

September 16, 2017

California Air Resources Board
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Reference: **Comments on Refinery Investment Credit Pilot Program**

Dear ARB Staff,

Life Cycle Associates would like to take this opportunity to provide our comments on the Refinery Investment Pilot Program. I believe that the RCIPP, as a component of the LCFS, should employ the same calculations, rules, and methods that apply to the LCFS regulation. I understand that RICPP is a different program and any set of rules could apply but there are bigger principles at stake here. The LCFS was developed to reduce the carbon intensity of fuels. As such the regulation strives to determine the carbon intensity on a life cycle basis using the same model (or emission factors derived from that model). Therefore, ARB should avoid the following potential inconsistencies in developing the RICPP.

The following comments address key points in the RICPP.

Emission Factors

Upstream and direct combustion emission factors should be consistent with the prevailing version of CA_GREET

- a. Do not use external emission factors (for example National LCI Database) to provide the basis for crediting power, hydrogen, or energy production. The emission factors for electric power, hydrogen, and either refinery fuel gas or make up natural gas are readily available in the CA_GREET model.
- b. Refineries participating in the program will be in California (see following comment about thresholds, so ARB could publish one set of emission factors that include direct and upstream emissions.
- c. ARB should publish CA_GREET direct and upstream emission factors based on the CA Grid mix and CA Petroleum mix for:
 - i. Electric power
 - ii. NG steam reforming hydrogen including NG upstream
 - iii. Natural gas to industrial boiler including NG upstream
 - iv. Refinery fuel gas to industrial boiler including crude oil upstream
 - v. Assumed refinery steam based on mix of natural gas and fuel gas including upstream emissions

For example, the CI for electric power in California is shown in Table 1. The emission factor is 366.6 g CO₂e/kWh. This emission factor represents the co-product credit for fuel production facilities in California that produce electric power. ARB has proposed a generic emission factor for displaced power. Why should oil refineries receive a different credit for co-produced power than other fuel producers in the LCFS system? ARB has determined that the average electricity mix for the region where fuels are produced is appropriate for power consumption and export. The same principle should apply to oil refinery credits.

Table 1. CA_GREET3 emission factor for electric power, CA Mix

1	Electricity Generation		
181			
182	9) Fuel-Cycle Energy Use, Water Consumption, and Emissions of Electr		
183		Stationary Use	
184		Total	
185		Feedstock	Fuel
186	Total energy	112,193	2,291,650
187	Fossil fuels	108,886	1,868,149
188	Coal	10,024	1,190,009
189	Natural gas	70,174	616,464
190	Petroleum	28,688	61,676
191	Water consumption	12.745	160.28
192	VOC	15.171	4.60
193	CO	21.308	89.72
194	NOx	41.350	69.47
195	PM10	11.333	33.45
196	PM2.5	2.404	24.16
197	SOx	16.844	31.17
198	BC	0.295	3.30
199	OC	0.557	8.11
200	CH4	342.231	7.02
201	N2O	0.553	0.91
202	CO2	6,867	91,169
203	CO2 (w/ C in VOC & CO)	6,948	91,325
204	GHGs	17,640	102,463
205	GHGs, gCO ₂ e/MJ	14.85	86.98
206			101.83

Credit Threshold

The workshop participants did not provide significant justification to resolve the question of credit threshold. Some thought that the simplicity of a fixed limit was attractive; however, fixed credit limits would exclude small refineries from participating in the program. The application to out of state refiners was also not thoroughly explored.

The notion of a CI limit appears confusing because refiners do not have a good understanding of the CI of individual refineries compared to the LCFS aggregate

refinery efficiency. An alternate proposed solution was to set a threshold as a fraction of the refinery's GHG emissions. Determining a threshold as a function of the refineries reported GHG emissions is indeed simple and all refineries participating in the program will have GHG inventories. The methods for determining the GHG emission might be different for out of state refineries but the issue is minor since the question is determining the threshold.

A very simple approach would be to base the threshold on the tons of GHG emission from all transportation fuels produced at the refinery. For example with a 0.1 g CO₂/MJ threshold, the threshold tonnes of CO₂ could be calculated from the fuel produced via

Threshold = 0.1 g/MJ x (119.5 MJ/gal CARBOB x gal CARBOB + 134.5 MJ/gal ULSD x gal ULSD). For example for 100,000 bbl/d of transportation fuels this threshold would correspond to

$0.1 \text{ g/MJ} \times 42 \times 365 \text{ day} \times 100,000 \text{ bbl/day} \times 128 \text{ MJ/gal} / 10^6 = 19,600 \text{ credits.}$

This threshold could also apply to out of state refineries. ARB will need to assess whether refineries that essentially have no LCFS obligation should be allowed to receive the more valuable LCFS credits for refinery improvements. A RICPP credit should only be allowed for refineries with LCFS obligation and for the unusual situation where out of state refineries ship refined product to California, the RICPP threshold should apply but the magnitude of credits should only be allowed to offset the portion of the deficit generation associated with the fuel imports or equivalent limit.

Crediting threshold

- To ensure that project GHG reductions are additional requires a minimum threshold
- Options include
 - Increasing the current threshold from 0.1 g CO₂e/MJ (for example 0.2 g/MJ CO₂e?)
 - Minimum GHG reductions of 25,000 MT/year
 - Fixed percentage of total refinery-wide emissions (e.g. X% of total refinery emissions)

Renewable Power

Renewable energy credits should be available for all fuels or at least a consistent set of limitations should apply to all fuel pathways. Note that this issue also applies to biofuel pathways. I understand the ARB's interest in limiting renewable power from renewable credits to zero emission fuels. However, the requirements for renewable power to other fuel production facilities should be clarified to determine what constraints apply to renewable power used for liquid fuel production.

For example:

- Must the renewable power be on the property of the biofuel for oil refinery facility?
- Can dedicated transmission lines be constructed to deliver renewable power from an off-site location? Biogas pipelines have been allowed. Can renewable power producers contract to use existing transmission lines to provide renewable power to a fuel production facility?
- Can on-site 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 or oil refinery?

Allocation

The question of allocation of emission savings was discussed. ARB currently allows the selective use of bio feedstocks for fuel pathways via the comingling method. For example a biodiesel plant using soy oil and other feedstocks assigns the soy oil to a soy biodiesel pathway even though the feedstocks are comingled. Oil refineries should be allowed to assign energy inputs such as solar steam, renewable power, or renewable hydrogen to transportation fuels for several reasons. The investments were motivated by the LCFS and the assignment of feedstocks is allowed under other aspects of the LCFS such as refinery co-processing.

Thank you for your consideration.

Best Regards,



Stefan Unnasch
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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.