

January 5, 2018

Dan Green
Executive Director, Alternative Energy
Ministry of Energy, Mines and Petroleum Resources
Victoria BC

VIA E-MAIL TO: lcfr@gov.bc.ca

Dear Mr. Green:

Re: Comments on British Columbia Low Carbon Fuels Compliance Pathway Assessment

Thank you for the opportunity to provide input on the British Columbia Low Carbon Fuels Compliance Pathway Assessment discussion paper. Electrification of transport can provide a major contribution to achieving BC's climate change objectives and to the successful implementation of the Renewable and Low Carbon Fuel Requirements Regulation. BC Hydro's comments are provided below.

1. Electric Vehicle Forecast

Section 7.2 of the discussion paper states that the CEVforBC program expects the ZEV population to be 48,000 vehicles by 2020. Assuming that these are predominantly electric vehicles (EVs), this is much higher than BC Hydro's current (2017) forecast cited on page 24. BC Hydro's forecast is based on the current policy and regulatory context.

2. Capacity for Electric Charging

The discussion paper correctly states that there is an adequate supply of electricity in BC to meet the charging needs of EVs. While energy availability is not a challenge, generation capacity is more constrained, as is the capacity of our distribution system and especially residential transformers. New investment is likely to be required, as well as policy and rate measures to ensure charging impacts are minimized. BC Hydro is currently examining options for an optional time of use rate to encourage off-peak charging of EVs.

3. Transportation Electrification Potential

The pathway assessment focuses primarily on the potential for passenger EVs. While this is a key area, there is a wide range of opportunities beyond EVs. BC Hydro is currently examining options for supporting electrification in the following sectors and applications:

- Electric buses
- Other commercial vehicles
- Forklifts
- Ferries
- Port drayage trucks and other port equipment

- Airports
- Mining operations (trucks and conveyors)
- Garden equipment (primarily lawnmowers)

The pathway assessment discussion paper states that transportation use of electricity in the diesel class is not expected to increase. However with opportunities listed above, the expansion of Skytrain to include the Evergreen Line this past year, and potential future expansion of Skytrain in the Broadway corridor and light rail in Surrey, electricity use in the diesel class may grow considerably.

4. Availability of Credits

The pathway assessment discussion paper notes that reporting of electricity use for EVs is currently incomplete, leading to an undersupply of compliance credits from this sector. BC Hydro is currently developing proposed quantification methods that will support much more comprehensive reporting of electricity used in vehicles. BC Hydro is also examining possible quantification methods for other sectors and applications, including forklifts, garden equipment, and other commercial transportation uses as discussed in the previous section. BC Hydro plans to bring forward these quantification methods in 2018 for government review. Implementation of these methods will help ensure the maximum number of credits from transportation electrification can be made available for compliance purposes.

5. Energy Effectiveness Ratio

The British Columbia Ministry of Energy, Mines and Petroleum Resources (“MEMPR”, or “the Ministry”) uses the Energy Effectiveness Ratio (“EER”) within its credit calculation as a multiplier to compare the efficiency of two fuel types.¹ The EER multiplier represents an efficiency comparison between two fuel streams on a distance per litre equivalent. For example, when comparing the efficiency of an electric vehicle relative to a traditional gasoline-powered engine, the Ministry uses an EER of 3.4 to calculate the credit value. This means that the EV is 3.4 times more energy efficient than a traditional gasoline engine.

British Columbia’s Renewable and Low Carbon Fuel Requirements Regulation has used a blanket fuel class EER multiplier for the electric transport credit calculation since the Regulation became effective in 2010. The electric transport EER multiplier has been 3.4 and 2.7 for gasoline and diesel, respectively. Similar to BC, Oregon initially adopted a blanket fuel class EER for diesel but in November of 2017 amended its regulation to segment diesel by specific transportation type.²

¹ [British Columbia Renewable and Low Carbon Fuel Requirements Regulation](#) – Part 2.1 – Requirements in Relation to Carbon Intensity of Fuels. 11.02(2) – Low carbon fuel requirements

² Oregon’s Department of Environmental Quality (“DEQ”) defines EER as a “dimensionless value that represents: (a) The efficiency of a fuel as used in a powertrain as compared to a reference fuel.....; or (b) The efficiency per passenger mile, for fixed guideway applications.” [Oregon Clean Fuels Regulation](#) – Definitions (40)

While Oregon has recently moved to a segmented diesel class, California has always segmented its EER multiplier for diesel, and has proposed further updates to these values in California Air Resources Board’s (“CARB”) September 2017 ‘*Preliminary Draft of Potential Regulatory Amendments to the Low Carbon Fuel Standard.*’³ BC Hydro proposes that the MEMPR consider segmenting the diesel fuel class EER multiplier by specific transport types to better capture the efficiency gains and GHG emissions benefits from transport electrification.

Table 1 lists the electricity EER’s for diesel fuel for California, Oregon and BC as initially developed and as updated (or proposed.) The electricity EER for gasoline is not included, as each region uses the same value of 3.4.

Table 1 Electricity Diesel Class Fuel EERs (by jurisdiction and status):

Fuel	California		Oregon		British Columbia
	Original (2009)	Proposed (2019)	Original (2015)	Updated (2017)	Original (2010)
All			2.7		2.7
Battery EV, or PHEV	2.7	5.0		2.7	
Transit Bus	4.2	5.0		4.2	
Fixed Guideway, Heavy Rail	4.6	4.6			
Fixed Guideway, Light Rail	3.3	3.3		3.3	
Fixed Guideway, Street Car	3.1	3.1		2.1	
Trolley Bus, Cable Car	3.1	3.1			
Forklifts	3.8	3.8			
Transport Refrigeration Unit		3.4			
Fixed Guideway, Aerial Tram				2.5	

Updates detailed in blue. All proposed changes listed for completeness regardless of whether or transportation class regulated under BC’s RLCFS.

California

Originally, CARB allocated a diesel fuel class EER multiplier of 2.7 and 4.2 to EVs and Buses, respectively. More recently, further research undertaken by CARB’s Advanced Clean Transit team on the efficiency of electricity transport determined that the EER multiplier for EVs and Buses is 5.0. In September of 2017, CARB’s staff proposed amending the diesel fuel class EER multiplier for EVs and Buses to 5.0 in its ‘*Preliminary Draft of Potential Regulatory*

³ [California Air and Resource Board Regulatory Amendments to the Low Carbon Fuel Standard](#) § 95486.b – Table 5. EER Values for Fuels Used in Light-and Medium-Duty, and Heavy-Duty Applications. CARB describes the EER as a “dimensionless value that represents the efficiency of a fuel as used in a powertrain as compared to a reference fuel. EERs are often a comparison of miles per gasoline gallon equivalent (mpge) between two fuels.” [California Air and Resource Board Low Carbon Fuel Standard Regulation](#) - 95481. Definitions and Acronyms.

Amendments to the Low Carbon Fuel Standard' (listed in blue in Table 1).⁴ If approved, the amendment that would be effective in 2019. CARB published a discussion paper in April, 2017, comparing the efficiency of battery electric vehicles relative to conventional diesel vehicles operated in the same duty cycle.⁵ The study found that the GHG emissions benefits and fuel saving from electrification of trucks and buses are better than previously understood, especially for low speed duty cycles. The study suggests updating CARB's LCFS EER multiplier to better reflect the more accurate data.

Oregon

In a January 2017, Oregon's Department of Environmental Quality ("DEQ") published a report on the GHG emissions benefits and fuel saving from electrification in the diesel class, titled '*Agenda Item F – Modifications to the Electricity Provisions*'.⁶ Within the report, the DEQ outlines its proposed EER values for electric transit buses, fixed light rail, street cars, and aerial trams. These values became effective in Oregon's regulation in November, 2017.⁷

British Columbia

BC's Renewable and Low Carbon Fuel Requirements Regulation currently has one blanket EER for all diesel class fuel, which is 2.7. BC Hydro suggests the Ministry, in consultation with BC Hydro, consider the potential applicability of the more recent studies undertaken by CARB and Oregon's DEQ on segmented diesel fuel class EERs during MEMPR's upcoming review of the program. BC Hydro believes that the result may provide a more accurate reflection of the efficiency gains and GHG emissions benefits from the electrification of transport in BC.

BC Hydro plans to participate in the January workshop and looks forward to a continued dialogue with government on how BC Hydro can best support BC's Renewable and Low Carbon Fuel Requirements Regulation and government's climate change objectives.

Yours sincerely,



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⁴ [California Air and Resource Board Regulatory Amendments to the Low Carbon Fuel Standard](#) – Table 5. EER Values for Fuels Used in Light-and Medium-Duty, and Heavy-Duty Applications.

⁵ [California Air Resources Board Discussion Draft 4/24/2017](#)

⁶ [Agenda Item F – Modifications to the Electricity Provisions](#). January 26-27, 2017

⁷ [Oregon Clean Fuels Regulation](#) - AMEND: 340-253-8080 – Table 8 – Oregon Energy Economy Ratio Values for Fuels Used as Diesel Substitutes

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