



Environment and
Climate Change Canada

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Canada



Considerations for Electric Vehicle Credit Generation

November 13, 2018
Clean Fuel Standard
Multi-Stakeholder
Consultative Committee

Outline

- Context
- Proposed Approach
- Options for Credit Calculations and Methodologies
- Next Steps



Context

- Electricity used by electric vehicles (EVs) could be treated as a “fuel” and generate credits under the Clean Fuel Standard (CFS)
 - Calculated as a substitute to gasoline (“end-use fuel switching”)
- Attributing GHG emission reductions to EV credits under the CFS is technically challenging given existing and planned programs aim to encourage EV sales
 - Provincial policies include: EV mandate in Quebec; financial incentives at the point of sale in British Columbia and Quebec
 - Federal policies include: LDV GHG Regulations (which provides incentives for EVs); zero-emission vehicle (ZEV) strategy; investments in R&D and infrastructure
- Efforts are underway to analyze:
 - potential incremental GHG impact of CFS credits for EVs
 - approach to credit creation for EVs in CFS regulations



Proposed Approach

- Home charging would be credited to utilities
- Public charging would be credited to site-hosts/network operators
- Proposal could improve business case for charging stations and expand the network
 - Would partly address issue of range anxiety
 - Would also improve awareness of EV technology
 - Could result in additional EV sales and associated GHG emission reductions



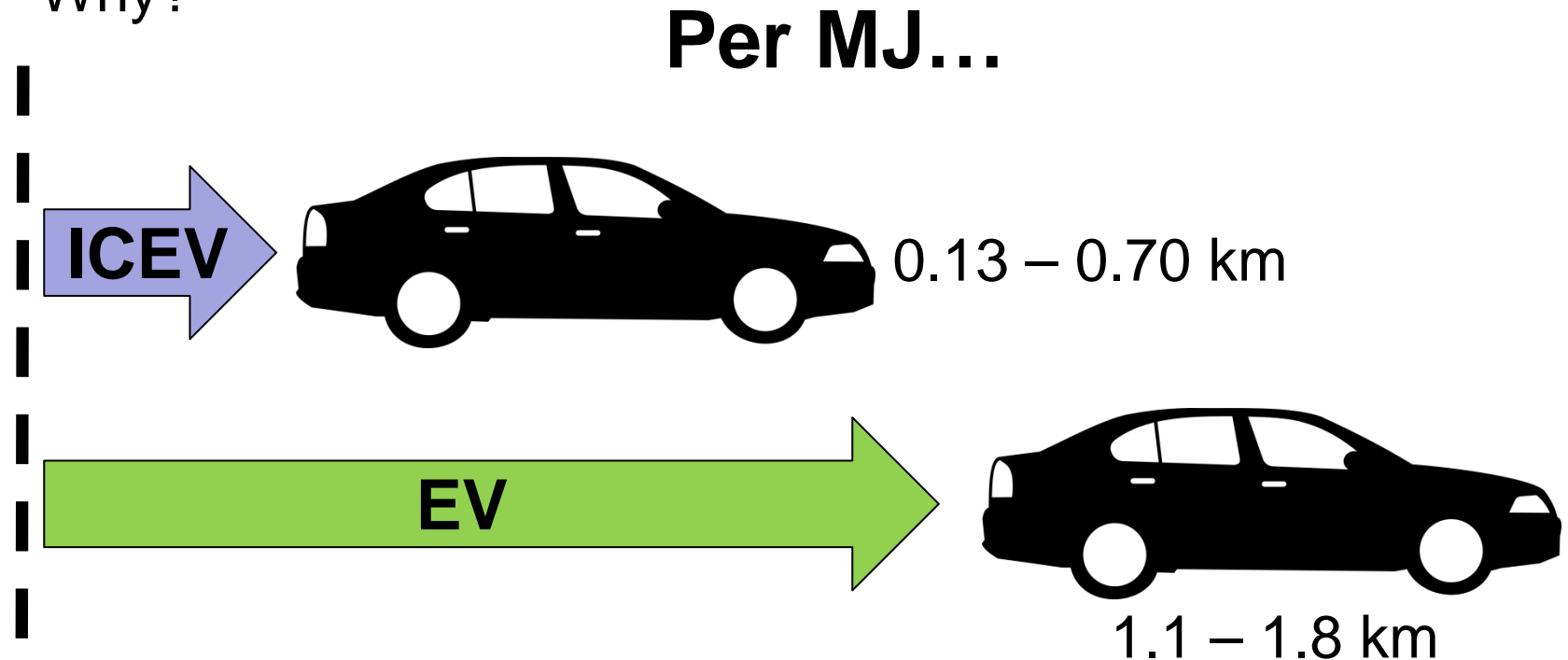
Crediting Options

- Considering need of a baseline of EV use/charging to deduct from future use
- Considering need of a “cap” on future EV use/charging to account for uncertainty with attribution to CFS
- Considering updating the energy efficiency ratio (EER) for EVs vs 3.4 used in other jurisdictions



Energy Economy/Efficiency Ratio (EER)

- Credits are based on displaced GHG emissions, therefore we need to determine emissions from gasoline vehicles displaced by EVs
- Why?



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Other Assumptions and Considerations

Other Assumptions

- Average kilometers travelled
- Average carbon intensity of electricity production

Other Considerations

- Options for hydrogen fuel cell vehicles
- Heavy-duty vehicles



Next Steps

We request your written comments by
November 30, 2018 to:
ec.cfsnccp.ec@canada.ca



Annex: Potential Calculation of Credits

Credits

$$= \left[\mathit{Energy}_{EV\ Charging} - \mathit{Energy}_{Baseline} \right] \times \mathit{EER} \\ \times \left(\mathit{CI}_{Fossil} - \frac{\mathit{CI}_{Elec}}{\mathit{EER}} \right) \times 0.0036$$

- *Energy* has units of MWh
- *CI* has units of $\frac{gCO_2e}{MJ}$
- The constant has units of $\frac{MJ \cdot tCO_2e}{MWh \cdot gCO_2e}$
- *EER* is unitless
- *Energy_{Baseline}* must be determined for each regulatee



Annex: Potential Calculation of Credits (Utilities)

$$\begin{aligned} \mathbf{Energy}_{\mathbf{Baseline}} &= \\ \mathbf{Baseline} &\times \mathbf{Provincial\ Distribution} \\ &\times \mathbf{Supplier\ Distribution} \end{aligned}$$

Where,

$Supplier\ Distribution_{Utility}$ could be based on the relative number of customers within that utility out of the total number of electricity customers in the province, limited to a fraction of EV charging that takes place at home (e.g., 90%)

$$\text{E.g., } Supplier\ Distribution_{Utility} = 0.9 \frac{Utility\ Customers}{Total\ Customers}$$



Annex: Potential Calculation of Credits (Networks)

$$\mathbf{Energy}_{Baseline} = \mathbf{Baseline} \times \mathbf{Provincial\ Distribution} \times \mathbf{Supplier\ Distribution}$$

Where,

$Supplier\ Distribution_{Network}$ could be based on the energy distributed by that network in a province in the reference year (e.g., 2017) out of the total energy distributed to EVs in that reference year.

$$\text{E.g., } Supplier\ Distribution_{Network} = \frac{Energy_{2017}}{ProvDist \times Baseline_{2017}}$$



Annex: Potential Calculation of Credits

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Credits =

$$\left[\text{Energy}_{EV \text{ Charging}} - (\text{Baseline} \times \text{ProvDist} \times \text{SupplierDist}) \right] \times \text{EER} \times \left(\text{CI, Fossil} - \frac{\text{CI, Elec}}{\text{EER}} \right) \times 0.0036$$

Where,

- $\text{SupplierDist, Utility} = 0.9 \frac{\text{UtilCust}}{\text{TotCust}}$
- $\text{SupplierDist, Network} = \frac{\text{Energy}_{2017}}{\text{ProvDist} \times \text{Baseline}_{2017}}$

