Total VMT was then calculated for each type of construction-related trip and divided by the fuel consumption factor from CARB's EMission FACtors (EMFAC) model. EMFAC provides the total annual VMT and fuel consumed for each vehicle type. Construction vendor and delivery/haul trucks were assumed to be heavy-duty diesel trucks. As shown in Table 1, Alternative 2 would consume a total of approximately 56,197 gallons of gasoline fuel (or 6,755,682,213 BTU) and approximately 215,307 gallons of diesel (or 25,882,977,211 BTU) during construction.

TABLE 1 – TOTAL ENERGY USE DURING CONSTRUCTION

Source	Gasoline		Diesel Fuel	
	Gallons	**BTU**	**Gallons**	**BTU**
Off-road construction equipment	20,346	2,445,879,857	181,123	21,773,572,068
Worker commute	35,540	4,272,415,713	94	11,300,142
Vendor trips	292	35,102,571	3	360,642
On-road haul trips	19	2,284,071	34,086	4,097,624,142
Total	**56,197**	**6,755,682,213**	**215,307**	**25,882,977,211**
Sources: Psomas 2024a based on data from CalEEMod, Offroad, and EMFAC. Note: Totals may not add due to rounding.				

Fuel energy consumed during construction would be temporary in nature and would not represent a significant demand on energy resources. Furthermore, there are no unusual characteristics of Alternative 2 that would necessitate the use of construction equipment that would be less energy-efficient than comparable equipment at construction sites in other parts of the State. Energy used in the construction of Alternative 2 would enable the development of roadway infrastructure that reduces traffic congestion which allows for a long-term reduction in VMT in the local area as vehicles would no longer go around the project site to avoid congestion. In addition, Alternative 2 would be developed to serve transit, bicyclists and pedestrians which would also reduce dependence on automobiles and thereby would reduce usage of transportation fuels. Therefore, the proposed construction activities would not result in inefficient, wasteful, or unnecessary fuel consumption.

Operational Effects

Energy consumption associated with operation of Alternative 2 would consist of electricity for lighting and transportation fuels. Energy used for lighting for Alternative 2 is not anticipated to change substantially from existing conditions. Transportation related energy consumption of gasoline and diesel fuel was calculated based on the quantity of vehicles, average travel distance, vehicle class, and fuel efficiency of each vehicle class as provided by the EMFAC model. Energy consumption calculations are included in in Appendix Q, Air Quality Appendices.

Changes in transportation fuel consumption as calculated based on the estimated VMT that would occur with Alternative 1 and Alternative 2. As shown in Table 2, below, fuel consumption of gasoline and diesel with Alternative 2 would be below the fuel consumption under Alternative 1, the No Project Alternative, due to the reduced VMT that would occur. Because Alternative 2 would reduce VMT and would develop infrastructure which serves transit, bicyclists and pedestrians, energy consumption associated with Alternative 2 would not be considered inefficient, wasteful, or unnecessary.

TABLE 2 – ANNUAL TRANSPORTATION ENERGY USAGE DURING OPERATION

Source	Vehicle Miles Travelled	Gasoline Fuel in Gallons	Gasoline Fuel in BTU	Diesel Fuel in Gallons	Diesel Fuel in BTU
Alternative 1	683,464	553,630	66,554,234,992	38,269	4,600,480,499
Alternative 2	655,807	531,227	63,861,074,349	36,720	4,600,480,499
Percent of Alternative 1 to Alternative 2	***96%***	***96%***	***Not applicable***	***Not applicable***	***Not applicable***
Sources: Psomas 2024a based on data from CalEEMod.					

Cumulative Effects

Cumulative effects associated with Alternative 2 includes a long-term reduction in transportation fuel consumption due to a reduction in VMT and the development of pedestrian, transit, and bicycle infrastructure. This reduction in transportation fuels would be support the State of California’s goal of energy reduction associated with efficient transportation systems.

<u>Alternative 2A – Design Variation A – Retaining Wall Along the West Side of SR-1/Lincoln Boulevard North of the Culver Boulevard Bridge</u>

Construction Effects

Alternative 2A would require implementation of a retaining wall along the west side of SR-1/Lincoln Boulevard north of the Culver Boulevard Bridge. Energy consumption is anticipated to be comparable to the estimates provided in Alternative 2, however Alternative 2A would require additional energy consumption associated with construction of the retaining wall. As discussed for Alternative 2, energy consumption to construct and implement the proposed roadway improvements would lead to a long-term reduction in transportation fuel consumption due to a reduction in VMT and through the development of pedestrian, transit, and bicycle infrastructure.

Operational Effects

Under Alternative 2A, operational effects related to energy would be the same as described for Alternative 2.

Cumulative Effects

Under Alternative 2A, cumulative effects related to energy would be the same as described for Alternative 2.

<u>Alternative 2B – Design Variation B – Cantilevered Widening of the Roadway Over Fiji Ditch to Avoid Direct Impacts to a Wetland Feature</u>

Construction Effects

Alternative 2B would install cantilevered edges to SR-1/Lincoln Boulevard at Fiji Ditch . Energy consumption is anticipated to be comparable to the estimates provided in Alternative 2. As discussed for Alternative 2, energy consumption to construct and implement the proposed roadway improvements would lead to a long-term reduction in transportation fuel consumption due to a reduction in VMT and through the development of pedestrian, transit, and bicycle infrastructure.

Operational Effects

Under Alternative 2B, operational effects related to energy would be the same as described for Alternative 2.

Cumulative Effects

Under Alternative 2B, cumulative effects related to energy would be the same as described for Alternative 2.

Alternative 2C – Design Variation C – Wider Culver Boulevard Bridge

Construction Effects

Alternative 2C would develop a wider replacement Culver Boulevard Bridge over SR-1/Lincoln Boulevard. Energy consumption is anticipated to be comparable to the estimates provided in Alternative 2, however Alternative 2C would require additional energy consumption associated with construction of the wider Culver Boulevard Bridge. As discussed for Alternative 2, energy consumption to construct and implement the proposed roadway improvements would lead to a long-term reduction in transportation fuel consumption due to a reduction in VMT and through the development of pedestrian, transit, and bicycle infrastructure.

Operational Effects

Under Alternative 2C, operational effects related to energy would be the same as described for Alternative 2.

Cumulative Effects

Under Alternative 2C, cumulative effects related to energy would be the same as described for Alternative 2.

Alternative 2D – Design Variation D – Provide Bicycle/Pedestrian Ramp From South Side of Culver Boulevard Bridge to West Side of SR-1/Lincoln Boulevard

Construction Effects

Alternative 2D would develop an additional bicycle/pedestrian ramp. Energy consumption is anticipated to be comparable to the estimates provided in Alternative 2, however Alternative 2D would require additional energy consumption associated with the additional ramp that would be built. As discussed for Alternative 2, energy consumption to construct and implement the proposed roadway improvements would lead to a long-term reduction in transportation fuel consumption due to a reduction in VMT and through the development of pedestrian, transit, and bicycle infrastructure.

Operational Effects

Under Alternative 2D, operational effects related to energy would be the same as described for Alternative 2.

Cumulative Effects

Under Alternative 2D, cumulative effects related to energy would be the same as described for Alternative 2.

AVOIDANCE, MINIMIZATION, AND MITIGATION MEASURES

No avoidance, minimization, or mitigation measures are applicable energy.

CONCLUSIONS

In summary, Alternative 1 (the No Build Alternative) would involve no construction activities; therefore, this alternative would result in no usage of energy by construction vehicles or other energy-related impacts. Alternative 1 would maintain operation of the existing roadway; therefore, vehicle miles traveled (VMT) reductions and associated transportation fuel reductions would not occur under this alternative.

Alternative 2 (the Base Alternative) would involve direct energy use during construction from off-road construction vehicles as well as from worker trips, materials deliveries, etc. Fuel energy consumed during construction would be temporary in nature and would not represent a significant demand on energy resources. Alternative 2 would result in an overall reduction in operational energy consumption given that Alternative 2 would result in VMT reductions and resultant reductions in transportation fuel consumption.

The design variations (Alternatives 2A, 2B, 2C, and 2D) would have similar effects related to energy as Alternative 2, although Alternatives 2C and 2D would require a minor amount of additional energy during construction given they involve additional construction activities that are not included in Alternative 2.

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