

December 22, 2017

California Air Resources Board
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Reference: **Comments on renewable energy for biofuel pathways**

Dear ARB Staff,

Life Cycle Associates would like to take this opportunity to provide our comments on the opportunities for renewable power under the LCFS. Based on ARB staff presentations^{1,2} the following requirements apply or are under consideration.

- Renewable power via grid transmission is allowable for EV charging and hydrogen electrolysis pathways
- ARB is considering additional LCFS credits for smart charging with lower CI renewable power
- Green Tariff Shared Renewables and “Off-site, Co-owned” provisions apply to the use of renewable power for ZEVs
- Renewable power for all other fuel pathways must use on-site power

Renewable power should be available for all fuels distributed by common carrier as long as they provide environmental benefits. ARB has allowed for LCFS credits to be generated for renewable biogas, transmitted by pipeline. The same credits should be allowed for solar and biomass based power using for fuel production facilities as long as such crediting provides an environmental benefit.

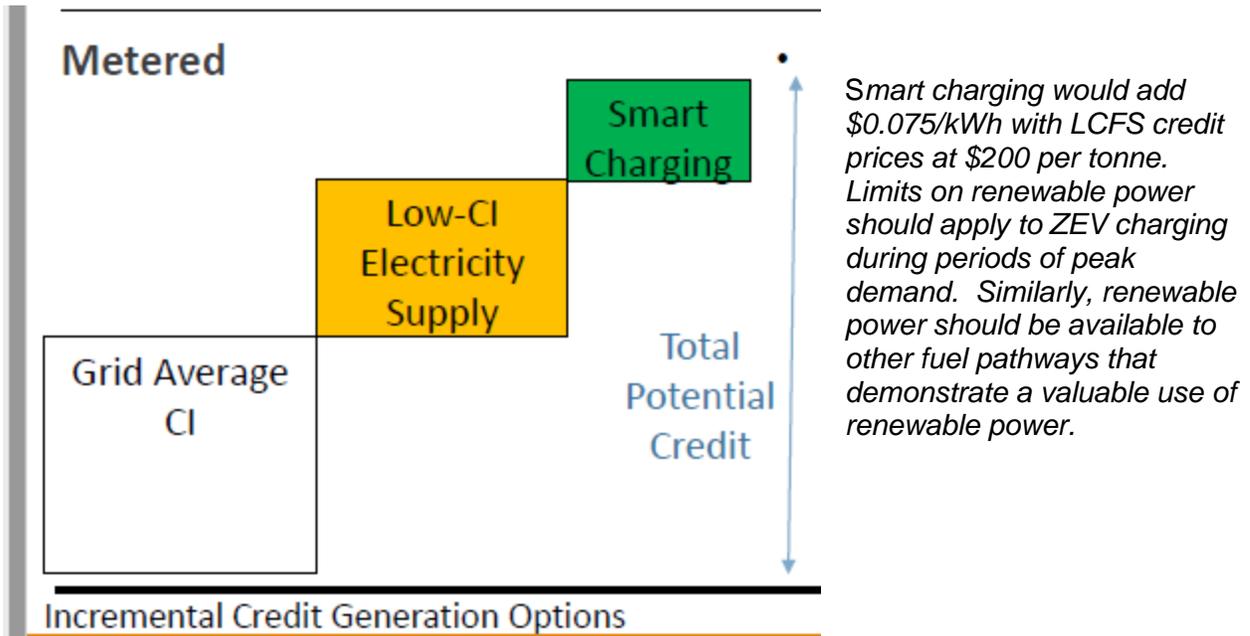
Risks with Renewable Power

ARB also needs to understand the risks of affecting the electricity markets in a negative way. With LCFS credit prices of \$200 per tonne, changing the CI for electric power from 104 to 0 g CO_{2e}/MJ results in an additional LCFS credit value of \$0.075 /kWh for ZEV charging. This is an attractive incentive to use solar PV power. However; during hot days, if the grid is at peak demand, the incentive sets up a competition between air conditioning and EV charging. Gangs of ZEVs could even conspire to create a power crisis on the scale of the events of the year 2000 and cyber security considerations need to be taken into account. So, renewable power for ZEV applications needs to be used judiciously.

Recommendation 1. ARB should institute protections against ZEV smart charging bidding up the price of power during periods of high power demand when the stress on the grid is highest.

¹ ARB (2016). Grid & Renewable Electricity in the LCFS. Public Working Meeting for Stakeholder Groups. Staff presentation. December 2, 2016.

² ARB (2017). Pre-Rulemaking Public Meeting to Discuss 2018 LCFS Preliminary Draft Regulatory Amendment Text, November 6, 2017.



Secondly applying a credit for the full difference between the average CI and PV power represents an aggregation error as the renewable power is part of the average mix. The error is not double counting but needs to be taken into account. Credit generation is based on the CI of average electric power and the assignment of PV power to ZEV charging perturbs the average.

Recommendation 2. Adjust the CI of PV power for ZEV charging to reflect the contribution of renewable power towards the average mix. The average CI in the GREET model is calculated from the weighted MW of power and the WTW CI for each fuel (upstream + combustion). A simplified version the calculation illustrates the approach.

$$\text{Average CI} = (\text{MW NG}/\eta \times \text{CI NG} + \text{MW Coal}/\eta \times \text{CI coal} + \text{MW PV}) / (\text{MW NG} + \text{Coal} + \text{PV})$$

If $\text{MW PV} = \text{MW for Stationary} + \text{ZEV}$ then the above equation can be rewritten to take into account an adjusted average CI for ZEV.

If the above equation is grouped as $\text{CI} = \text{Emissions/Power} = \text{E/P}$
And the power for PV ZEV charging is Z, then the adjusted $\text{CI}' = (\text{P}/(\text{P}-\text{Z})) \times \text{prior average CI}$.

Since Z is far less than the statewide generation P, the effect on the average CI is small but easy to calculate. Entities recording PV power from smart charging should use the value CI' that would be calculated by ARB. In the early years of the LCFS CI/CI' for electric power will be extremely close to 1.0

Following some of these nuances, renewable power for fuel production facilities would provide benefits to the LCFS if it represents additional power and does not perturb the duck curve in an undesirable manner. We recognize that renewable power has a special role with electric

vehicles and hydrogen from electrolysis and understand the ARB's interest in limiting renewable power from renewable credits to only zero emission fuels.

In order to provide equitable access to renewable power, ARB should take into account the benefits us using renewable power beyond its role as a zero emission source of energy. Perhaps, off-site renewable power could be allowed if fuel producers can show that the power is an incremental investment. Another option would be to consider an incremental investment of renewable power that is demonstrated to have a positive effect on the duck curve with storage.

In any event, the requirements for renewable power to biofuel production facilities and oil refineries should be clarified.

For example:

- Will smart charging of EVs be smart enough to prevent unwanted price disruptions?
- Can dedicated transmission lines be constructed to deliver renewable power from an off-site location?
- Can renewable power be "stored" on the grid via net metering?
- Under what circumstances can an investment in renewable power be assigned to a bio-refinery? Perhaps ARB should allow investments in renewable power that are closely coupled to the biorefinery either in terms of location, effect on the duck curve, or other demonstrable benefit of load displacement.
- To what extent does property ownership and grid connectivity matter? For example on-site PV power that only feeds a biorefinery will skew the facilities use of grid power and exacerbate the duck curve.

Recommendation 3. ARB should consider proposals to build additional renewable power in support of biorefineries. Such renewable power should be new and should improve the capabilities of the grid. Based on such proposals, ARB should define requirements for renewable power that is not physically on a project site.

Thank you for your consideration.

Best Regards,



Stefan Unnasch
Managing Director
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Renewable Electricity Pathways

- *Summary:*
 - Potentially adding a Lookup Table pathway for *100% Solar or Wind*-generated electricity supplied to EV charging.
 - Clarifying current rule and adding flexibility for non-co-located renewable power.
 - See *Electricity discussion paper, page 4:*
 - (1) Green Tariff Shared Renewables (GTSR)* and (2) “off-site, co-owned” provisions
 - *Considerations:* Compliance requirements would include ARB approval and ongoing review of the metering methodology, utility or other contracts to ensure that the renewable power does not also generate any RECs or other renewable attributes in any other program.

QUESTIONS:

- Staff is seeking stakeholder discussion and feedback on the potential methods for recognizing renewable electricity used in electric vehicles.