

July 5, 2018

Sam Wade  
Chief, Transportation Fuels Branch  
Industrial Strategies Division  
California Air Resources Board  
1001 I Street  
Sacramento CA, 95814

RE: Proposed Amendments to the Low Carbon Fuel Standard

**Dear Mr. Wade,**

Thank you for the opportunity to comment on the Modified Text of the proposed Low Carbon Fuel Standard (LCFS) which was released as part of the ongoing rulemaking. The LCFS is a key element of California's climate and clean energy leadership. The current rulemaking to amend and extend the LCFS is a critical opportunity to put California on a path towards long-term sustainability. The LCFS plays a crucial role as the state works to attain the SB 32 target and set a course for even deeper cuts after 2030. California cannot achieve its climate or air quality goals without significant progress in the transportation sector. It is therefore crucial that the LCFS achieve the fullest extent of its potential to drive down emissions and support advanced clean energy technologies.

The LCFS has a strong track record of success to build upon; it has reduced carbon pollution emissions by more than 33 million tonnes since 2011,<sup>1</sup> supported over 300 California companies employing more than 20,000 workers, and contributed to over \$2 billion of investment in clean fuel production and distribution infrastructure.<sup>2</sup> By displacing highly-polluting petroleum fuels with cleaner alternatives, the LCFS has contributed to California's progress towards healthier air, saving over \$1 billion in health care expenditure and reducing the terrible burden asthma, heart disease and lung cancer inflict on Californians.<sup>3</sup> The LCFS is

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<sup>1</sup> <https://www.arb.ca.gov/fuels/lcfs/lrtqsummaries.htm>

<sup>2</sup> [http://www.calstart.org/Libraries/Policy\\_Documents/California\\_s\\_Clean\\_Transportation\\_Technology\\_Industry\\_-\\_2016.sflb.ashx](http://www.calstart.org/Libraries/Policy_Documents/California_s_Clean_Transportation_Technology_Industry_-_2016.sflb.ashx)

<sup>3</sup> [https://www.edf.org/sites/default/files/content/edf\\_driving\\_california\\_forward.pdf](https://www.edf.org/sites/default/files/content/edf_driving_california_forward.pdf)

supported by a broad and diverse coalition of California business, scientific, health and community stakeholders who recognize the unique value it provides.

In general, NextGen **strongly supports the re-adoption of the Low Carbon Fuel Standard through 2030**. We reiterate our concern that the proposed CI reduction target, 20% by 2030, is excessively conservative and likely to send an insufficient signal to fuel markets to produce the greatest possible benefits for California.<sup>4</sup>

## Comments on LCFS Assignment Priority and Point-of-Sale Rebates

Board Resolution 18-17 instructed Staff to work with stakeholders to develop a method for using LCFS credits from unmetered residential charging to support a state-wide EV rebate program. **NextGen strongly supports the creation of a point-of-sale EV rebate program**. It is our understanding that utilities and EV manufacturers have been conducting negotiations since the April board meeting, hoping to reach a mutually satisfactory solution. While we do not doubt all parties' shared desire to achieve this goal, or their capacity to design or implement a solution, it appears that a number of challenges remain before a mutually satisfactory agreement could be reached.

**Until a comprehensive, state-wide program can be developed, CARB should seek opportunities to take incremental steps toward this goal.** Accordingly we suggest the following changes.

### **Amend § 95483 (c) (1) (A) to read:**

(A) *Base Credits*. The EDU is the credit generator for base credits for EV charging at single-family residences in its service territory. The EDU must meet the requirements set forth in paragraphs 1. through 5. in section 95491 (d) (3) (A)

- (1) The owner or lessee of an EV may assign credits generated by residential charging of their vehicle to a third party, provided that party can provide an accurate record of residential charging on a quarterly basis.

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<sup>4</sup> Please see our April 23rd comment letter and supplementary material for more detail.

**Rationale:**

Allowing vehicle owners to assign residential charging credits to a third party will allow voluntary participation in a number of rebate or incentive programs, including point-of-sale rebates offered by manufacturers or financiers. With the right to assign credits clearly established in the statute, an EV buyer could sign future residential charging credits over to the EV manufacturer in return for a rebate at the time of sale. Manufacturers would, in turn, use the ongoing stream of LCFS credits to finance future rebates. This is, in fact, the basic model proposed by auto manufacturers for a state-wide point of sale rebate. Under this proposed change, auto finance companies or carbon credit aggregators could enter the market with a range of innovative products. Should an owner decline to assign credits, or if no alternatives are available, the credits would revert to the EDU by default.

**Amend § 95483 (c) (1) (B) to read:**

**(B) Incremental Credits.** Any entity, including an EDU, is eligible to generate incremental credits for improvements in carbon intensity of electricity used for EV charging at single-family residences. Multiple claims for incremental credits for metered residential EV charging associated with a single FSE ID, where no clear contractual record can be found, will be resolved pursuant to the following order of preference:

**Rationale:**

The original wording was unclear and could be read to imply that any claim made by a Load-Serving Entity, would automatically be resolved in its favor regardless of clear documentation that incremental credits were assigned elsewhere. This is particularly problematic as it concerns smart charging credits. The decision to modify charging behavior in order to obtain these credits may be facilitated by a third party, by provision of information, a device or software to the vehicle owner. We anticipate that load serving entities will attempt to incentivize smart charging behavior, but they may not be the only entity to do so. Since the behavioral changes required to maximize smart charging are made by vehicle owners and drivers, they should have an opportunity to assign the credits as they see fit. The proposed change recognizes that and ensures that LSEs or EV manufacturers cannot unilaterally override the driver or owner's preferences. This change also supports the suggested amendment to § 95483 (c) (1) (A), above.

*Comments on Possible Statewide Point of Sale Rebates Funded by LCFS Residential Charging Credits*

We support the ongoing efforts by EV manufacturers, utilities and other stakeholders to develop a comprehensive, State-wide point-of-sale EV rebate. While we would prefer that such a rebate be administered by a state agency or independent non-profit organization, we recognize that allowing EV manufacturers to manage the program may be a simpler, but similarly effective solution, provided appropriate safeguards and oversight mechanisms exist. If EV manufacturers are to manage the program, CARB must provide rigorous oversight to ensure that the value of LCFS credits is returned to Californians. The program administrator should be compensated for reasonable management costs arising from the rebate program, but the administration of such a program should not yield profit or speculative opportunity for the administrator. This means CARB must require transparent accounting of revenues and expenditures; automakers that wish to manage their own programs must commit to promptly disbursing revenue from the sale of LCFS credits.

To this end, any organization which seeks to receive LCFS credits for the purpose of providing a point-of-sale rebate must provide a transparent proposal for administering the program for CARB and allow for public review. This must include:

- A clear indication of expected revenue and expenditure, including financing, administrative costs, risk premiums, and any other expenditure that is not returned to the public via EV rebates.
- A verifiable plan of action to increase rebate expenditure in the event that LCFS credit prices will be above plan assumptions, resulting in more revenue than anticipated.
- The capacity to track the number of LCFS credits generated by residential charging of the vehicles for which LCFS credits will be assigned to the manufacturer and excluding charging at public, private or commercial metered charging station. Credits from metered stations shall remain with the station operator, as under the current LCFS protocol.
- Regularly scheduled reviews to demonstrate that the program is actually performing in line with expectations.
- A commitment to allow an independent audit at CARB's discretion.

## Comments on the Proposed Capacity-Based Infrastructure Credit Pathways

LCFS Staff, at the direction of the Board following the April Board Meeting, have developed a set of proposals for generating LCFS credits based on the capacity of ZEV fueling infrastructure, rather than the actual quantity of fuel dispensed, as is the practice at present. At the time these pathways were proposed, there was no evidence indicating that such an abrupt departure from the established, and quite successful, structure of the existing program was warranted. Despite several conversations with stakeholders over the last several months, we have still not seen such evidence and remain unconvinced that the proposed infrastructure pathway serves an important role in the LCFS. Nevertheless, we recognize the desire to support the expansion of ZEV fueling infrastructure in California and are committed to working with Staff and stakeholders to ensure that the proposed infrastructure capacity pathways achieve their goals in an efficient and equitable fashion. As such, we have several comments and suggestions relating to the provisions proposed in the June 20th Modified Text.

### *The Proposed Cap on Credits From ZEV Fueling Infrastructure Pathways is Too Large and Non-Binding*

The modified text proposes that both Hydrogen Refueling Infrastructure (HRI) and DC Fast Charging Infrastructure (FCI) pathways be limited to credits equal to 2.5% of total LCFS credit generation for a given quarter. The proposed amount is too high and should be reduced, in order support actual emissions reductions from the LCFS and to better conform with the Board's intent when it moved to adopt Resolution 18-17.

In addition, **the current mechanism for enforcing the proposed 2.5% cap is, in fact, non-binding.** Under circumstances which could occur under a number of likely market and technological conditions, the current proposal would allow permits significantly in excess of the nominal 2.5% cap for each pathway to be repeatedly issued. This soft cap does not sufficiently assure the environmental integrity of the program.

**We recommend CARB make the following changes:**

#### **Amend § 95486.2 (a) (3) to read:**

Application Approval Process. The HRI application must be approved by the Executive Officer before the station owner may generate hydrogen refueling infrastructure credits. If HRI credits from all approved stations exceed ~~2.5~~ 1 percent of deficits in the prior quarter, the Executive Officer will ~~not approve additional HRI pathways and will not accept additional applications until HRI credits are less than 2.5~~ apportion HRI credits equal to 1% of ~~1 percent of deficits. HRI applications will be evaluated for approval on a first come, first served basis~~

deficits in the prior quarter to all stations with an approved HRI pathway based on the station's proportional contribution to total HRI credit generation that quarter.

**Amend § 95486.2 (b) (3) to read:**

Application Approval Process. The FCI application must be approved by the Executive Officer before the applicant may generate FCI credits. If FCI credits from all approved FSEs exceed ~~2.5~~ 1 percent of deficits in the prior quarter, the Executive Officer will ~~not approve additional FCI pathways and will not accept additional applications until FCI credits are less than 2.5~~ 1 percent of deficits. ~~FCI applications will be evaluated for approval on a first come, first served basis~~ apportion FCI credits equal to 1% of deficits in the prior quarter to to all operational stations with and approved FCI pathway based on the station's proportional contribution to total FCI credit generation that quarter.

***Rationale for reducing credit caps to 1%:***

**The 2.5% Caps Allow More Pollutant Emissions and Reduce Expected Emission Cuts from LCFS Below Scoping Plan Proposals**

Under the proposed 20% LCFS CI target, assuming fuel demand equal to the “High Demand” scenario in the Illustrative Compliance Scenario calculator, the program generates a cumulative 332 million deficits under the LCFS program through 2030. The “Low Demand” scenario generates 287 million deficits. Compliance with the LCFS requires that deficits must be matched with credits, which represent a reduction in emissions. The proposed infrastructure pathways would allow 5% of this deficit generation to be met with infrastructure credits, which do not represent actual reductions in emissions. Our modeling indicates that it is very likely that both HRI and FCI pathways will routinely generate enough credits to exceed the 2.5% ceiling multiple times through 2025.<sup>5</sup>

Applications are accepted through 2025, though hydrogen stations can wait up to two years after the application is submitted to come online without penalty, and can re-submit their application after two years have elapsed, but with reduced duration of infrastructure credit eligibility. This implies that the number of stations eligible to receive credit is likely to continue growing even when applications are not being accepted, as approved, but not yet operational stations enter service. While the uncertainty involved in such modeling is

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<sup>5</sup> Please see attached spreadsheet model and modeling memo for more detail.

admittedly high, the available evidence indicates that aggregate infrastructure capacity credit generation at or near 5% would be completely feasible and perhaps even likely during the 2020-2030 timeframe.

### **A 5% Reduction In LCFS Deficit Generation Could Compromise the LCFS Market and California's Ability to Attain GHG Targets.**

The reduction in deficit generation will exert a significant downward pressure on LCFS credit prices, muting the signal which spurs investment in clean technologies. This exacerbates the downward price pressure resulting from the smoothing of the CI trajectory in the 2018-2022 period. Both the CARB's modeling<sup>6</sup> and recent independent modeling by Ceruology Inc.<sup>7</sup> indicate a robust supply of LCFS credits and a strong credit bank through the mid 2020's. Reducing demand by 5% from a market that would likely have had an approximate balance between supply and demand could dramatically reduce the amount of investment into supply, which will be necessary to meet California's long-term obligations.

More importantly, reducing deficit generation by 5% will likely lead to a reduced LCFS credit price, which will reduce the incentive for further reductions in emissions; conventional market theory would anticipate that reducing credit demand by 5% will reduce long-run supply by about 5% as well. Losing that 5% of supply means losing the GHG emissions reductions reflected by those credits; in effect, the LCFS will yield approximately 5% fewer GHG reductions than it would have otherwise. Even if one accepts the premise that the infrastructure incentivized by HRI and FCI pathways yields deeper long-term emissions cuts, those cuts would likely not materialize until after 2030, due to limits on the rate of expansion by the state-wide ZEV fleet. Depending on modeling assumptions, the cumulative reduction in deficits due to infrastructure credits through 2030 is likely to be 12-16 million metric tonnes. These values could, under a variety of conditions, reduce the LCFS program's expected cumulative reductions below those expected under the 18% target originally proposed by CARB and which was the basis for modeling the LCFS' contribution to attainment of SB 32 targets under the scoping plan. **The proposed infrastructure capacity credits likely leave the LCFS weaker than the original 2017 discussion draft and potentially unable to meet its 2030 cumulative reductions targets under the scoping plan.** Adding these infrastructure credits would allow deficit-generating entities, such as petroleum refiners, to produce and sell more fuel into the California market, which would drive up

<sup>6</sup> As reflected in all 20% target scenarios in the Illustrative Compliance Scenario calculator.

<sup>7</sup> <https://nextgenamerica.org/californias-clean-fuel-future/>

GHG emissions under the cap-and-trade program, increasing cap-and-trade credit prices and making attainment of SB 32 targets significantly more difficult.

**Limiting HRI and FCI credits to 1% of total deficits, as in the proposed amended language above, limits the potential for HRI and FCI credits to disrupt market signals and restores over half of the cumulative emissions cuts which would otherwise be lost to these programs.**

*The Proposed 2.5% Limits Exceed the Board’s Authorization in Resolution 18-17*

At the April 28th Board meeting, several issues relating to the LCFS were discussed, which resulted in Board Resolution 18-17. The specific motion, by Members Berg and Gioia called for Resolution 18-17 to be approved “incorporating all the comments that [the Board] made here”.<sup>8</sup> At the meeting, the most specific discussion about the proposed infrastructure credits was put forward by Dr. Sperling who said “... it won’t be a big part of the total credits. It was estimated at one or two percent.”<sup>9</sup>

The proposal in the Modified Text proposes a program which would allow both HRI and FCI pathways to generate credits equal to 2.5% of total LCFS deficits, for a total of 5% of total deficits. As discussed below, the non-binding nature of this cap allows for significantly more than 2.5% of credits to be issued to either pathway in a given quarter and there are multiple likely deployment scenarios which would result in both HRI and FCI exceeding the 2.5% limit. This far exceeds the “one or two percent” which was the only stated comment relating to the scope of the proposed infrastructure capacity credits at the board meeting.

**Limiting HRI and FCI credits to 1% of total deficits, as in the proposed amended language above, better conforms to the Board’s guidance from the April 28th hearing.**

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<sup>8</sup> <https://www.arb.ca.gov/board/mt/2018/mt042718.pdf> Pg. 266.

<sup>9</sup> <https://www.arb.ca.gov/board/mt/2018/mt042718.pdf> Pg. 240



### *Rationale for Switching from a Soft to a Hard Cap*

A broad consensus emerged at the April meeting that infrastructure capacity credits should be limited in scope because they compete against actual emission reductions and represent a substantial deviation from the LCFS' established mechanisms of action. The guidance given by Dr. Sperling, which was the basis for the Resolution 18-17 indicated that there should be a meaningful limit on total permit generation from these pathways, in order to limit the risk of excessive allocation of permits through this pathway until there had been an opportunity to review the performance of these programs under real-world conditions.

The June 20th Modified Text articulates this limit as a threshold after which no new applications will be accepted. Per conversations with staff, this mechanism was chosen because it was simple to implement and did not require an analytical process to develop and model alternatives. We certainly understand and support the desire to keep the LCFS as simple as possible, however **the proposed mechanism is significantly flawed in that it is not actually a cap on HRI and FCI permits, it merely imposes a temporary halt to the program's growth.** Under several reasonable scenarios, the proposed mechanism would allow infrastructure credits in excess of 2.5% of total LCFS deficits to be issued for one or more quarters each year through 2025 and possibly even a year or two after that. If the HRI and FCI pathways achieve their goals of achieving the targets laid out in Executive Order B-48-18, then it is extremely likely that there will be enough stations generating credit from these pathways to routinely exceed the 2.5% limit. The proposed mechanism, a temporary freeze on accepting applications is nominally a check against this, but in practice it is almost certain to be ineffective.

Applications for HRI pathways can be approved up to two years before the station enters service. If more than two years elapse between approval of an HRI application and the station entering service, can re-apply for HRI credits, the only penalty is that its eligibility for such credits drops from 15 years to 10 years. This means that the amount of HRI credits issued is likely to grow each quarter, *even if the Executive Officer ceases approving applications, as directed by § 95486.2 (a) and (b).* The Executive Officer is not afforded any authority to reject applications or limit HRI credit issuance even if it is obvious, given the existing and imminently operational hydrogen fueling station capacity, that granting such applications will cause future HRI credit generation to exceed 2.5% of LCFS deficits.

For example, consider a hypothetical scenario in which 2nd quarter HRI credit generation is 100 tonnes below the 2.5% threshold. Even if no additional applications were accepted, it is entirely possible that 3rd and 4th quarter HRI credits would exceed the 2.5% limit as previously-approved stations come online. More importantly, the Executive Officer would have *no authority to reject or delay permit applications* received in the 2nd quarter for stations which would be operational in the 3rd or 4th quarter. The proposed cap mechanism would continue to approve applications even when doing so would incontrovertibly cause the program to exceed the cap in future quarters.

FCI pathways can also exceed the soft cap through similar mechanisms. Even though FCI pathways cannot be approved in advance of the station entering service, applications must be approved as long as *current-quarter* FCI credits do not exceed 2.5% of total deficits.

The outcome of this regulatory design is quite predictable. The Executive Officer will not approve applications when the system is currently exceeding the threshold, but the applications themselves will continue to accumulate during that period. As soon as credit generation drops below the 2.5% threshold, even if it is only for one quarter, the entire backlog of unprocessed applications can be approved, once again driving the system above the putative cap.

Under a scenario in which the 2.5% target is exceeded, applications will merely be delayed until the total number of permits issued drops below 2.5% of total deficits. *This is likely to happen at the start of each year, when LCFS targets increase.* At best, the proposed mechanism delays applications for a few quarters until the next target increase, but is completely compatible with an outcome in which the program issues HRI and/or FCI permits in excess of 2.5% of total deficits for one or more quarters every year. It is even compatible with a scenario which issues HRI or FCI credits equal to more than 2.5% of deficits *on a yearly basis.*

There is a simple solution which converts the current soft cap to a hard one, without the complexity of modeling expected future infrastructure credit generation: **Instead of rejecting applications when the cap is reached, the Executive Officer should apportion HRI and/or FCI credits equal to the amount of the cap among all parties which would have received such credits.** This structure guarantees that infrastructure capacity credit issuance does not exceed the specified cap. There are multiple apportionment methodologies which would be appropriate for this task. We suggest apportioning based on the proportion of total HRI credits generated that quarter, which preserves the basic principle of directing credits towards stations with the greatest

amount of unused capacity. Alternatively, the proposed infrastructure credit provisions in the Modified Text generally give priority to stations based on earliest date of approval, using seniority to establish a hierarchy would be an acceptable alternative to proportional distribution, however unless the total credit generation per station were capped, this would likely lead to only a small number of stations receiving HRI or FCI credit. Some stakeholders, including NRDC and UCS, have indicated that they support a declining cap on total infrastructure credit per station. This mechanism, if set at appropriate levels, would allow apportionment based on seniority to function without excluding new stations from the provision.

We recognize that the proportional allocation proposal introduces a measure of uncertainty regarding the amount of credits a project can expect in any given quarter. We recognize this uncertainty can impede efforts to get projects approved, however we would note that projects are still eligible for 15 and 5 years of HRI and FCI credits, respectively, which allows time for a sufficient number of credits to be developed by each project. Given the substantial amounts of revenue available through this HRI and FCI credits, relative to likely capital costs<sup>10</sup>, proportional apportionment of credits would at worst, delay full recoup of infrastructure costs for project developers. Under the Success Case, a 1200 kg hydrogen station could expect to receive over \$3 million in revenue through 2025 alone, while retaining 10 more years of eligibility under the program. Even if rate of credit generation is slowed by proportional allocation, the station would still expect millions in total revenue, enough to offset the majority of station capital costs under most scenarios. Apportioning credits by date of application approval would reduce this uncertainty, but also reduce the number of projects which receive credit. Again, we are open to either method, though would suggest the proportional approach since it supports more stations, and in a more equitable fashion.

### **If the Current Proposal Succeeds in Meeting Infrastructure Targets, It Will Almost Certainly Exceed the 2.5% Threshold By A Significant Amount**

The results of the attached modeling focus on scenarios in which the state achieves, or at least approaches, critical ZEV infrastructure deployment goals: 10,000 DC fast charger installations and 200 hydrogen fueling station installations. For both HRI and FCI, two scenarios for fuel consumption from the supported infrastructure are considered. The capacity-based credit formula yields fewer HRI and FCI credits as fuel consumption through supported infrastructure increases. For both HRI and FCI, *any scenario which meets the*

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<sup>10</sup> See modeling memo and attached worksheet.

*targets for infrastructure deployment set by Executive Order B-48-18 will exceed the proposed 2.5% threshold unless fuel sales exceed even highly optimistic projections.*

The Cerulogy case examined in the attached model represents a scenario in which 5.8 million ZEVs are deployed by 2030 and more than 1 million by 2025. This achieves the ZEV deployment target specified in B-48-18 and yields a significant consumption of electricity for transportation fuel, enough to satisfy over half of the total LCFS credit demand in 2030. This represents a reasonable vision of success in California's transition towards a predominantly zero-emission transportation future. Even under this fairly optimistic projection of electricity consumption, a DC fast charger installation trajectory compatible with attaining the 10,000 fast charger target specified in B-48-18, yields credit generation significantly in excess of the 2.5% threshold. **If the program succeeds, it will almost certainly exceed its intended limits to do so.** The HRI pathway shows similar behavior, even the Success Case, which assumes a very rapid growth in hydrogen consumption, exceeds 2.5% of aggregate credit in most years through 2025. As discussed above, the soft-cap mechanism specified in the Modified Text is incapable of ensuring actual HRI and FCI credit generation stays below the 2.5% threshold, it will likely result in massive numbers of permit approvals during the brief windows when targets increase and temporarily bring the number of deficits above the limit on HRI or FCI credit generation. **CARB should not adopt a policy which will violate its own rules on the road to success.**

### ***The Proposed HRI and FCI Pathways Should Limit Per-Station Credit Generation to a Reasonable Fraction of Capital Cost***

The proposed HRI and FCI pathways are intended to support the deployment of fueling infrastructure in advance of anticipated ZEV demand. This functionally solves the chicken-and-egg problem of infrastructure deployment in an immature market. By subsidizing much of the capital cost, early project developers are not subjected to undue risk that vehicle demand will not materialize quickly enough to support their investments. This basic principle is sound, and there is evidence from early deployment of EV charging infrastructure that can effectively support ZEV deployment.

We appreciate Staff's effort to design a system which rewards aggressive deployment of refueling and fast charging infrastructure, which will help improve the market's adoption of ZEVs. The credit calculations presented in § 95486.2 (a) (5) and (b) (5) present a system which reduces the risk to project developers, however they ultimately allow project developers to receive revenue far in excess of likely capital investment in

the stations, which would ultimately lead to windfall profits by project developers. While we recognize the State of California's role in reducing the risks of ambitious technological development to early movers in an area of critical importance, California policy should not deliver massive profit to developers irrespective of whether their product is actually used.

**We recommend CARB add the following subsection to § 95486.2 (a) and (b), selecting HRI and FCI as appropriate :**

(8) Maximum Credit Generation Per HRI/FCI Application

- (A) Each station approved HRI/FCI pathway shall be assigned a maximum allowable credit value, equal to 75% of capital expenditures minus grant revenue.
  - (a) Capital expenditures shall be taken from Line 1 of subpart (6) (B), above.
  - (b) Grant revenue shall be taken from Line 5 of subpart (6) (B), above, less any grant revenue specifically awarded for non-capital expenses, such as operations and maintenance.
- (B) The Executive Officer shall track the cumulative credit value generated by each station that generates HRI/FCI credits, as the sum of all quarterly credit values in constant-dollar terms using the Consumer Price Index as the discount rate. Quarterly credit value, for the purpose of this determination, shall be calculated by multiplying the number of credits assigned in a given quarter by the average LCFS credit price reported to CARB in that quarter.<sup>11</sup>
- (C) When a station's cumulative credit value exceeds the maximum allowable credit value, it is no longer eligible for HRI/FCI credits. This loss of eligibility for HRI or FCI credits shall not otherwise affect the station's status in the LCFS or any other grant program, regulation or market-based mechanism. In the quarter in which a station loses its eligibility for HRI/FCI credits, the Executive Officer shall issue credits until that station's maximum allowable credit value is reached.
- (D) Stations which are approved for an expanded capacity, as in subpart (7), above, may elect to recalculate their maximum allowable credit value based on the total capital cost and grant value of the total project.

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<sup>11</sup> Note that this valuation does not imply that the credits must actually be sold at that price, nor that their use by the credit generator is restricted in any way. The cumulative credit value is only a metric for tracking total infrastructure capacity credit value as compared to capital expenditure.

These amendments ensure that the proposed HRI and FCI pathways achieve their intent of supporting the deployment of ZEV fueling infrastructure while ensuring that fuel providers do not make windfall profits from a State climate policy instrument. Requiring the developer to retain 25% exposure to the capital involved in a project ensures that an incentive remains to site and size stations appropriately for expected future demand, rather than to maximize near-term payback from HRI and FCI credits.

It should be noted that eligibility for HRI and/or FCI credits in no way affects a station's eligibility for credits through conventional LCFS pathways or participation in other programs. Revenue from LCFS credits, the sale of fuels and all other sources is still due to the station owner.

***Rationale for the suggested Amendment:***

As written, the HRI and FCI pathways could yield far more revenue from the sale of HRI and FCI credits than is necessary to shield project developers from excessive risk from building fueling infrastructure in advance of vehicle deployment.

Consider a hypothetical 1200 kg/day hydrogen fueling station approved for a HRI pathway, which enters service in 2020, which is available for use 98% of the specified hours and dispenses an average of 400 kg of hydrogen per weekday and half as much on weekends<sup>12</sup>. Using the default CI specified in the Modified Text for the dispensed hydrogen, this station would generate over 1400 HRI credits per quarter in 2020.<sup>13</sup> This yields over \$700,000 of yearly revenue at \$125 LCFS credit prices.<sup>14</sup> If this station's dispensed hydrogen grows to 800 kg per weekday by 2025, *the total HRI credit generation will be over \$3 million through 2025*. Note that this growth trajectory for hydrogen consumption is extremely optimistic. 400 kg/day is several times the likely hydrogen demand from most stations as predicted by the CARB Illustrative Compliance Scenario Calculator and significantly in excess of IEPR projections in 2020. Doubling per-station hydrogen consumption in just 5 years would imply a nearly unprecedented rate of growth. More likely hydrogen growth trajectories would yield even more HRI credits and exacerbate the degree by which HRI credits overshoot capital costs.

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<sup>12</sup> To provide a sense of scale for the hypothetical 300 kg/day station: The CARB Illustrative Compliance Scenario anticipates approximately 2.5 million kg of total hydrogen demand in 2020, which equates to approximately 110 kg per station per day if the 2020 fleet is comprised of the approximately 60 currently operational stations plus all stations for which the CEC ARFVTP program has secured funding. If hydrogen demand follows the significantly higher utilization trajectory projected under the 2017 IEPR, distributed across 75 stations, each station would average around 340 kg per day. As each station sells more hydrogen, the number of HRI credits decreases.

<sup>13</sup> This calculation was confirmed by Jim Duffy in an email on June 28th.

<sup>14</sup> See attached modeling memo and worksheet.

2013 NREL hydrogen fueling infrastructure cost projections place the capital cost for a 1200 kg station in a range between \$4 million and \$6.2 million<sup>15</sup>; these values would be expected to decline as more stations are constructed and operators gain more experience with their construction and operation. Most station developers indicate that the overwhelming majority of stations deployed over the next 5 years in California will also be supported by Federal, State or local grants, such as the CEC ARFVTP program, which has invested over \$130 million in hydrogen fueling infrastructure through the 2018-2019 fiscal year, supporting the deployment of 64 fueling stations.<sup>16</sup> These grants typically provide a maximum of half the total capital cost of a project, in order to maximize the number of stations deployed and to ensure that project developers retain some risk, as an incentive to commit to expanding the utilization of each station once deployed. **The proposed HRI credits, in combination with other policy incentives will likely exceed the capital costs of expected hydrogen fueling infrastructure.**

Similarly, the per-station incentive for FCI appears to be significantly in excess of what is needed to stimulate deployment of DC Fast Chargers. Navigant Consulting estimates capital costs for a 150 kW charger to be \$50,000 - \$75,000.<sup>17</sup> Both the CARB case and the Cerulogy case in the attached model predict a 150 kW charger installed in 2020 would receive \$153,000 or \$134,000 respectively, through 2025; potentially more than double the capital cost for installing the infrastructure, especially where the site has been made ready for charger installation. The California Public Utilities Commission recently approved over \$730 million in charging infrastructure investments, much of which will be used to make sites ready for charger installation. This means that there will likely be a great many opportunities for installing chargers at the lower end of the projected cost range. The proposed FCI pathway does not differentiate between high-cost and low cost sites when allocating FCI credits, our proposed amendments do.

The credit generation model presented in the Modified Text places no limits on the total amount of credit which could be generated by any given station and the modeling shown on the attached worksheet, and described in the modeling memo, demonstrate that under feasible conditions, **the revenue provided from HRI and FCI credits could exceed the total capital cost of each station.** While we acknowledge that state policies can, and should, have a role in supporting the deployment of ZEV fueling infrastructure, State policy

<sup>15</sup> Based on values presented in Table ES-1. <https://www.nrel.gov/docs/fy13osti/56412.pdf>

<sup>16</sup> <https://efiling.energy.ca.gov/GetDocument.aspx?tn=223279>, Table ES-1

<sup>17</sup> Costs for DCFC installation vary significantly due to differing needs for site preparation and enhancements to local grid infrastructure.



instruments, especially ones which function through a market-based mechanism, **should not guarantee profit**. As structured in the Modified Text, the HRI and FCI pathways could easily guarantee profits regardless of the station's utilization or its contribution to attaining California's ZEV deployment goals. This profit could easily be well in excess of any reasonable rate of return allowed under any other State grant or incentive program.

**The proposed amendments ensure that the HRI and FCI pathways fulfil their intended function of supporting the deployment of ZEV fueling infrastructure, while eliminating the risk of windfall profits from this provision.** By limiting total state capital incentives to 75% of total capital required, project developers are obligated to carefully consider future demand for a proposed station and build to meet expected need, rather than building to maximize credit under the HRI and FCI pathways. Without some skin in the game, developers could find that capacity up to the program's limit will always pay for itself through HRI and FCI credits, regardless of whether it is ever used. Should the HRI and FCI programs routinely run up against their ceiling values, as the our modeling indicates is likely, a limitation on credits generated per station will also ensure that these provisions support the largest possible number of stations, instead of simply rewarding the first developers to get an approved application.

### *The Proposed HRI and FCI Pathways Create a Strong Incentive to Over-size Fueling Infrastructure Compared to Expected Need*

Since the capacity of proposed fueling infrastructure is directly proportional to HRI and FCI credits generated under most conditions, the program creates an incentive for project developers to install more capacity than expected demand at a given location could reasonably support. To some extent, this is a desired outcome since state ZEV deployment goals are better served by maintaining a reasonable buffer of excess capacity than by insufficiency. There is a limit to this benefit, however, at at some point excess capacity becomes merely excessive.

#### **Total incentive per station 2020-2025 (\$ million)**

The figure to the right illustrates the relationship between station size and expected HRI credit generation. For both the BAU and Success cases, a 1200 kg/day station yields approximately \$2.8 million more in HRI revenue through 2025 than a 600 kg/day

Station Capacity (kg)	BAU	Case	
		Success	
1200	\$	4.8	\$ 3.4
1000	\$	3.9	\$ 2.4
800	\$	2.9	\$ 1.5
600	\$	2.0	\$ 0.5



station. From a producer's point of view, if the incremental cost to increase the size of a proposed station from 600 kg/day to 1200 kg/day is less than \$2.8 million, it becomes an extremely attractive proposition. This may lead to stations significantly over-sized for the site's needs, with the expense of unnecessary capacity borne by California fuel consumers, and communities who breathe dirtier air as fewer clean fuels make it into the market.

**Limiting maximum credit generation per station helps ensure that Californians do not pay for capacity that benefits no one except the station's operator.**

## **Comments on Avoided Methane Credits in Pathway CI Certification**

Several waste-based biofuel production processes utilize material that would otherwise have decomposed and released methane, a potent greenhouse gas, into the environment. CARB has appropriately indicated that the GHG value of this avoided methane can be counted as a reduction in emissions from a given pathway. In some cases, particularly biogas from livestock operations, the avoided methane credit can drive net CI significantly below zero. This is an appropriate and scientifically-justified result, so long as there is reason to believe that the methane would have been emitted had the fuel production process not prevented it. This principle of "additionality" ensures that fuels do not receive financial value - through LCFS credits - for emissions benefits that would have happened with or without the LCFS.

At present, pathways which claim an avoided methane credit are valid for a 10 year reporting period, which can be renewed under some circumstances. If a law, regulation or mandate would require the elimination of the methane emissions which provided opportunity for the avoided methane credit, the project can still claim the avoided methane credit for the duration of the current reporting period, which could be up to 10 years. This violates the principle of additionality which underpins the life cycle analyses upon which the LCFS is based.

**We suggest the following amendments to § 95488.9 (f) (3) (B)**

**(B)** Notwithstanding (A) above, in the event that any law, regulation, or legally binding mandate requiring either greenhouse gas emission reductions from manure methane emissions from livestock and dairy projects or diversion of organic material from landfill disposal, comes into effect in California during a project's crediting period, then the project is only eligible to continue to receive

LCFS credits for those greenhouse gas emission reductions for the lesser of: five years from when the law, regulation or mandate would have required the control of the methane emissions or the remainder of the project's current crediting period. The project may not request any subsequent crediting periods.

#### **Rationale:**

The provision, as currently written allows credits to be issued contrary to principles of additionality for an arbitrarily long period of time. It also provides a disincentive for early control of methane emissions, since delaying the certification of a LCFS pathway extends the time period under which the avoided methane credit can be claimed. Shortening the grace period under which non-additional credits are granted strikes a balance between ensuring that biofuel projects which control methane still receive significant LCFS support and adhering to sound science. A shorter period also restores some of the value project developers would receive for controlling methane emissions before they would otherwise be legally obligated to. By limiting the additionality grace period after control would have otherwise been required, it is more likely that early control of methane will yield more total LCFS credits than would delaying development and pathway certification until the last possible opportunity in order to ensure 10 years of avoided methane credit.

## **Comments on Provisions Relating to Credit Generation at Refineries**

Staff have proposed a number of provisions which allow refineries to reduce on-site emissions resulting from the production of transportation fuels, subject to certain limits and conditions. We agree that such projects deserve recognition and LCFS credits for the real, quantifiable, additional and verifiable emissions reductions they produce. We suggest a few amendments to clarify the language in these provisions, and ensure that the Executive Officer has the information necessary to make informed determinations about the validity of proposed pathways.

#### **We suggest the following amendments to § 95489 (e) (1) (D) (5)**

5. Process improvement projects that deliver a reduction in baseline refinery-wide greenhouse gas emissions as outlined in 95489(e)(1)(G)2. Greenhouse gas emissions reductions due to curtailment, simple maintenance; compliance with other statute or regulation, upgrades to meet industry standards and crude oil switching that results in greenhouse gas reductions in the project system boundary 83 without improvements in the processing units or equipment involved are not eligible. For the purposes

of this section, curtailment is defined as an intentional operational and/or physical change exclusively for the reduction or cessation of total gasoline and gasoline blendstocks and diesel production at the refinery. Curtailment does not include the coincidental rate reduction or shutdown of associated emitting equipment as part of a process improvement project or projects aimed primarily at optimizing refinery efficiency.

**Rationale:**

Life cycle analysis, which is the basis of the LCFS, requires that emissions reductions credited to a fuel pathway be additional to what would have happened absent the fuel pathway in question. That is, actions that would have been taken whether or not the LCFS existed are generally not counted towards emissions reductions. The proposed change clarifies that emissions reduction projects undertaken to comply with other statute or regulation, including local air quality programs, are not additional and therefore not eligible for LCFS credit. Similarly, upgrades to bring a refinery up to normal practices within the refining industry are not additional, since they presumably would have occurred without the LCFS.

**We suggest moving § 95489 (e) (1) (G) (2) into its own sub-part as § 95489 (e) (1) (H) for clarity**

**We suggest adding a definition of “Second or higher order effects” as used in § 95489 (e) (3) (A) (4) in an appropriate section of the rule. This definition should include effects on a system or process caused by changes in heat, energy, materials, byproducts or operational parameters in a different system**

**Rationale:**

The proposed language does not give an explicit definition of second or higher order indirect effects which could lead to confusion over the extent of obligation to provide documentation on the part of the pathway applicant under § 95489 (e). The intent of the language is clear: that if a project subject to a refinery investment credit pathway causes significant changes in refinery emissions through indirect effects, these should be considered in the pathway as well. A more explicit definition will reduce the potential for disagreement over what constitutes a second or higher order indirect effect.

## Comments on the Proposed Carbon Capture and Sequestration Protocol

We recognize the significant effort staff have made in improving the proposed carbon capture and sequestration (CCS) protocol. CARB staff are breaking new regulatory ground and building a foundation which could support early deployment of a technology which may be a crucial tool to mitigate climate change. For the most part, we echo the comments the Clean Air Task Force and the Natural Resources Defense Council are submitting in this comment period, regarding several technical issues which were addressed in the Modified Text.

Specifically, **we agree that the blanket application of a 100 year monitoring requirement is unscientific, insensitive to the conditions at the injection site, and presents a massive deterrent to developers considering first-generation commercial projects.** Since post-injection monitoring will almost certainly not begin on any project until the 2040's or 2050's at the earliest, defining appropriate post-injection monitoring protocols now ignores the decades of likely technological progress. 100 years of post-injection surface monitoring may provide very little reassurance that there has been no atmospheric leakage when compared to subsurface or atmospheric monitoring approaches. The 100 year surface monitoring requirement imposes massive costs to any project developer, which creates an obstacle to financing projects.

We also agree with CATF and NRDC that unexpected subsurface migration of injected carbon dioxide should not invalidate CCS credits, provided that such migration does not lead to atmospheric release. **Monitoring should be designed to be geographically and geologically appropriate to ensure no atmospheric leakage has occurred** and not focused on whether subsurface behavior matches the predictions of current models.

Given the lack of real-world experience with CCS, we recognize that the first generation of commercial scale projects will entail real, though probably not substantial, risk that the stored carbon could escape. We commend Staff for the thought and effort they have made to design a program which can manage this risk. Given the critical need to deploy CCS at commercial scales, it may be prudent for CARB to temporarily adopt a view of risk that diverges from precedent, for the first few projects which utilize this pathway. Because of the immense uncertainty regarding first-generation commercial-scale CCS projects, when risk is accurately priced into development costs, projects may become too expensive for any developer to accept, even after considering the value of LCFS credits. CARB may wish to consider absolving developers of the first small handful of projects of much of the credit reversion risk in order to ensure that those projects move forward and begin to develop

the corpus of real-world experience necessary to support expansion of CCS at a pace capable of meeting global climate targets. For example, CARB may wish to exempt the first few projects from credit reversion risk except in the case of negligence or malfeasance. Any such re-evaluation of risk should be contingent on project developers adhering to the highest possible quality standards during project development and a high level of transparency regarding project design and performance. This exemption from normal risk-management protocols should be strictly limited in both scope and duration. In essence, CARB may wish to consider a more permissive approach to the first handful of pilot projects which can help inform the development of more robust and empirically-supported future CCS policy. While this means California will accept the risk that emissions from a leak at a CCS project could increase future emissions, the potential payback from developing CCS technology to commercial viability is so great that an exception may be warranted in this case.

## **A Strong LCFS Positions California for Success**

CARB has an opportunity to build upon many years of success by extending a strong LCFS program through 2030 and building upon the foundation it has laid. California has an opportunity to continue its leadership in climate, clean energy and transportation policy for years to come.

We again thank CARB and the LCFS Program Staff for the opportunity to comment on this critical rulemaking and for their effort, thoughtfulness, transparency and receptiveness to feedback through this process. Their work has produced a strong and set of proposals for the LCFS program and with a few amendments, as discussed in this letter, we are confident that the LCFS can achieve its full potential to deliver cleaner air, innovative technology and sustainable transportation. We look forward to continued engagement on this matter as it continues through the rulemaking process.

Thank you,

Colin Murphy Ph.D.  
Transportation Policy Manager  
NextGen California