Comments of Conventional Jet Fuel Obligation - Proposed Amendments to the Low Carbon Fuel Standard

Dear California Air Resources Board,

We appreciate the opportunity to provide comments following the California Air Resources Board's (CARB) public workshop on April 10, 2024, regarding the proposed amendments to the Low Carbon Fuel Standard (LCFS).

We have been actively engaged in researching how to promote aviation decarbonization in California, focusing on both technical feasibility and policy implications. Sustainable aviation fuel (SAF) or alternative jet fuel is one of our main areas of focus. In our analysis, we measured the potential impact of jet fuel prices on aviation demand if the LCFS mandates intrastate conventional jet fuel.

Aviation demand (D) can be modeled as a function of the state's gross domestic product (GDP) and either jet fuel prices (P) or airfare (Airfare):

$$\ln D = \beta_0 + \beta_1 \cdot \ln GDP + \beta_2 \cdot \ln P + \varepsilon$$

$$\ln D = \theta_0 + \theta_1 \cdot \ln GDP + \theta_2 \cdot \ln Airfare + \varepsilon$$

Where, airfare can be expressed by a function of jet fuel prices (P):

$$\ln Airfare = \alpha_0 + \alpha_1 \cdot \ln P + \varepsilon$$

Therefore, the elasticity of air transport demand with respect to jet fuel prices (β_2) is equal to the elasticity of air transport demand with respect to airfare (θ_2), multiplied by the elasticity of airfare with respect to jet fuel prices (α_1):

$$\frac{\partial \ln D}{\partial \ln P} = \frac{\partial \ln D}{\partial \ln Airfare} \cdot \frac{\partial \ln Airfare}{\partial \ln P}$$

$$(\beta_2 = \theta_2 \cdot \alpha_1)$$

Thus, by measuring the elasticity of aviation demand with respect to airfare and the elasticity of airfare with respect to jet fuel prices, we can measure the impact of jet fuel prices on aviation demand.

Our analysis used total passengers as the metric for aviation demand and the passenger-weighted average airfare as the metric for airfare. To model California's aviation demand for both intrastate and domestic flights, we gathered quarterly data on demand and airfare from the Bureau of Transportation Statistics, as well as GDP data from the US Bureau of Economic Analysis from 2000 to 2019. Additionally, we collected jet fuel price data from the Energy Information Agency (EIA) to establish the relationship between airfare and jet fuel prices. By leveraging these datasets, we were able to measure the elasticity of aviation demand with respect to airfare and the elasticity of airfare with respect to jet fuel prices.

The jet fuel price forecast is $16.44 per million Btu ($723.5/Ton) for 2030 and $17.77 per million Btu ($779/Ton) for 2035, based on EIA forecasts. Credit price is based on Appendix C-1: Standardized Regulatory Impact Assessment in the proposed LCFS Standard Amendments where the credit price is $76/MT credits in 2030 while $138/MT credits in 2035. Based on the adjusted carbon intensity in Appendix C, the jet fuel adjusted CI is 89.43 g CO2e/MJ. Thus, the deficits for intrastate jet fuel used is $0.15/gallon ($48/Ton) in 2030, and $0.68/gallon ($222.5/Ton) in 2035.

Three scenarios were evaluated: the baseline scenario, consistent with the existing design of the LCFS without eliminating the jet fuel exemption from fossil jet fuels; the proposed scenario, based on proposed amendments to the LCFS with the elimination of the jet fuel exemption from intrastate fossil jet fuels; and the enhanced scenario, considering the elimination of the jet fuel exemption from domestic fossil jet fuels (both intrastate and interstate).

Under these scenarios, two assumptions for price impacts on flight types were considered: assuming the price impact will affect domestic flights, not just intrastate flights, with an elasticity of air transport demand with respect to jet fuel prices (β_2) of -0.0625; assuming the price impact specifically targets intrastate flights, with an elasticity of air transport demand with respect to jet fuel prices (β_2) of -0.1154.

The following tables show the changes in the jet fuel price, the percentage change in jet fuel price, and the corresponding impact on intrastate demand (or domestic demand).

Table 1. Jet Fuel Price Impacts on Domestic Aviation Demand Change

Scenario		Jet Fuel Price ($/Ton)	Jet Fuel Price Change (%)	Domestic Aviation Demand Change (%)
2030	Baseline	723.5	-	-
	Proposed	727.8	+0.6%	-0.04%
	Enhanced	771.5	+6.6%	-0.4%
2035	Baseline	779	-	-
	Proposed	799	+2.6%	-0.2%
	Enhanced	1001.5	+29%	-1.8%

Table 2. Jet Fuel Price Impacts on Intrastate Aviation Demand Change

Scenario		Jet Fuel Price ($/Ton)	Jet Fuel Price Change (%)	Intrastate Aviation Demand Change (%)
2030	Baseline	723.5	-	-
	Proposed	771.5	+6.6%	-0.8%
2035	Baseline	779	-	-
	Proposed	1001.5	+29%	-3.3%

* where under enhanced scenario, the jet fuel price impact on domestic aviation demand is the same as shown in Table 1.

Based on the tables above, our main observations are as follows: When considering the impact on domestic flights, the proposed scenario leads to minor changes, with reductions of -0.04% in 2030 and -0.2% in 2035. However, if price impact specifically targets intrastate flights, the impact becomes more significant. Under the proposed scenario, reductions will be -0.8% in 2030 and -3.3% in 2035.

Sincerely,

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