



Intersect
Power

2 Embarcadero Center 7th Fl. San Francisco, CA 94111

August 21, 2017

[Submitted Electronically]

Clerk of the Board
Air Resources Board
1001 I Street
Sacramento, CA 95814

RE: Low Carbon Fuel Standard 2018 Amendments

To whom it may concern,

Intersect Power appreciates the opportunity to review and comment on the California Air Resource Board's ("CARB") Low Carbon Fuel Standard ("LCFS") 2018 Amendments. Intersect Power is an infrastructure development company bringing renewable, utility-scale power to wholesale customers and markets. Under CARB's proposed amendments to the Low Carbon Fuel Standard, we are a potential supplier of credits generated from renewable electricity production.

We are providing the below comments to bring the perspective of a solar developer to the LCFS amendment process. If CARB has any questions regarding our comments, please contact Todd Johansen (858.945.8115) or Luke Dunnington (510.421.1359).

Thank you for providing this opportunity to comment on the Low Carbon Fuel Standard 2018 Amendments.

Best,

Luke Dunnington
Chief Operating Officer
Intersect Power, LLC

Intersect Power Comments

Low Carbon Fuel Standard 2018 Amendments

August 21, 2017

Executive Summary

Intersect Power, a utility-scale renewable energy development company, thanks the California Air Resource Board (CARB) for the opportunity to comment on the Low Carbon Fuel Standard 2018 Amendments concept paper. We are pleased to see that CARB intends to strengthen the compliance targets and that CARB's amendment to the Standard's refinery provisions specifies renewable electricity production as qualifying for credit generation under LCFS. However, the restriction of qualifying renewable energy generation to **on-site** severely impedes cost-effective project development at the intended scale under this program due to the unfavorable solar development conditions on-site at California refineries. These unfavorable conditions include:

- I. Limited available and extremely high cost land
- II. Poor solar resource
- III. Permitting restrictions
- IV. Civil engineering considerations
- V. Financing obstacles
- VI. Refinery ownership & short tenor

Given that CARB intends to strengthen the compliance targets for regulated entities, thus increasing the demand for credits under LCFS, CARB must provide for additional sources of credit supply to meet this increasing demand. As a low cost and widely available GHG-free resource, renewable electricity is an excellent potential source of credits. However, since restricting qualifying renewable electricity generation to on-site creates significant barriers to successful projects and increases the cost of compliance for regulated entities, Intersect Power proposes allowing for off-site production to qualify for LCFS credit generation, if it meets the following criteria:

- I. New build/additionality
- II. Long-term contract
- III. Renewable energy credit (REC) retirement
- IV. In-county geographical limitation

Expanding the Refinery Investment Credit Pilot Program to include off-site generation as eligible to produce credits will enable refineries to successfully contract for renewable power to fulfill their obligations under the Low Carbon Fuel Standard, resulting in fewer emissions from refinery operations and lower cost compliance for regulated entities.

About Intersect Power

Intersect Power is an infrastructure development company bringing renewable, utility-scale power to wholesale customers and markets. Our team develops greenfield solar projects with the goal of reducing carbon emissions and delivering value and viability to both energy buyers and financiers. Together, our team members have taken more than 60 projects, as small as 1MW and as large as 270MW, from siting

and permitting through to financing and commissioning. Currently, Intersect Power is developing a pipeline of 1 GWp of PV + storage projects in the United States. Our team's functional expertise, stemming from 15+ years in the energy industry, spans all relevant disciplines including site acquisition, permitting, interconnection, origination, engineering, procurement, construction, and financing. With over 2GWp of renewable assets developed, contracted, financed, and delivered to commercial operation, our team members have a tremendous track record of identifying and delivering competitive, reliable renewable energy projects.

Introduction

Intersect Power applauds CARB for seeking to strengthen the fuel carbon intensity (CI) compliance targets for regulated entities through 2030.¹ Intersect Power similarly commends CARB for seeking amendments to the Low Carbon Fuel Standard (LCFS) program, which add flexibility and optionality for regulated entities.² As the LCFS is strengthened it will be critical to offer new pathways to earn credits for regulated entities.

Specifically, Intersect Power is encouraged to see the proposed amendment to the Refinery Investment Credit Pilot Program ("Program"), which serves to further specify which types of projects qualify to earn refinery credits under the program.³ Intersect Power agrees that renewable electricity production that results in a reduction of refinery greenhouse gas emissions of at least 0.1 gCO₂e/MJ should qualify to earn credits under the LCFS program. Due to falling equipment costs as well as widespread deployment, solar energy costs in California are at an all-time low.⁴ Renewable electricity generated from solar PV can thus provide a cost-effective supply of credits for refineries under LCFS, helping refineries meet the increasingly stringent CI standards, and resulting in compliance cost savings which will be passed through to California fuel buyers.

As currently contemplated, the amendment to the Refinery Investment Credit Pilot Program contained in CARB's July 2017 concept paper proposes that on-site renewable electricity generation be among the specified types of projects qualifying to produce credits under the Program.⁵ While Intersect Power is pleased that CARB is specifying renewable electricity production as potentially qualifying for the Program, constraining the qualifying renewable electricity to **on-site** generation at refineries limits options and increases costs for regulated entities. Utility-scale solar PV is California's lowest cost form of renewable electricity when developed in the right locations.⁶ Unfortunately, there are several reasons this excellent resource is not able to be used widely at California refineries. We discuss below the primary impediments to solar development on-site at California refineries.

¹ CARB, *Pre-Rulemaking Concept Paper*, July 24, 2017. Pg. 3-4

²Ibid, p.3

³Ibid, p.29

⁴Trabish, Herman K. "Solar in 2017," *Utility Dive*, January 12, 2017.

<http://www.utilitydive.com/news/solar-in-2017-as-non-traditional-markets-break-records-more-doors-open-fo/432582/>

⁵CARB Concept Paper pg. 29

⁶ Lazard, "Levelized Cost of Energy Analysis 10.0," December 12, 2017.

<https://www.lazard.com/perspective/levelized-cost-of-energy-analysis-100/>

Bolinger, Mark and Joachim Seel, "Utility-Scale Solar 2015," Lawrence Berkeley National Laboratory, August 2016.

https://emp.lbl.gov/sites/all/files/lbnl-1006037_slides.pdf

O'Boyle, Michael, "Wind and Solar Are Our Cheapest Electricity Generation Sources," *Greentech Media*

On-Site Solar Generation: A Challenge for California Refineries

California refineries utilize very large amounts of electricity.⁷ On average, a California refinery uses ~178,000 MWh of electricity per year,⁸ resulting in ~77,000 tons of CO₂ emissions.⁹ If a solar facility is to reduce refinery emissions by at least 0.1 gCO₂e/MJ, it would need to produce ~35,000 MWh per year of carbon-free electricity¹⁰ which, depending on the solar resource in a given area, would require a solar facility with a nameplate capacity of approximately 12.5 MWac.

This scale of facility is difficult to achieve *on-site* at California refineries, due to the following factors:

I. Land Availability & Cost

Solar PV facilities require roughly eight gross acres per MWac of installed capacity. This means a refinery would need to have approximately 100 acres of available land on-site to support a solar PV facility that would qualify under the proposed amendments to the Program. Most California refineries are located in relatively urban and/or coastal areas, and do not have this kind of acreage available for development on-site. If a refinery does have available land, it may have future core business plans for the area or may not identify solar as the highest and best use. As industrial land costs are often prohibitively high for solar development (especially in urban and coastal areas), it is unlikely a solar developer could compete with other potential uses for available land.

II. Solar Resource

The cost of solar energy is highly dependent upon the intensity of the solar resource in the area in which a project is constructed. Many California refineries are located in regions with relatively poor solar resource, compared to that available elsewhere in the state. Coastal refineries especially suffer from low irradiance due to periodic fog cover. Restricting refinery solar facilities to on-site also restricts them to these lower-irradiance areas, increasing the facility energy costs, and therefore increasing compliance costs for regulated entities and their customers.

III. Permitting Restrictions

Many coastal and heavily populated urban areas, where most California refineries are located, limit permits available for solar development or do not allow zoning for solar at all. Similarly, the coastal regions of California have more stringent environmental reviews and permitting requirements than

⁷ PADD 5 energy use: https://www.eia.gov/dnav/pet/pet_pnp_capfuel_dcu_nus_a.htm

Capacity of operating PADD 5 refineries: https://www.eia.gov/dnav/pet/pet_pnp_cap1_dcu_nus_a.htm

⁸ Calculated using average refinery energy consumption in PADD 5, weighted by higher average CA refinery capacity.

PADD 5 energy use: https://www.eia.gov/dnav/pet/pet_pnp_capfuel_dcu_nus_a.htm

Number & capacity of operating PADD 5 refineries: https://www.eia.gov/dnav/pet/pet_pnp_cap1_dcu_nus_a.htm

⁹ Carbon intensity of electricity “Refinery provisions,” *LCFS Final Reg Order*. Pg. 121.

¹⁰ Calculated using electricity intensity in refining from CA GREET 2.0, converted using thermodynamic conversions from NIST (<https://www.nist.gov/sites/default/files/documents/pml/wmd/metric/SP1038.pdf>) to find the contribution of refining electricity to the CI of CARBOB listed in CA GREET 2.0. The minimum CI reduction for a project of this type (LCFS Final Reg Order pf. 120:

<https://www.arb.ca.gov/regact/2015/lcfs2015/lcfsfinalregorder.pdf>) was divided by the contribution of refining electricity to the CI of CARBOB to find the proportion of electricity that needed to be renewable to meet the specified minimum reduction. This proportion was multiplied by the annual average CA refinery electricity use to find the minimum renewable electricity generation to meet the requirement

other parts of the state and some California Refineries are located in areas that would require a solar developer to go through the California Coastal Commission's burdensome regulatory process. These permitting considerations create significant barriers to the development of solar projects on-site at California refineries and would expose refineries to higher costs and longer development timelines as a result.

IV. Civil Considerations

The cost of constructing a solar facility increases dramatically above a 5% grade and technical challenges are exacerbated above a 7.5% grade. Based on our Google Earth surveys of the land around California refineries, those which do have open land near them are located in relatively hilly regions, making these parcels challenging and expensive for solar development.

V. Financing Obstacles

When refinery land is traversed by existing surface or underground infrastructure - often buried pipes and other subterranean foundations critical to refinery operations - significant obstacles to financing emerge. To protect the facility, solar project financing parties will need to limit access and operational rights to the land under the solar facility, which compromises the host refinery's operations. The existence of high pressure and volatile products within the buried infrastructure may also present a risk to the solar facility which lenders will be unwilling to underwrite. Similarly, refinery restrictions on construction practices in proximity to their infrastructure will create a cost burden beyond what 3rd-party financing can typically support. It will thus likely be difficult to successfully obtain project financing for a project constructed on-site at California refineries.

VI. Tenor

If CARB maintains the on-site requirement for renewable energy facilities to qualify for credits under the Program, it is highly likely that the lack of third party financing will result in refineries being the ultimate owners of the facilities on their land. If a refinery owns the solar facility on its land, it has discretion to change the use of that land at any time. Should a refinery determine that solar is no longer the highest and best use for its excess land, it may convert the land to another use, reducing the length of its commitment to the carbon intensity reduction project. As CARB has expressed a goal that refineries' investments under the program represent long-term commitments, restricting qualifying renewable energy facilities to on-site does not provide the proper incentives or structures for a refinery to achieve this goal.

As is illustrated above, there are significant challenges to developing solar PV facilities on-site at California refineries. If CARB chooses to limit qualifying renewable electricity generation projects to on-site, it is likely that few solar projects will be built as a result of this policy and parties regulated under LCFS will need to find other, more expensive sources of credits in order to comply with tightening CI requirements, passing those higher compliance costs on to California fuel buyers.

Intersect Power would like to note that while the same, on-site requirement for renewable electricity exists in the provisions for crude production,¹¹ crude oil producers (both those in California and in regions which supply California with crude) are located in areas that do not exhibit many of the

¹¹ CARB, "Credits for Producing Crude Using Innovative Methods," *LCFS Final Reg Order*. Pg. 99

unfavorable characteristics of refineries discussed above, and are thus more suitable for solar development. Intersect Power is thus limiting our recommendation that off-site generation qualify for credits to the refinery provisions included in CARB's July 2017 concept paper.

Potential Benefits of Limited Off-site Renewable Generation for Refineries

CARB's July 2017 concept paper contemplates tightening the fuel carbon intensity compliance requirements for regulated entities through 2030.¹² Increasing the CI reductions which regulated entities must achieve will result in an increase in the number of deficits and a commensurate increase in demand for credits to offset those deficits. In order to maintain price stability in the LCFS credit market through 2030, CARB must also provide adequate credit supply to meet the increasing demand and allow for an expansion of supply within the operational and financial restrictions of regulated parties and the industries supplying credits.

As a low cost and widely available GHG-free resource, renewable electricity is an excellent potential source of credits for refineries to utilize to reduce their CI and meet their deficits under CARB's standards out to 2030. The California electric grid already connects refineries to the areas of the state with the best solar resource and land suitable for solar development, meaning there is no need for refineries to build renewable energy facilities behind the meter for the refinery and the state to realize the benefits of this GHG-free electricity production.

It is important to mention that CARB has already considered the benefits of GHG-free grid electricity in its November 2016 discussion paper regarding Electricity as a Transportation Fuel.¹³ That paper identified at the time that the state had zero applications for CI values using renewable electricity for EV charging and posited that flexibility for the co-location requirement could improve the number of credits generated.¹⁴ The parameters CARB considered then for 100% renewable electricity generated off-site as a fuel pathway are similar to those which need careful thought here regarding refineries, including proximity, dedicated power supply, and carbon accounting and verification. Ultimately, CARB identified and proposed a process to allow off-site renewable generation to be used for EV charging and result in an improved CI score.

As we discussed above, and as CARB has considered regarding EV charging, restricting qualifying renewable electricity generation to on-site creates significant barriers to successful projects and increases the cost of compliance for regulated entities. Intersect Power thus proposes expanding the definition of renewable electricity production which qualifies for LCFS credit generation to include specific off-site generation. In recognition of CARB's goal that qualifying renewable energy generation achieve additionality, represent a long-term commitment by the refinery, and avoid double counting of environmental attributes, Intersect Power proposes that, in order to qualify for credit production under the LCFS Refinery Investment Credit Pilot Program, off-site generation must meet the following requirements:

¹² CARB Concept Paper pg. 3-4

¹³ CARB, *Electricity as a Transportation Fuel*, November 23, 2016

¹⁴ Ibid, p.4

I. New-Build/Additionality

The renewable energy facility must be new, and constructed after this rulemaking process.

II. Long-Term Contract

In order to guarantee that the investment in renewable energy represents a long-term commitment on the part of the refinery to reduce the carbon intensity of their refining process, Intersect Power proposes a minimum power purchase agreement (PPA) contract length of 25 years. To guarantee a refinery's commitment to a CI reduction project, CARB could also consider requiring 3rd-party ownership of the renewable energy system, which would guarantee that a refinery could not abandon a project before the end of the contract or the project's life. While California has ambitious renewable energy goals that endeavor to achieve a low-carbon future,¹⁵ a 25+ year contract accelerates refineries beyond today's standards, and brings the state closer to achieving these low-carbon goals in the near term.

III. Renewable Energy Credit (REC) Retirement

For every MWh of renewable electricity produced which is counted towards generating credits under LCFS, the corresponding REC (or environmental attribute) would be retired and accounted for through the Western Renewable Energy Generation Information System (WREGIS) to guarantee that the "green" attributes of the renewable energy are not double counted.

IV. Geographical Limitation

To guarantee that the environmental benefits resulting from GHG-free renewable electricity generation occur within relative proximity of the refinery gaining credits for this reduction in carbon intensity, Intersect Power proposes that qualifying renewable energy facilities be located within the same county as the refinery.

The above-proposed contract terms for off-site renewable energy projects are quite standard in the renewable energy industry, making them simple and straightforward for refineries to implement. Expanding the Refinery Investment Credit Pilot Program to include limited off-site generation as eligible to produce credits will enable refineries to successfully contract for renewable power to fulfill their obligations under the Low Carbon Fuel Standard, resulting in fewer emissions from refinery operations and lower cost compliance for regulated entities.

Conclusion

Intersect Power appreciates the opportunity to comment on CARB's July 2017 Concept Paper as part of the rulemaking process to update and amend the Low Carbon Fuel Standard out to 2030. We applaud CARB for seeking to strengthen the LCFS compliance targets for regulated entities and for further specifying projects that qualify to generate credits under the Refinery Provisions. As the LCFS is strengthened, it is critical that CARB offer new pathways for regulated entities to earn credits.

¹⁵ SB32, SB350, potentially SB100.

As a widely available and low-cost resource, renewable electricity production can be an excellent source of credits for refineries to utilize to meet their LCFS obligations. However, limiting qualifying generation to on-site renewable energy facilities creates significant development challenges and raises costs for these projects. There is very little available land near California refineries, and that which is available is high cost, steep, and potentially encumbered with existing surface or sub-surface infrastructure. Most California refineries are located in areas with poor solar resource and burdensome permitting requirements, raising costs for developers which are passed through to refineries and their fuel-buyers. Refineries are also more likely to own on-site facilities, as opposed to signing a long-term contract with a 3rd party, and thus may not be incentivized to maintain their commitment to the carbon intensity reduction project for the life of the renewable energy facility.

To address these barriers to successful renewable energy deployment under LCFS, Intersect Power recommends CARB expand LCFS to allow for off-site renewables to be eligible for credit generation when the project is new-build, contracted for 25 or more years, located within the same county as the refinery, and the REC associated with each credit produced is retired. There is precedent for similar changes in CARB's EV charging provisions.

Overall, expanding credit generation for refineries to include off-site renewable energy projects will both support CARB's need to provide for additional sources of credit supply as it tightens CI standards and also allow for refineries to meet these standards in a low-cost manner, passing savings on to California fuel buyers and bringing the state closer to achieving its carbon reduction goals.