Implications of Washington HB 1091
Proposed LCFS Legislation that is Twice as Ambitious as California LCFS

Carbon Intensity Target Comparison
Washington House Bill 1091 (HB 1091) calls for a 10% reduction in the carbon intensity (CI) of transportation fuels by 2028 and a 20% CI reduction by 2035. If the program begins on January 1, 2023, it will require a 10% CI reduction in the 6th year of the program and a 20% CI reduction in the 13th year of the program. By comparison, the current California Low Carbon Fuel Standard (LCFS) requires a CI reduction of 10% in the 12th year of the program. Thus, the pace of the Washington program is double the pace of what California has achieved with its LCFS and other greenhouse gas reduction programs. California has targeted a 20% CI reduction in the 20th year of the LCFS. The proposed Washington program aims to achieve this goal seven years faster than what California's program has scheduled.

California reduced its LCFS CI-reduction targets in 2019 and 2020 to enable compliance when it became clear that the previous CI-reduction targets were overly ambitious. Given its even more ambitious CI reduction schedule, Washington state may deal with challenges similar to those faced by California.

Regulatory Flexibility
HB 1091 does not appear to give regulators the authority to change CI-reduction requirements. By contrast, the California Air Resources Board (CARB) has the authority to adjust CI targets to enable compliance and assure ongoing feasibility.[1] As mentioned above, CARB has done so on more than one occasion. Under the Oregon Clean Fuels Program (CFP), which is modeled on California's LCFS, the Oregon Department of Environmental Quality (OR DEQ) can reset the standard based on Fuel Forecasts performed by the Oregon Office of Economic Analysis (OEA) – an agency independent from OR DEQ. The experiences, standards, and procedures in Oregon and California strongly suggest that regulators require a significant amount of flexibility in order to respond to program shortfalls and the need to continually adjust mandated targets to achieve feasibility. The Washington program would benefit from authority to make similar adjustments.

Cost of Compliance
The costs to comply with HB 1091 are anticipated to be higher than those seen in California or Oregon for the following reasons:

- California CI-reduction standards were frozen at 1% for three years early in the program, allowing obligated parties to accumulate a sizeable bank of credits at much lower prices than Oregon experienced at similar CI-reduction levels.
- Washington will have to compete for low-CI fuels with existing LCFS-style programs in Oregon, California, British Columbia, and Canada (which is rolling out a similar program). If Colorado, New York, and other states implement similar programs, the increased competition for low-carbon fuels could increase the costs of each of these programs, including Washington's.

[1] In the early years of LCFS, the CI reduction standard was frozen at a 1% CI reduction standard in response to a lawsuit. Later, in the 2018 rulemaking, CARB reduced the standards in 2019 and 2020 from 7.5% and 10%, to 6.25% and 7.5%, respectively, to assure ongoing viability of the program.

To estimate the cost of the Washington LCFS program proposed in HB 1091, consider the following:

- California's LCFS added about 22 cpg to CARBOB and ULSD in 2020 with a 7.5% CI reduction.[2] If LCFS credit prices remain constant, a 10% CI reduction adds about 33% to the cost of gasoline and diesel, or about 29 cpg. A Washington 20% CI reduction would result in about twice the cost of a 10% CI reduction, making the cost added to gasoline and diesel about 58 cpg.[3]
- According to the U.S. Energy Information Administration (EIA), total transportation fuels demand in Washington in 2018 was 123 million barrels (approximately 21% of California demand and more than double Oregon demand).[4]

Currently, petroleum products used in Washington state make up about 93% and 98% of the energy in the gasoline and diesel pools, respectively.[5] For California in 2020, petroleum products made up 88% of the transport pool to almost achieve a 7.5% CI reduction.[6] Renewable fuels made up 12% of the transport fuel. To meet a 10% CI reduction, renewable fuels will need to increase to about 16% (10/7.5 x 12%) of the transport fuel pool, which leaves 84% of the pool from petroleum products. Therefore, an estimate of the cost of HB 1091 to consumers in 2028 with a 10% CI reduction with LCFS credit prices held constant is:

84% x 123 million barrels x 42 gallons/barrel x $0.29 per gallon x 1 billion/1000 million = $1.3 billion per year

Using the same calculation and similar logic, the estimated cost of a 20% CI reduction standard in 2035 is estimated at:

68% x 123 million barrels x 42 gallons/barrel x $0.58 per gallon x 1 billion/1000 million = $ 2 billion per year

The above calculations are estimates; actual costs to consumers are likely to differ to some degree. Both of these estimates assume fuel mixes changing in ways similar to what has occurred in California, constant demand for transport fuels, and a constant LCFS credit price of $200/MT. Credit prices could differ depending on supply and demand for low-carbon fuels, and demand for fuels could differ depending on changes in vehicle miles travelled (VMT) and vehicle fuel efficiency changes.

Pathway Eligibility

Section 4(3)(a)d of HB 1091 states "Transportation Fuels with associated GHG emissions exceeding 80% of the 2017 levels established in Section 3 of this act are not eligible to generate credits under the CFP."

The greatest impact of this clause is to not allow credits from fossil fuels such as CNG, LNG, and LPG as these fuels have CI values between 80 and 87 gCO_2e/MJ with Energy Economy Ratios

[2] Average OPIS published LCFS credit price for 2020 and Stillwater analysis.
[3] The actual range of credit prices could be significantly more or less than this. However, prices have been near $200 for more than a year.
[4] https://www.eia.gov/state/seds/data.php?incfile=/state/seds/sep_use/tra/use_tra_WA.html&sid=WA
[5] Assuming 10% ethanol in the gasoline pool and 2% biodiesel in the diesel pool. References in the EIA Washington State Energy Profile.
[6] CARB LCFS Quarterly Data Spreadsheet, https://ww3.arb.ca.gov/fuels/lcfs/lrtqsummaries.htm and Stillwater Analysis

(EERs) of 0.9 for spark ignition vehicles. Presumably, the regulation would debit CNG & LNG fuels for its EER of 0.9 which is less than the 1.0 assume for diesel vehicles. It is unclear whether CNG & LNG would generate deficits in the first few years of the program, as these fuels should be below the standard at the start.

The drafters of Washington state's LCFS program will need to address how to handle truckloads of finished E10 gasoline brought into Washington from adjacent states. According to Section 4(3)(a)d of HB 1091 mentioned above, if E10 trucked into the state is considered a discrete fuel, as it is in Oregon, it would not be eligible to generate credits, even if the CI of the blend is below the standard for gasoline. In fact, even if ethanol had a CI of 0, the blend would still not generate any credits. In effect, this clause negates the ability of ethanol blended outside of the state to generate credits simply because it was blended before crossing state lines.

An alternative approach is to treat the ethanol portion of the gasoline blend as a separate fuel, in which case the ethanol would generate credits and the petroleum portion of the fuel would generate deficits. Under this approach, the importer would report and demonstrate a pathway-specific CI of the ethanol blended before import or, if they did not know the CI, would use a default set by Washington regulators. California and Oregon have defined "substitute" pathway codes for fuels with unknown CI. Washington state could take the same approach.

Since most truckloads brought into Washington come from Oregon, which has its Clean Fuels Program (CFP), implementation of this approach would likely involve cooperation with the OR DEQ. Since the average ethanol CI in Oregon in 2019 was about 56 gCO2e/MJ,[7] which is much below the 80% threshold stated in Section 4(3)(a)d of HB1091, the ethanol portion of gasoline that is delivered by truck from there into Washington would generate considerable credits.

Emission Reduction Targets

Section 3(2)(c) of HB 1091 requires the state to adopt a standard to achieve GHG emissions reductions established in RCW 70A.45.020,[8] which mandates a 95% reduction below 1990 emission levels by 2050. It is noteworthy that EIA data show that transportation energy consumed in Washington state has increased from 101,823 thousand barrels in 1990 to 123,078 thousand barrels in 2018 (a nearly 21% increase). Any increase in total transportation energy consumed in the state increases the volume of low-carbon fuels required to comply with the LCFS program proposed in HB 1091. Considering the growth trend in transportation energy usage, meeting the 95% reduction target for GHG emissions will be very challenging.

One way to reduce the GHG emissions from the transport sector is to transition to electric vehicles (EVs). Here we explore electrification of transport as a tool for achieving the targets set by HB 1091. Consider a scenario where **all** vehicles in Washington are transitioned to EVs, and **all** of the power used to charge EVs is produced from solar panels (photovoltaics). Given life cycle emissions for photovoltaics of about 40 gCO_2e/kwh (11 gCO_2e/MJ),[9] and zero power loss through the grid, the average CI of transport fuels in this scenario would be reduced by nearly 89% from baseline levels of about 99 gCO_2e/MJ. Incorporating an assumed energy efficiency ratio (EER) for EVs of 3.4 reduces total emissions further, achieving a total emission reduction of

[7] https://www.oregon.gov/deq/ghgp/cfp/Pages/Quarterly-Data-Summaries.aspx
[8] https://apps.leg.wa.gov/rcw/default.aspx?cite=70A.45.020
[9] https://www.nrel.gov/docs/fy13osti/56487.pdf

approximately 96% from baseline levels. As such, the 95% reduction target in transport by 2050 is theoretically possible; however, achieving 95% emission reduction in the transportation sector would require 100% electrification of the fleet powered by 100% renewable power driven by substantial photovoltaic generation and storage infrastructure. While this might be possible in theory, the batteries required to store electricity from times of peak supply during sunny days to meet demand at times that are cloudy or at night would be extremely expensive using current technologies. As such, this scenario may not be economically feasible.