

Low Carbon Fuel Standard

Public Workshop: Potential Future Changes to the LCFS Program

DECEMBER 07, 2021



Good morning and welcome to today's public workshop on the Low Carbon Fuel Standard. My name is Cheryl Laskowski, and I am chief of the Transportation Fuels Branch, which oversees the LCFS program. Before we proceed, I'd like to introduce you to the members of our team that are with us today.

Agenda

- Implementation Updates
- Guiding principles for potential future changes
 - Q&A after each slide
- Stakeholder proposals
- Next Steps

The purpose of today's workshop is to present initial staff concepts for potential future changes to the LCFS. The concepts presented today are preliminary and also build off of the concepts presented in the October 2020 LCFS workshop, with some updates to reflect public feedback received. A few items before we get started: we have a great turnout—over 700 attendees are with us today, showing the level of interest in the program. We have allotted 3.5 hours for today's workshop, so I ask commenters to keep their comments brief and to submit longer comments in writing. We will be pausing frequently to discuss specific comments, and so I also ask that comments be kept on the current topics. If we have time at the end, we can open up for broader comments. I'll now ask Jordan Ramalingam from my team to continue the presentation.

Workshop Logistics

- Workshop materials and public comment docket available on the LCFS Meetings and Workshops page:
<https://ww2.arb.ca.gov/our-work/programs/low-carbon-fuel-standard/lcfs-meetings-and-workshops>
- Q&A during the workshop
 - Use the “Raise Hand” function in the GoToWebinar toolbar, which should be located to the right of your screen as shown
 - When staff call your name, please “Unmute” yourself by clicking the red button, and proceed to introduce yourself
- Written comments may be submitted to the public comment docket
 - Comment docket open Dec 7 to Jan 7



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Thanks Cheryl. As we begin to discuss potential changes to the program, staff will pause after each slide to solicit live public feedback. To speak during these live Q&A periods, use the “Raise Hand” function in the GoToWebinar toolbar, which should be located to the right of your screen as shown.

When staff calls your name and activates your audio controls, “Unmute” yourself by clicking the red microphone button, and proceed to introduce yourself,.

The arrow at the top of the toolbar will expand the Control Panel for additional options.

The link to the online comments docket is available on this slide, as well as the posted presentation.

LCFS Implementation Updates

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Before we discuss potential amendment concepts, we will first provide an update on program implementation.

LCFS Supports GHG reductions

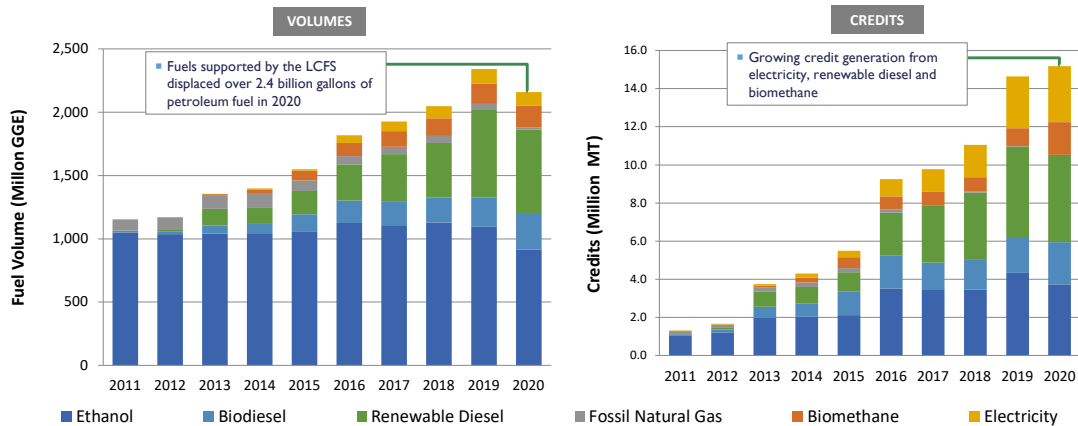
- LCFS program critical part of California's climate change portfolio¹
- Incentivizes transition away from fossil fuels in transportation, with accompanying greenhouse gas emissions reductions
- LCFS has supported and grown the alternative fuels market

1. <https://ww2.arb.ca.gov/news/latest-ghg-inventory-shows-california-remains-below-2020-emissions-target>

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Alternative fuels such as ethanol and renewable diesel displace fossil fuels and reduce the amount of fossil-based CO₂ emissions released into the atmosphere. Growth in California consumption of these fuels is due mostly to implementation of the Low Carbon Fuel Standard. Policy signals from the LCFS send the market signals needed to invest in and commercialize alternatives to the entrenched fossil fuel market. By incentivizing a shift away from gasoline and diesel, the LCFS is driving down greenhouse gas emissions from the transportation sector and can play a critical role in the transition to a carbon neutral economy.

LCFS is Increasing Diversity and Volume of Low-carbon Fuels



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This chart demonstrates how the LCFS is working as intended and achieving the goal of diversifying our transportation fuel options.

The chart on the left shows the volume of alternative fuel reported in the LCFS. We now see significant volumes of renewable diesel, biomethane, and electricity. All-together, alternative fuels displaced over 2.4 billion gallons of petroleum fuel in 2020 in California, despite the overall contraction of fuel consumption in 2020 due to COVID-19.

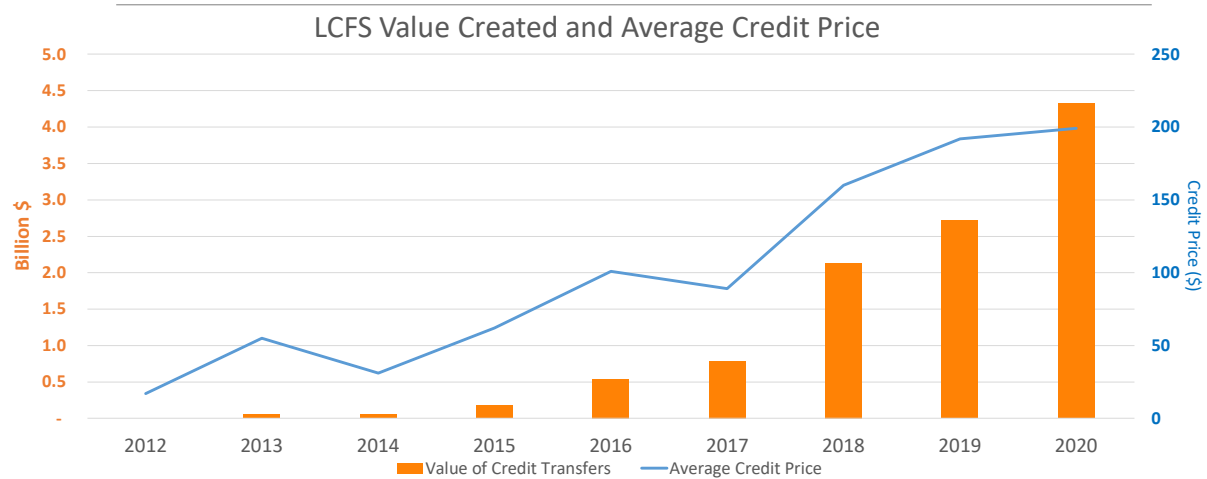
The chart on the right shows the credits generated by those volumes of fuels. Credits are based not only on fuel volume, but how much carbon is emitted by the fuel across its life cycle.

Two trends I'll note here include electric vehicle charging and renewable diesel production. Electric vehicle charging has increased substantially in the last few years, and we expect continued growth as EVs further penetrate the market, consistent with California's aggressive ZEV deployment goals.

Renewable diesel capacity increased over 500% between 2013 and 2019, and many US fuel producers have made announcements for expanded production in

the coming years.

LCFS Promotes Investment in Low Carbon Fuels



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The LCFS is providing significant funding to promote low-carbon fuels. The value of LCFS credit transfers continues to climb year over year. Despite the pandemic, the value of LCFS credit transfers in 2020 was over \$4 billion, up from 3 billion just the year prior.

Importantly, the LCFS supports innovative technologies and unlocks new investment opportunities, which result in value creation at different stages of fuel supply chains and can create more jobs and economic growth. We are encouraged to see growing investment in the low carbon fuels space and expect growth to continue as the program sends a steady long-term price signal and continues to attract more private investment.

Fuel Pathways and Verification Status

- Over 600 fuel pathways certified since 2019
- Added verification in 2020

Fuel	Certified Pathways	
	2019	Nov 2021
Biodiesel		103
Natural Gas (incl. Renewable)		164
Electricity		87
Ethanol		187
Hydrogen		44
Propane		2
Renewable Diesel		31
Alternative Jet Fuel		6
Renewable Naphtha		15
Total		639

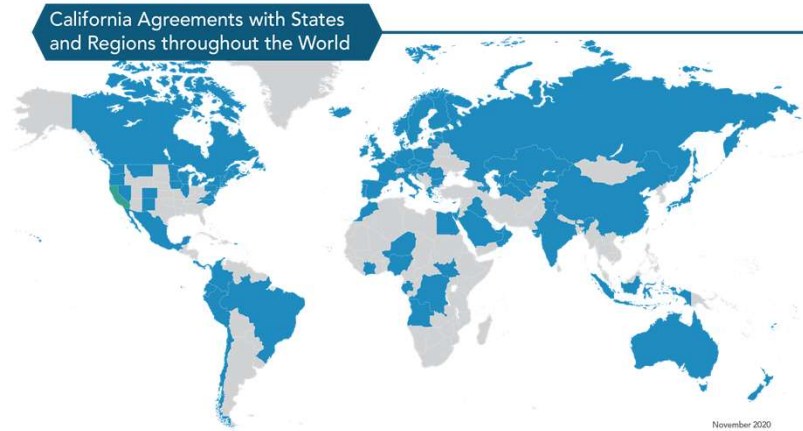
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2020 marked the first year that third-party verification for fuel pathway reports were required. Compliance by the August 31, 2021 deadline exceeded 95%, and we're actively working with the remaining entities.

Since the regulatory update effective January 2019, the team has certified over 600 fuel pathways. As many of you who have applied for pathway certification know, this represents an incredible effort by our pathway certifications team and our applicants to ensure rigorous and efficient implementation of the Program.

Successful Policy Model Being Adopted in Other Jurisdictions

- Additional jurisdictions are adopting or are considering Clean Fuels Standards
- New and emerging programs will send even stronger market signal to innovate and invest in low-carbon fuel production



Like so many of CARB's innovative programs, the success of California's LCFS program is attracting other jurisdictions to adopt their own clean fuels programs. We were excited to see Washington State approve a program this year and work closely with our counterparts along the Pacific Coast. We also collaborate closely with other states and are seeing growing interest from a number of jurisdictions. As additional states create their own programs, we are confident that the market will continue to respond with increased alternative fuel production and further innovation using advanced, sustainable methods.

Introduction

- CARB's Scoping Plan provides actionable blueprint to achieve the state's climate targets
 - The 2022 Scoping Plan update will evaluate how to achieve carbon neutrality by mid-century and the types and role of low carbon fuels needed in the future
- This workshop presents staff initial concepts for future program changes and seeks public input
 - Future workshops may include additional concepts, including from ongoing Scoping Plan development
 - Future rulemaking could potentially take effect in 2024 upon approval of the 2022 Scoping Plan Update in late 2022

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Let's pivot now to discuss the context for this workshop and potential future changes to the LCFS. AB 32 requires that CARB update its climate change scoping plan every five years. Climate change scoping plans are actionable blueprints to achieve the State's climate targets. The 2022 scoping plan update is focused on evaluating how to achieve carbon neutrality by mid-century, taking into account the types and role of low carbon fuels needed in the future. The final scoping will be presented to the Board for consideration in late 2022.

This LCFS workshop will present and solicit feedback on initial staff concepts for future program changes. Our goal today is to signal our openness to adjusting and improving the LCFS program going forward in ways that reflect the Scoping Plan direction as well as the feedback we've received thus far on the program. The concepts we present today are preliminary, and this list is not exhaustive.

As many of you know, CARB's Scoping Plan Update is scheduled for two Board hearings in 2022. Given the ongoing development of the scoping plan, we expect future workshops will include additional concepts informed by the Scoping Plan.

And finally, we know from our previous workshop and conversations over the past year that many of you are interested in *when* the next round of LCFS regulatory

changes could be effective. Because we are looking to align with the direction of the final Scoping Plan and because the APA rulemaking process typically takes 12-24 months; we think 2024 is the soonest any LCFS regulatory changes could take effect.

Broad Principles for Policy Concepts

- Align with long-term statewide climate goals and further incentivize private investment in low carbon fuels
- Accelerate transition to zero emission vehicles in line with Executive Order N-79-20
- Support exportability of the program to other regions
- Harmonize with federal policy signals
- Reflect changes in technologies, data, and stakeholder feedback
- Streamline implementation

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The initial staff concepts for changes to the program can be grouped into several broad principles. These are:

- Align with long-term statewide climate goals and further incentivize private investment in low carbon fuels
- Accelerate transition to zero emission vehicles in line with Executive Order N-79-20
- Support exportability of the program to other regions
- Harmonize with federal policy signals
- Reflect changes in technologies, data, and stakeholder feedback
- Streamline implementation

You will see these guiding principles applied throughout today's presentation.

Incentivize Investment and Align with Long-term Climate Goals

- Send long-term market signal to attract private investment in transportation decarbonization
- Achieve long-term climate goals, such as Executive Orders aimed at deep decarbonization and carbon neutrality by mid-century
- Seeking input:
 - Establish declining CI compliance targets post-2030, and potentially strengthen interim pre-2030 targets
 - Allow for book-and-claim accounting of new-or-expanded low-CI hydrogen injected into hydrogen pipelines
 - Promote electricity storage

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In order to decarbonize the transportation sector, private investment in fuels, vehicles and infrastructure must continue to increase. Attracting investment in the low carbon fuels sector requires a steady, long-term market signal accompanied by regulatory certainty. In addition, existing policies must help facilitate achievement of California's long-term climate goals, in particular those aimed at deep decarbonization and carbon neutrality by mid-century.

Staff seeks input on several potential changes that are in line with this objective. First, staff is considering potentially proposing to establish declining post-2030 CI targets to help provide investment certainty and facilitate further reductions in the CI of transportation fuels. Staff is also considering strengthening pre-2030 CI targets, which would account for the aggressive zero emission vehicle adoption that is expected under Executive Order N-79-20. Accelerating pre-2030 targets would also provide a smoother transition to more aggressive targets post-2030, which may be needed depending on the pathway for carbon neutrality identified in the Scoping Plan.

Second, staff is evaluating options that expand the ability of the LCFS to support the continued diversification and growth of low-CI fuels. For example, one option would be to expand the allowance for book-and-claim accounting to low-CI

hydrogen injected into regional hydrogen pipelines. This idea would be consistent with the development of regional clean hydrogen hubs supported through the federal bipartisan infrastructure bill and, if designed correctly, could also help to grow hydrogen fuel availability. Staff are interested in ideas you may have that support novel hydrogen production, as well as ideas to ensure the LCFS is only incentivizing new or expanded low-CI hydrogen production that can be tracked and appropriately accounted for in the program.

Third, staff is considering proposals to better support installation of electricity storage for excess renewable production. One example would be electricity storage installed alongside renewable electricity generation at California oil fields and refineries. More accurately reflecting the avoided emissions benefits of this storage in the LCFS program could support increased expansion of renewables storage into the future. There may already be existing provisions in the LCFS to guide this idea, for instance, the Smart Charging Carbon Intensity Lookup Table Values that exist in the regulation reflect the hourly impact of dispatched electricity due to the varying portfolio of CA power generators throughout a typical day. We could use these existing values to accurately reflect the GHG benefits of dispatched stored renewable energy. Staff is also considering allowing entities to generate credit for installing electricity storage and shifting the discharge of solar electricity generation from low-carbon intensity hours in the morning and afternoon to high-carbon intensity hours that coincide with peak demand in the evening.

These are just a few examples of ways we could use the LCFS to incentivize additional actions that align with California's long-term climate goals. We expect there will be additional areas of potential policy alignment as the Scoping Plan development continues and we welcome your comments and suggestions here.

I'll now pass the presentation on to my colleague, Jacob Englander. Jacob, go ahead.

Harmonize with Federal Policy

- California joined the Beyond Oil & Gas Alliance at COP 26¹, aimed at ending reliance on fossil fuels
- Federal emphasis on decarbonizing aviation sector²
- Seeking input:
 - Limit and ultimately phase out credit generation for petroleum projects
 - Add intrastate jet fuel as required fuel

1. [Governor Newsom Announces California has Joined New Global Alliance Committed to Ending Reliance on Fossil Fuels | California Governor](#)
2. <https://www.whitehouse.gov/briefing-room/statements-releases/2021/09/09/fact-sheet-biden-administration-advances-the-future-of-sustainable-fuels-in-american-aviation/>

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California's policies do not exist in a vacuum, and we must seek to align with aggressive climate policy signals coming from the federal government and the international community. During the recent UN climate summit, California joined several other countries in the Beyond Oil and Gas Alliance, sending yet another clear message that California is determined to end reliance on fossil fuels. In addition, the Biden administration has made it a point of emphasis to support efforts to decarbonize the aviation sector, announcing goals for dramatically increasing sustainable aviation fuel production capacity and signaling future federal funding for production facilities.

To align with these clear directional signals, staff is evaluating concepts that would limit and ultimately phaseout credit generation for petroleum projects. In previous rulemakings the LCFS placed limits on hydrogen refueling and DC fast charging infrastructure credits. Those limits include:

- Establishing an end date for accepting applications for crediting, and
- Limiting credit generation to the recovery of capital expenses or establishing an overall end date for crediting.

One option would be to establish similar limits on credit generation for petroleum

projects in the LCFS.

On the aviation side, as the Federal government explores options for increasing the availability of sustainable aviation fuels, we may have an opportunity to help spur demand for those fuels here in California and reduce our in-state aviation emissions. Adding fossil jet fuel consumed in intrastate flights as a deficit-generating fuel under the LCFS program could provide a stronger market signal to transition from fossil fuels to sustainable aviation fuel or zero-emission alternatives and would build on the momentum in the market and the forthcoming federal benefits.

Accelerate Transition to ZEVs

- Executive Order N-79-20 establishes framework for transition to ZEVs with sales/fleet targets across vehicle classes
- LCFS program can support achievement of these targets
- Seeking input:
 - Support hydrogen refueling infrastructure for medium-and-heavy-duty vehicles
 - Define new energy economy ratios (EER) for emerging zero emission fuel-vehicle combinations

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Transitioning to ZEVs is critical for achieving California's climate and air quality targets. Executive Order N-79-20 established goals that reflect the urgency with which California needs to accomplish this transition. Existing regulations already support ZEV technology in both the on-and-off-road vehicle sectors, and others are being developed that will further accelerate uptake of ZEVs, such as Advanced Clean Cars II and Advanced Clean Fleets. The LCFS program already plays a key role in this transition and may need to play a larger role to meet these aggressive targets.

The existing hydrogen refueling infrastructure, or HRI provision, supports development of public hydrogen stations in the early years of ZEV deployment. Currently these provisions only apply to stations serving light-duty vehicles, yet we know transitioning the medium and heavy-duty fleets to zero-emission is critical for California to achieve its climate and air quality goals. Given the current success of the light-duty HRI provisions and the growing demand for medium and heavy-duty ZEV fueling infrastructure, staff is evaluating potentially proposing to expand the HRI provisions to include refueling infrastructure for medium and heavy-duty vehicles. Staff seeks input on how such a provision should be structured, particularly given that the current light-duty HRI provisions are limited to public stations and that private fueling infrastructure is much more common for medium

and heavy-duty vehicles.

The Executive Order also establishes goals for transitioning to zero emission off-road equipment, and staff seeks input on developing new categories of energy economy ratios for alternative fuel-vehicle combinations not currently in the program. Staff is interested in data that could support new EERs for battery-electric and hydrogen fuel cell electric locomotives, battery-electric micromobility applications, hydrogen fuel cell electric cargo handling equipment, and off-road battery-electric recreational equipment such as all-terrain vehicles.

Reflect Changes in Technology and Data

- Potential updates to reflect evolutions in technological performance and data availability
- Seeking input:
 - Update emission factors as appropriate
 - New Tier 1 Calculator for hydrogen fuel pathways
 - Update to new version of OPGEE model
 - Update certain existing EERs with more recent data

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The LCFS is a science-based program that is underpinned by the best available science and data. In order to maintain CARB's rigorous standards for data quality, staff is considering a number of updates to program data and modeling tools.

Staff is considering updating emission factors and fuel specifications for existing modeling tools, as appropriate. This would be pursued through a transparent public process and will be informed by publicly available models, reports and inventories and peer-reviewed research articles.

Staff is considering developing a new Tier 1 simplified CI calculator for hydrogen pathways. A Tier 1 calculator would streamline application review by avoiding the need for Tier 2 pathways in most cases, while adding a greater degree of customization than the Lookup Table pathways currently permit. Staff is also considering updating to a new version of the Oil Production Greenhouse Gas Emissions Estimator, or OPGEE model. Earlier this year, CARB staff and Professor Adam Brandt from Stanford University presented draft revisions to OPGEE and solicited stakeholder feedback. The current draft version of OPGEE v3.0 adds several major features, namely, greatly improved stream tracking, gas processing simulation with process simulators, and gas fugitives modeling with improved data sets and statistical modeling. Staff is evaluating stakeholder feedback,

incorporating additional revisions to the model, and will present a final draft version of OPGEE v3.0 together with draft CI values for crudes as part of a future workshop.

And lastly, in an effort to reflect changes in technology and data, staff is considering updating certain existing EERs with more recent data, in particular EERs that have not been updated for some time and for which more data is now available.

Streamline Implementation and Enhance Exportability (1 of 2)

- California's greatest influence is the exportability of its programs for adoption in other jurisdictions
- Several other jurisdictions are adopting or seriously considering LCFS programs of their own
- Seeking input:
 - Develop a single CI benchmark table for gasoline, diesel, and substitutes
 - Implement third-party verification for additional fuel reporting entities
 - Require validation of pre-project baseline data for petroleum projects
 - Remove deemed-complete designation for fuel pathways

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California's cutting-edge policies have always carried outsized influence due to their exportability, and the LCFS is no exception. As mentioned earlier, several other jurisdictions have adopted or are seriously considering adopting LCFS-like standards. Potential future changes to the program should attempt to streamline implementation and enhance exportability to help other jurisdictions adopt their own version of the program.

One potential future change is to develop a single 2010 baseline CI for gasoline and diesel and a single CI benchmark table that accounts for all fuels consumed in transportation during the baseline year of 2010. Fuels consumed in 2010 include CARBOB, ethanol, diesel, natural gas, electricity used in fixed guideway transit, and electricity used in forklifts. Staff is also considering a single Lookup Table CI for CARBOB and diesel rather than separate CI values.

In addition, staff is also considering potentially proposing to require third-party verification for Quarterly Fuel Transaction Reports from the following fuel reporting entities:

- EV Charging transaction types;
- eTRU (electric transport refrigeration units), eCHE (electric cargo holding

- equipment), and eOGV (electric ocean-going vessels) Fueling;
- Forklift Hydrogen and Electricity Fueling;
 - Fixed Guideway Electricity Fueling; and
 - Fuel Cell Vehicle (FCV) Fueling transaction types, not limited to hydrogen from book & claim biomethane.

Staff is also considering a proposal to require third-party validation of pre-project (baseline) data as part of the approval process for petroleum projects. The current regulation does not require third-party validation of this pre-project data during the application phase. Therefore, projects may be approved prior to knowing whether the pre-project (baseline) data and the credit calculation methodologies approved as part of project certification are valid. This change would better align the project-based crediting application process with the fuel pathway application process, where credit calculation methodologies and baseline data are subject to rigorous third-party verification during the fuel pathway application process, prior to annual reporting.

Lastly, staff is considering potentially proposing to remove the deemed-complete designation for fuel pathways, and instead allowing fuel transaction reports to be submitted for the open reporting period upon certification for all types of fuel applications.

Streamline Implementation and Enhance Exportability (2 of 2)

- Seeking input:
 - Allow for preferential allocation of low-CI hydrogen to specific fuel pathways used for reporting
 - Allow hydrogen production facilities not co-located with refinery to generate credit under refinery investment provision

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Continuing on this theme of streamlining implementation and enhancing exportability, staff is also interested to hear how we can further incentivize additional low-CI hydrogen capacity. We need to have adequate hydrogen supply to meet future demand and want to ensure that if we adjust our current approach to further incentivize hydrogen, we do so in a way that sends the right signal to the market to add new, low-CI hydrogen options.

Staff is also considering potentially proposing to allow merchant hydrogen production facilities that are not co-located with a refinery to generate credit for GHG reduction projects under the refinery investment credit provision. This proposal would provide consistent treatment of hydrogen production facilities that supply hydrogen directly to petroleum refineries.

Stakeholder Concepts

- Stakeholders have requested staff reevaluate land use change (LUC) carbon intensity values
- Stakeholders have requested consideration of site-specific agricultural inputs in fuel pathway life cycle analyses

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Stakeholders have also suggested several concepts to staff, two of which are touched upon here.

One such request is to re-evaluate land use change values. To date, staff has not seen a consensus in the literature that warrants directional changes in existing land use change values. Staff also believes that continuing to include strong land use change CIs in the LCFS sends the correct policy signal to avoid and/or transition away from the use of crops to more sustainable feedstock and fuel alternatives that provide much more certain emission reduction benefits. However, staff is open to considering new data and research related to this topic as science evolves in the future.

Another request is to allow for consideration of site-specific agricultural inputs in fuel pathway carbon intensity calculations. Staff is interested in stakeholder input on how to address potential GHG leakage. For example, it is possible that projects which adopt advanced farming practices with lower emission impacts would report site-specific data under the LCFS while projects with emission impacts higher than the average for the specific commodity/crop might choose to report average values. Staff is interested in seeking input on whether default farming values need to be adjusted to mitigate the impact of any imbalances that

may result by the consideration of site-specific agricultural inputs. Staff is also interested in observing how reporting and verification methods improve in the future, as well as the development of methods to ensure 100 year permanence for soil carbon projects.

With that, we will open things up for general comments from the public, which could also include items not covered in today's presentation.

Next Steps

- Submit written comments to online docket, through Jan 7, 2022
 - Link to submit written comments:
https://www.arb.ca.gov/lispub/comm2/bcsubform.php?listname=lcfs-wkshp-dec21-ws%20&comm_period=1
- Further pre-rulemaking workshops in early 2022

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We encourage interested stakeholders to submit written feedback to our online docket. We look forward to reviewing your feedback.

Staff will continue to track the progress of the 2022 Scoping Plan Update to inform additional LCFS amendment concepts. We will also continue to evaluate our existing provisions to ensure alignment with recent and evolving policy direction, including supporting the transition to ZEVs that the Governor called for in his Executive Order. And lastly, we will continue to engage with other jurisdictions as they consider and adopt their own clean fuel standards.

You can expect more LCFS workshops in 2022 to further explore these and other concepts. Thank you.