

Mr. Richard Corey  
Executive Director  
California Air Resources Board

ARB Docket Submission: LCFS

April 20, 2018

Dear Mr. Corey,

Linde would like to provide comments on the provisions for hydrogen in the ISOR (Initial Statement of Reasons) for Amendments to the Low Carbon Fuel Standard.

Hydrogen is expected to provide over 1.5 million credits by 2030 on sales over 100 million kg of hydrogen, which represents a significant growth over today's credit generation. An important element of credit generation is the opportunity for low carbon pathways that use renewable feedstocks including landfill, waste water treatment, anaerobic digester, and other sources of biogas. The use of biogas fits with other initiatives including the Federal Renewable Fuel Standard (RFS) and the renewable requirements of SB 1505. Once all policies are in place, the use of renewable biogas as a feedstock will allow for the generation of RINs and meet the obligations of SB1505.

The use of RNG (Renewable Natural Gas) as a feedstock has an alternative use as CNG. The RNG is valued based on its value as gas, LCFS credit, and RFS renewable identification number (RIN). However, EPA has not yet ruled on RIN generation for hydrogen pathways. Therefore, if a hydrogen producer purchases RNG for the steam reforming of methane to hydrogen, they will not be able to recover the value of the RIN. The loss of potential revenue to the hydrogen producer could be over \$3 per kg of hydrogen. The hydrogen industry needs an interim strategy to comply with the renewable requirements of SB 1505 for methane steam reforming pathways.

As a transitional option, we propose that ARB allow the purchase or transfer of LCFS credits that were generated from renewable biogas to CNG or LNG to meet SB1505 requirements. These credits would not be transferred to obligated parties but instead, hydrogen producers could transfer these credits to ARB's buffer account. Such an approach would free up a source of renewable feedstock without obligating hydrogen producers to purchase an asset with an unusable RIN.

In order to implement this approach for one million Btu of hydrogen, ARB could allow hydrogen producers to obtain and transfer to ARB the LCFS credits that were associated with RNG. Table 1 shows the LCFS credits associated with 1 million Btu of RNG that could be used as feedstock for hydrogen production. We recommend that hydrogen producers be allowed to work with RNG credit generators to determine the amount of LCFS credits per mmBtu of RNG or that ARB assigns a default value. The LCFS credits generated depend on the baseline CI, CI for RNG, and the EER for the pathway. In the example below 70.21 credits would be generated for 1000 mmBtu of RNG. ARB could use this credit generation rate to allow for the calculation of renewable biogas feedstock to meet SB1505 compliance.

Table 1. Calculation of LCFS Credits Generated per mmBtu of Renewable Biogas.

	<u>Baseline</u>	<u>Biogas</u>	<u>Delta</u>
Biogas Needed (scf)		1,075,269	
(Therms)		11,075	
(mmBtu, LHV)		1,000	
EER		0.90	
Fuel Energy (GJ, LHV)	857	1,055	
Fuel CI (g/MJ)	93.0	10.00	
WTW GHG Emissions (tonne)	79.73	9.53	<b>70.21</b>
			<b>Credits</b>
	0.0702	Credits/mmBtu, LHV	

We propose that ARB allow hydrogen producers to apply these credits in proportion to the mmBtu of natural gas feedstock used for hydrogen production. The hydrogen producer could transfer to credits to ARB's account for retirement. In order to implement this approach, ARB would need to determine the fate of the credits. For example the credits could be retired and not used to meet the compliance obligation or ARB could apply them to a buffer account to address issues associated with credit shortfalls.

This implementation of this option would be straightforward from the fuel producer's perspective. Fuel producers could either generate credits for RNG to hydrogen pathways or they could obtain RNG credits and transfer the credits to ARB. Fuel producers could track the quantity of renewable hydrogen and their total hydrogen sales for transportation to verify compliance with the 33.3% renewable requirement under SB 1505.

We recommend that ARB allow the option to apply RNG based LCFS credits for a period of 10 years to allow for the development of additional biogas resources as well as the alignment of the RFS program with renewable hydrogen.

Thank you for considering this issue.



Respectfully,

**Mike Beckman**

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