

Pre-Rulemaking Public Meeting to Discuss 2018 LCFS Amendments

Industrial Strategies Division
Transportation Fuels Branch

August 7th, 2017

Sacramento, CA

California Environmental Protection Agency

 **Air Resources Board**

Meeting Participation

- Posted materials can be found on the LCFS Meetings webpage
 - https://www.arb.ca.gov/fuels/lcfs/lcfs_meetings/lcfs_meetings.htm
- Watch and listen via the Webcast:
 - <https://video.calepa.ca.gov/>
- Ask questions or provide feedback during the working meeting
 - Email SierraRm@calepa.ca.gov
 - Participate via conference call
 - Toll Free: 888-469-3081
 - Toll/Outside the United States: 1-630-395-0486
 - Participant Code: 8435209
- Feedback should be sent to:
 - LCFSworkshop@arb.ca.gov
 - by September 4, 2017



Agenda Outline

- Biodiesel Additive and other Non-Regulatory Program Updates
- Public Process & Rulemaking Timeline
- Rulemaking Scope
 - Target Setting
 - Fuels and Regulated Parties
 - Third-Party Verification
 - LCA Modeling Tools and Pathway Certification
 - Crediting Provisions for Crude Production and Refineries
 - Credit Transactions
- Request for Alternatives



NON-REGULATORY UPDATES



Certification of Biodiesel Additive

- National Biodiesel Board conducted emissions testing of NO_x mitigation additive (VESTA™ 1000) following protocols under Alternative Diesel Fuels (ADF) regulation
- Tests showed that VESTA™ 1000 additized B20 reduces NO_x emissions by 1.9 percent and PM by 18 percent compared to conventional diesel
- VESTA™ 1000 is cheaper, easier to handle, and requires lower amounts of additive than the only other additive currently certified under the ADF regulation (DTBP)
- ARB expects higher amounts of biodiesel overall in CA, with no additional NO_x, due to this certification



New Pathways

- Total new pathways certified in 2017 (through 7/20/2017)

Tier 1	Tier 2	Total
41	21	62

- Including:
 - 21 pathways for Biodiesel
 - 18 Ethanol
 - 9 Renewable Natural Gas
 - 7 Renewable Diesel
 - 4 Hydrogen
 - 2 Fossil LNG/L-CNG
 - 1 Electricity

Livestock Pathways and SB 1383

- The first LCFS pathway for dairy manure biomethane to CNG (including avoided methane per ARB Livestock Protocol) has been approved and is delivering fuel to California.
- ARB efforts to improve predictability of revenue streams for renewable gas:

Establish pilot financial mechanism	Provide guidance on regulatory impact on credit revenues
<p>LCFS staff held first workshop June 26, 2017 outlining possible methods to decrease the exposure of developers and investors to fluctuations of environmental credit prices.</p>	<p>LCFS Guidance document to be issued this year; staff is considering a crediting period aligned with the Livestock Offset Protocol.</p>

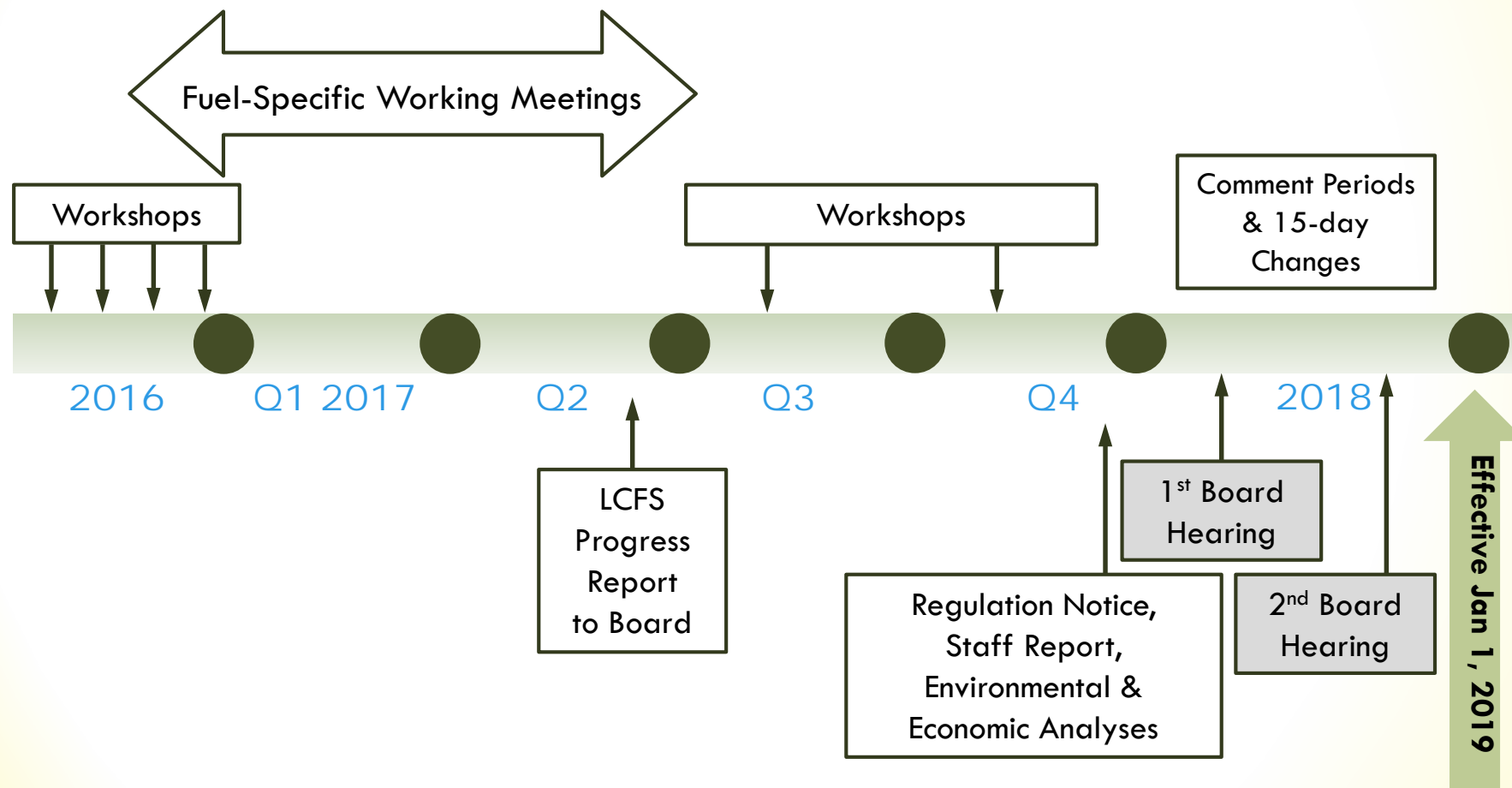
- Dairy/Livestock Working Group and Subgroups have been formed
 - Include a broad range of stakeholders to identify and address technical, market, regulatory, and other barriers to development of methane reduction projects
 - For more information on the Dairy Working Group and meeting schedules see: <https://www.arb.ca.gov/cc/dairy/dairy.htm>



PUBLIC PROCESS & RULEMAKING TIMELINE



Rulemaking Timeline



Public Process – Concept Paper and other Resources

- In conjunction with the fuel-specific working meetings, staff prepared in-depth discussion papers relating the changes envisioned for pathway certification, reporting and verification processes. New materials include:
 - An updated Draft Simplified CI Calculator for starch ethanol
 - A new Draft Simplified CI Calculator for sugarcane ethanol
 - Instructions for the Tier 1 ethanol calculators
- Staff has prepared an **LCFS 2018 Amendments Concept Paper** (posted July 24, 2017) to discuss the potential regulatory amendments that may be proposed.
- New Modeling Tools:
 - Draft Illustrative Compliance Scenario Calculator
 - Draft OPGEE v2.0
 - Draft CA-GREET 3.0

Environmental Analysis

- An Environmental Analysis (EA) will be prepared to analyze potentially significant adverse impacts caused by reasonably foreseeable actions.
- EA will be designed to meet requirements of CARB's certified program under the California Environmental Quality Act (CEQA).
- The CEQA Environmental Checklist (CEQA Guidelines Appendix G) will be used to identify and evaluate potential indirect impacts.
- The EA will be an appendix to the proposed Amendments to the Low Carbon Fuel Standard.



Environmental Analysis to be Prepared

- The EA will include:
 - Description of reasonably foreseeable actions taken in response to amendments
 - Programmatic level analysis of potential adverse impacts caused by reasonably foreseeable actions
 - Beneficial impacts
 - Feasible mitigation measures to reduce/avoid significant impacts
 - Alternatives analysis
- Input invited at this early stage on appropriate scope and content of the EA.
- Draft EA will be released for a 45 day public comment period.

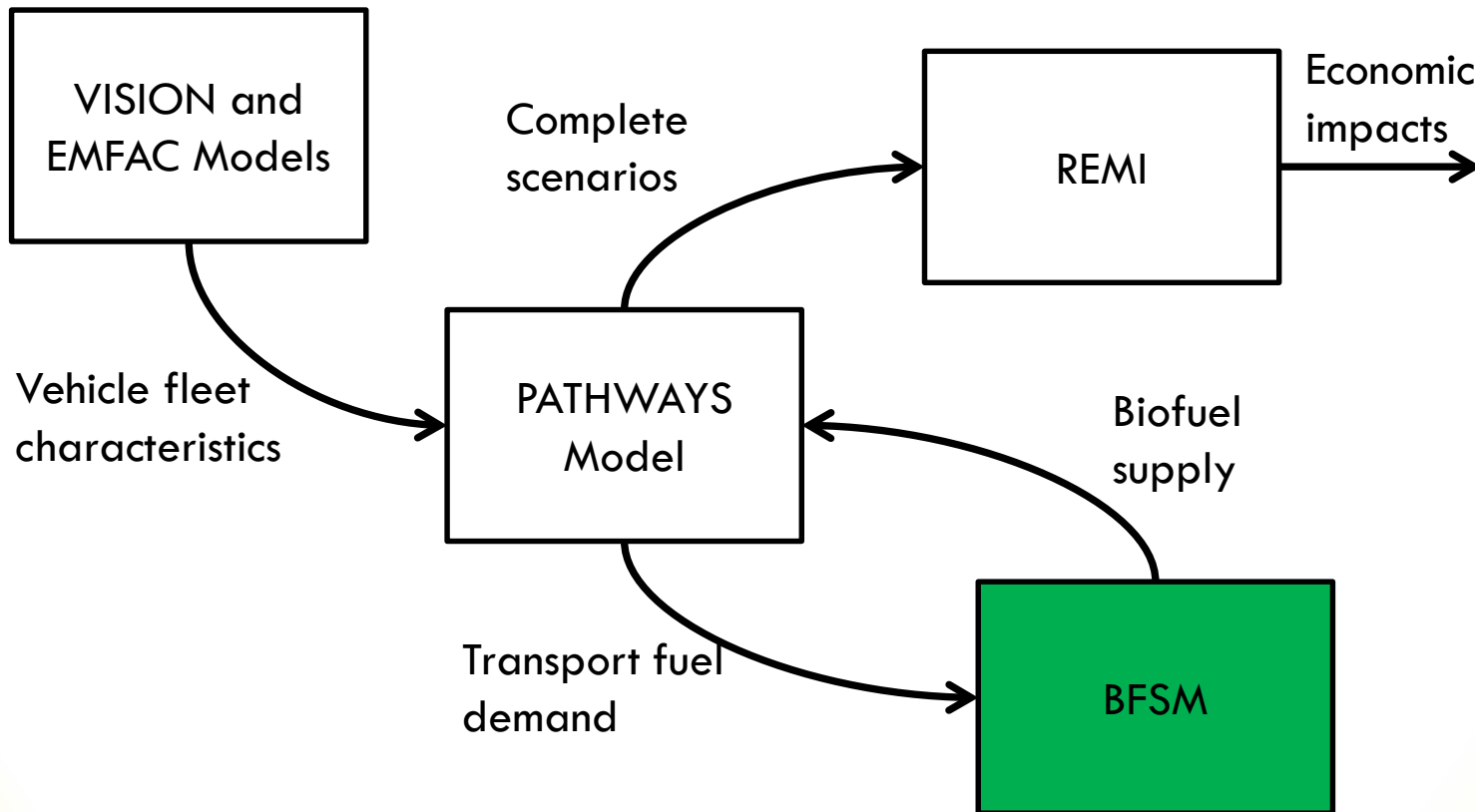
TOPIC #1 TARGET SETTING



Climate Change Legislation and Scoping Plan

- Last year, SB 32 (Pavley) and AB 197 (Garcia) were adopted, codifying an aggressive target to reduce GHG emissions 40% below 1990 emissions by 2030.
- Last month, the Legislature approved and the Governor signed AB 398 and AB 617 to extend Cap-and-Trade and reduce nonvehicular air pollution.
- LCFS staff continues the process of establishing LCFS targets through 2030 in conjunction with the Scoping Plan process.

ARB is Building on the Scoping Plan Process



Data Sources Used to Inform Modeling

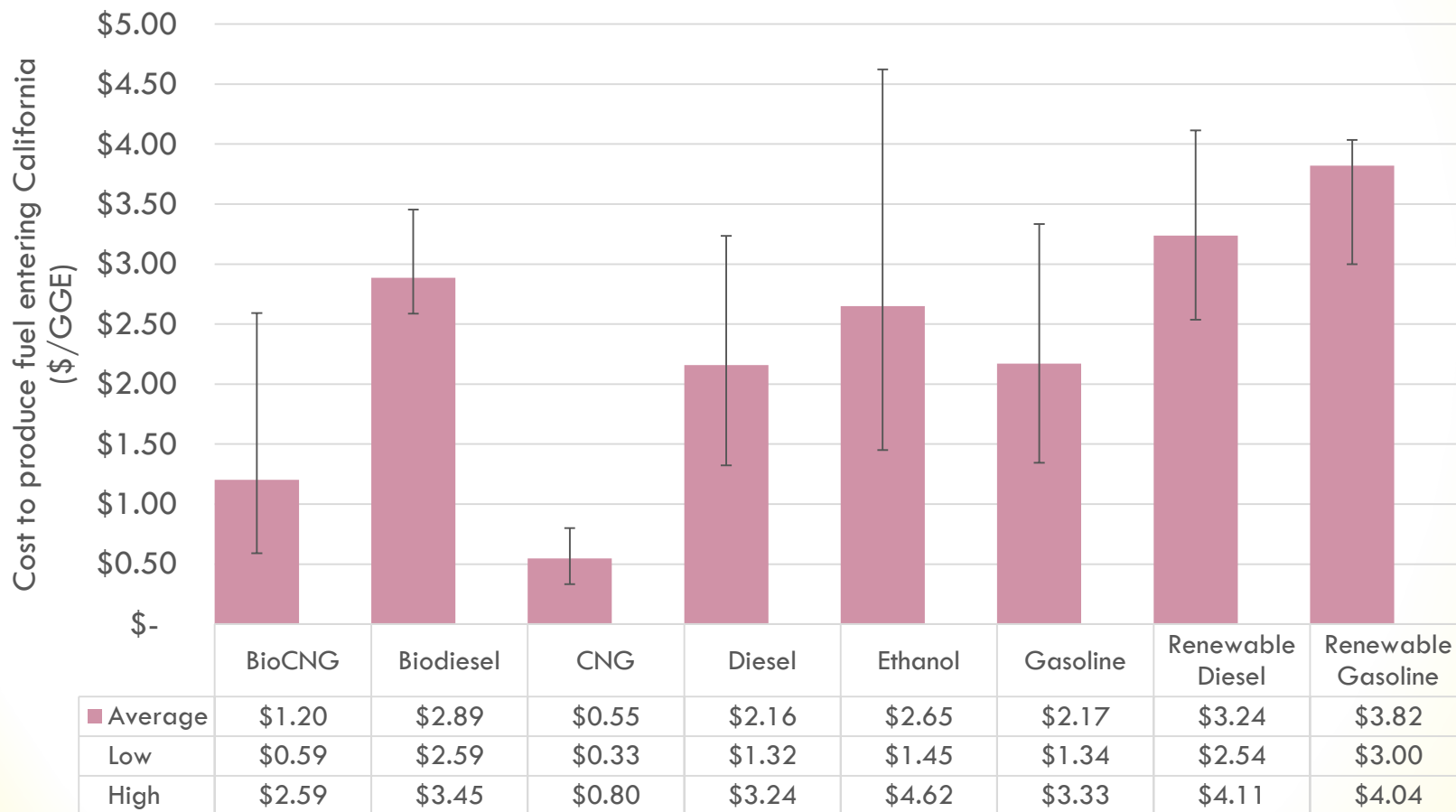
Transport Energy Demand	PATHWAYS model EIA's Annual Energy Outlook CEC's IEPR	Technology Pathways	NREL research ARB Research Contracts Public feedback
Feedstock Costs and Supply	DOE Billion Ton Study EPA Landfill Methane Outreach Program USDA AgStar Public feedback	Technology costs	NREL research ARB Research Contracts Public feedback
Carbon Intensities	Certified Pathway Averages CA-GREET 2.0 GREET 2016	Facility capacity and feasibility/constraints	Lux Research Data Bloomberg New Energy Finance Public feedback

For more details on data sources refer to the BFSM Technical Documentation:

https://www.arb.ca.gov/cc/scopingplan/bfsm_tech_doc.pdf



Summary of Cost Ranges for Leading Fuel Types in California



New Modeling Tools to Assess Fuel Supply Scenarios

Biofuel Supply Module (BFSM)*

- Excel-based model
- Publicly released Sept. 2016
- Builds fuel-technology supply curves
- Selects fuel supply based on lowest-cost fuel pathways

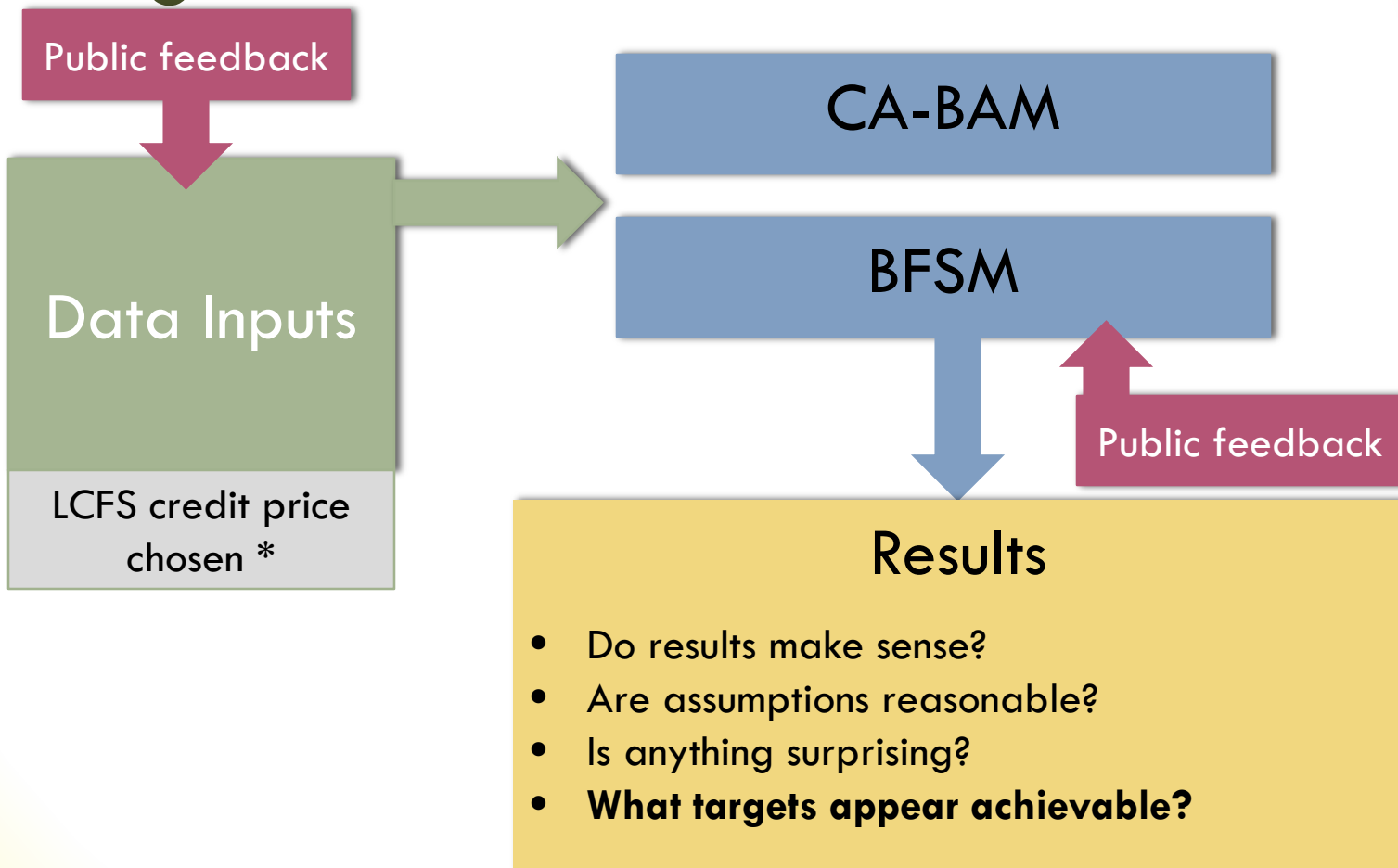
California Biofuel Allocation Model (CA- BAM)

- Python-based model
- Minimum cost optimization for supplying fuel pool
- Includes competition from other regions
- Uncertainty distributions for values

*Model is available for download at: <https://www.arb.ca.gov/cc/scopingplan/meetings/meetings.htm>

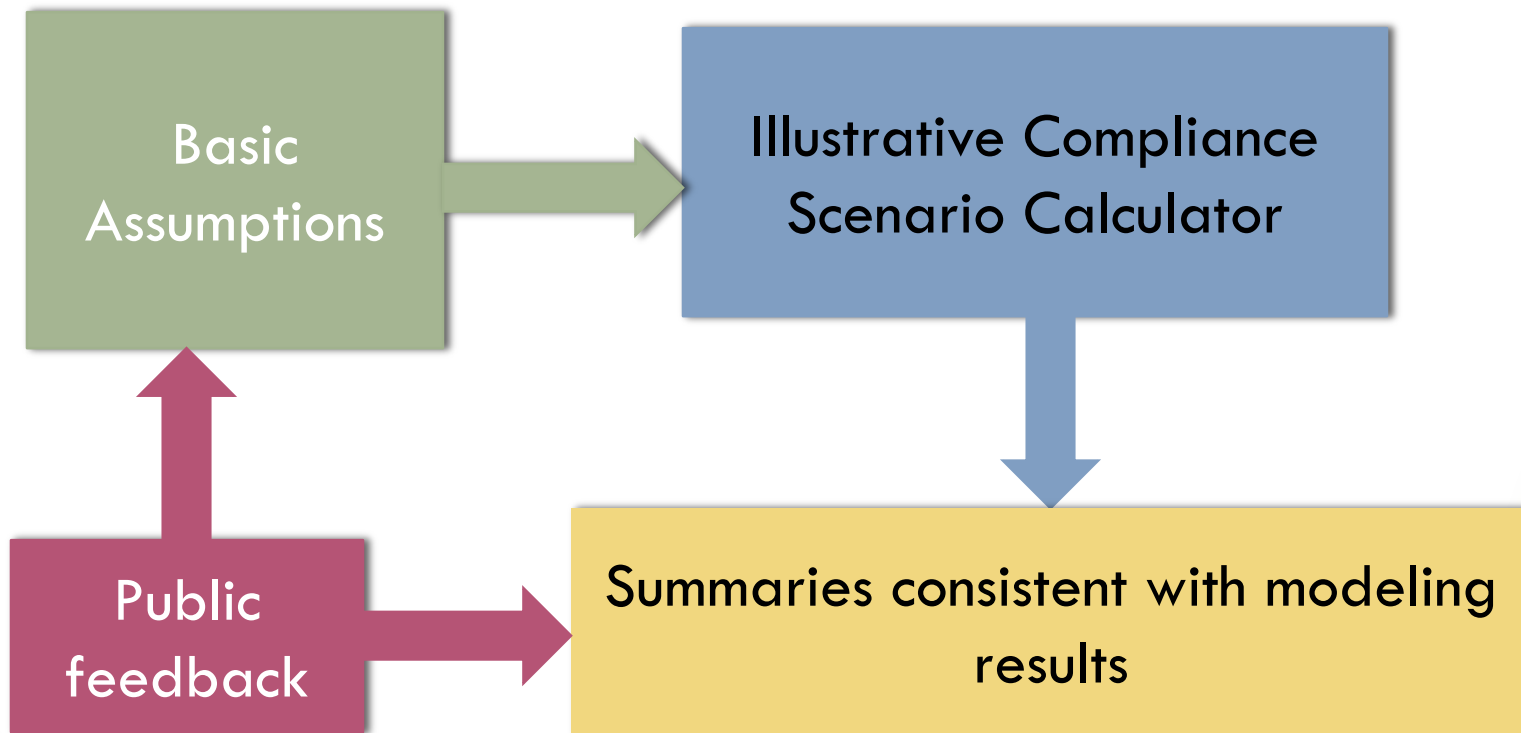


Models Are Used to Better Understand and Establish Feasible Targets



* A range of LCFS credit prices are selected, and supply is calculated

Scenario Calculator Helps Summarize and Convey Modeling Results to Public



Draft scenario calculator posted with materials for today's meeting at:
https://www.arb.ca.gov/fuels/lcfs/lcfs_meetings/lcfs_meetings.htm

Staff is Soliciting Continued Feedback

- Alternative fuel conversion costs and conversion efficiencies
- Feasible rates for capacity expansion by fuel type
- Additional data sources for feedstock costs and supply
- Representative average CI values for alternative fuel types and feasible rates at which these values may decline
 - Adoption of CCS in producing alternative fuels
- Reasonable credit generation for petroleum provisions through 2030:
 - Innovative crude (solar/wind electricity, solar steam, and CCS)
 - Refinery investment (including potential for CCS projects)
 - Renewable hydrogen for refineries



TOPIC #2 FUELS AND REGULATED PARTIES



Allowing Alternative Jet Fuel to Earn Credits

- Allow AJF to generate credits as an opt-in fuel
- Conventional jet fuel would not be subject to LCFS (would not generate deficits)
- Regulated Party: AJF producer or importer
- Option for credit generation would apply to fuel loaded to all planes in California
- CI Calculation and Credit Generation
 - CI for AJF and 2010 baseline CI for conventional jet fuel would be calculated using CA-GREET model
 - Annual compliance standard would be calculated for jet fuels
 - Credits would be generated based on difference between AJF's CI and annual standard for jet fuel



Benefits of Including AJF in LCFS

- Addresses significant and growing source of GHG emissions
 - GHG emissions from aviation contribute to 2-3% of total global emissions and are expected to grow
- May lead to increased investment in facilities that produce AJF and renewable diesel
 - Airline industry is partnering with alternative fuel producers through direct investment and off-take agreements
- May potentially reduce criteria pollutant emissions
 - Significant reductions in PM, SO_x
 - Slight reduction or no change in NO_x

Initial Thoughts on Removing the Exemption for Propane

- Regulated party
 - Renewable propane: producer or importer
 - Fossil propane: station owner
- LCFS participation
 - Renewable propane: opt-in fuel, Tier 2 pathway application.
 - Fossil propane: required, Lookup Table pathway.

LCA Stage	Approximate Fossil Propane CI using CA-GREET 2.0 (gCO ₂ /MJ)	
	Crude refining	NG production
Feedstock	11.98	7.62
Fuel (refining and distribution)	13.2	6.21
Combustion	64.51	64.51
Life cycle CI	89.69	78.34



Potential Pathways for Renewable Propane

- By-product of renewable diesel & jet production
- Catalytic dehydration of glycerol from biodiesel production
- Fluidized catalytic cracker (FCC) off-gases from co-processing renewable oils in refineries
- Blending of bio-DME

Benefits of Including Propane

- May lead to increased use of renewable propane as a transportation fuel in California
 - Use of propane as a transportation fuel in California has almost tripled over the past 15 years
- May provide criteria pollutant benefits as compared to conventional gasoline and diesel vehicles
 - Low-NO_x propane engines
- Renewable propane can be produced from wastes and residues



More Information is Needed to Allow Propane to Participate in the LCFS

- Current source(s) for propane used in CA
- Amounts of propane used in different applications in California (e.g. heavy duty vehicles, light duty vehicles, forklifts, etc.)
- Additional pathways for renewable propane
- Most likely pathways for renewable propane in CA
- Potential amounts of renewable propane by pathway type
- Representative facility data for estimating CI values for renewable propane by pathway type
- Criteria pollutant performance of propane vehicles (stock and retrofit) as compared to similar gasoline and diesel vehicles
- Data necessary to determine appropriate EER values for propane vehicles



Remove Opt-in Status of Fossil CNG

- Current Regulation: North American fossil CNG is an opt-in fuel because it is presumed to meet the CI standard through 2020
- Proposal: Remove the opt-in status of fossil CNG because it may become a deficit-generating fuel
 - Reporting would be required for fossil CNG
 - Fossil CNG would be added to the Lookup Table to facilitate reporting (no pathway application required)
 - Fossil LNG and L-CNG would continue to apply via Tier 1 application
 - Renewable natural gas to bio-CNG pathways would maintain opt-in status



Remove Opt-in Status of Hydrogen

- Current Regulation: Hydrogen is an opt-in fuel because it is presumed to meet the CI standard through 2020
- Proposal: Remove from the list of opt-in fuels in order to monitor statewide compliance with GHG emissions and renewable energy resource requirements of California SB 1505
 - Reporting of all hydrogen dispensed for transportation purposes would be required, but...
 - Until the total amount of hydrogen dispensed in California reaches 420 million MJ per year (3.5 million kg), regulated parties can claim the low volume exemption.
 - For H₂ supplied by an upstream party, we suggest the Fueling Facility Owner would have the first right of refusal to generate credits or deficits, with the ability to contractually pass the opportunity to generate credits/deficits to an upstream producer.
- Next steps:
 - Developing standard methods for determination of renewable hydrogen content, and
 - Determine representative CI input parameters for Lookup Table pathways.

TOPIC # 3 THIRD-PARTY VERIFICATION



Verification Topics Outline

- Need for Third-Party LCFS Verification Program
- Potential Verification Requirements
 - Data Types Subject to Verification
 - Entities Responsible for Verification
- Key Steps for Verification Process
- Material Misstatement, Nonconformances, and Verification Outcomes
- Verification Frequency and Credit Generation
- Additional Considerations
 - Potential Requirements for Verification of Certain Feedstocks
 - Accreditation and Oversight Program
 - Conflict of Interest Assessment, Disclosure, Monitoring

Need for Adding Third-Party Verification Program

- 1) Ensure completeness and accuracy of data used to support LCFS market
- 2) Enhance market confidence
- 3) Ensure conformance with regulation
- 4) Independent verification of GHG-related data is an international standard
- 5) ARB already includes third-party verification for other GHG programs (MRR and Cap-and-Trade Offset Projects)



Data Types Subject to Verification

Initial Validation of Fuel Pathway Applications (CIs)

- An initial third-party review of input values submitted for new fuel pathways to assure that the calculated CI is based on valid, independently-reviewed, site-specific data, streamlining ARB staff vetting of the application input data

Ongoing Verification of Operational CI Calculation and Fuel Quantities

- Ongoing third-party review of fuel quantities and fuel pathway CI calculations would be required to assure the validity of issued credits and deficits
- This would require new annual reporting of ongoing CI performance to ARB

Ongoing Verification of Petroleum Data

- Ongoing third-party review of data reported by project applicants to calculate innovative crude and refinery credits, quantity reports used for gasoline and diesel deficit claims, and crude oil volume reports



Entities Responsible for Verification

- **Fuel pathway applicants** (who become **fuel pathway holders** once their pathway is certified) for all material related to the fuel pathway carbon intensity—including co-applicants
 - Validation/Verification for Tier 1 and Tier 2 fuel pathways and lookup table pathways for hydrogen produced from biomethane
 - ARB staff would conduct audits of all other lookup table pathways not listed above
- **Parties reporting** quarterly fuel quantities in the LRT using the following transactions:
 - Produced, imported, and exported for all liquid fuels;
 - Considering triennial verifications for alternative fuel production facilities that generate $\leq 6,000$ credits in a calendar year
 - Importers always verified
 - Considering no verification for exporters who report fuel quantities resulting in $\leq 6,000$ credits and $\leq 6,000$ deficits in a calendar year
 - Natural gas and propane vehicle fueling; hydrogen vehicle fueling for hydrogen produced from pipeline-injected biomethane

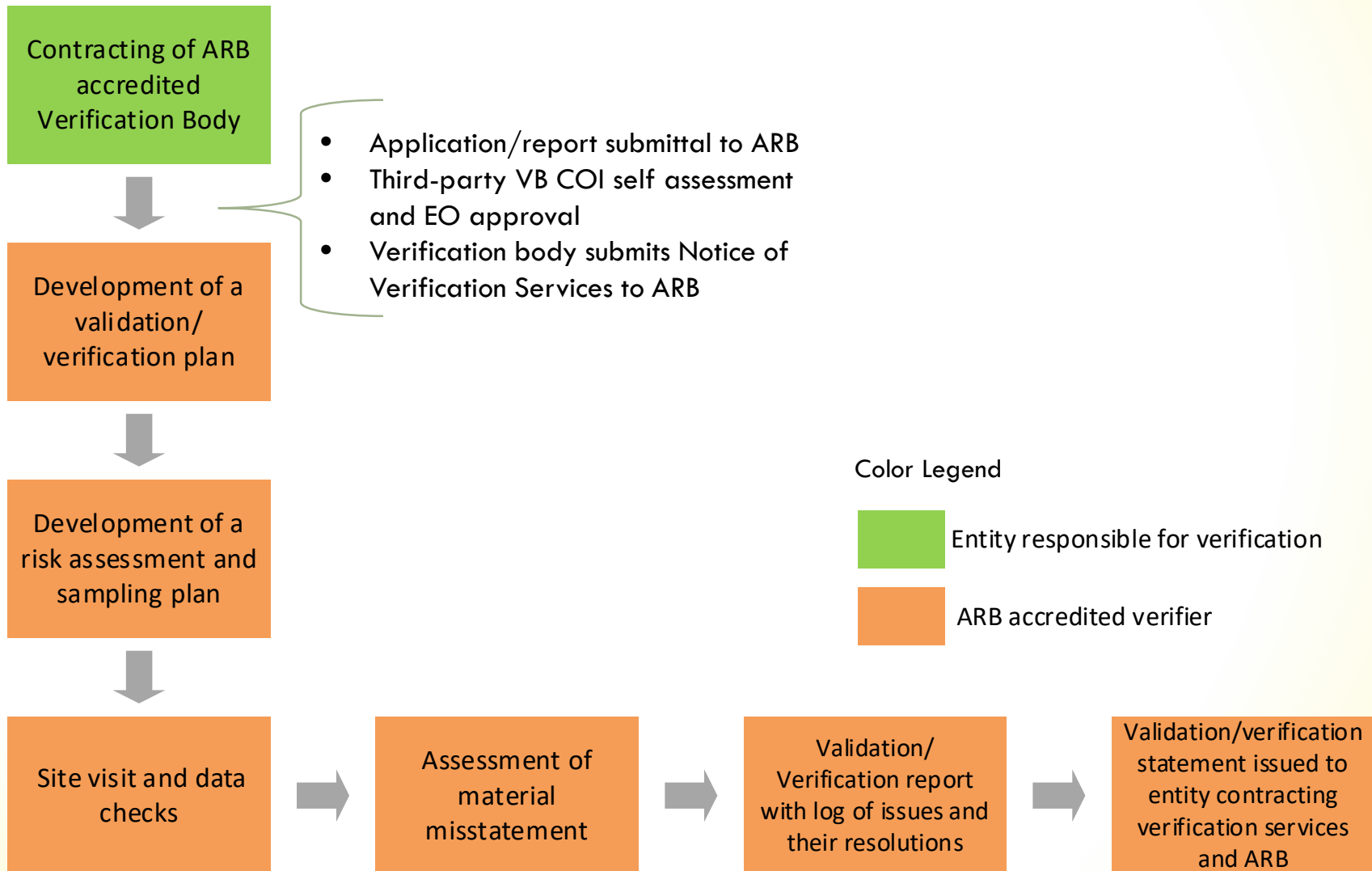


Entities Responsible for Verification (continued)

- **Project operators** for innovative crude projects and refinery credit projects
- The **party supplying data** related to crude volumes
- **Feedstock suppliers** who apply for separate ARB recognition and elect to be responsible for separate validation and verification of their feedstock



Key Steps for Verification Process



Material Misstatement Definition

- General Definition:
 - the sum of errors that may cause a verifier to believe that the key reported value(s) contains errors $> 5\%$
- By data type:
 - CI or any Fuel Quantity by FPC by Quarter contains errors $> 5\%$
 - Refinery, Innovative Crude, or CCS Project Report contains errors resulting in an *overstatement* of the reported total GHG emission reductions or GHG removal enhancements $> 5\%$
 - an *understatement* of total reported GHG emission reductions or GHG removal enhancements in the Project Report *is not* a project material misstatement

A verification body would submit an adverse verification statement (meaning reported data are unacceptable) to ARB and the client if they cannot say with reasonable assurance that the submitted data are free of material misstatement.



Examples of Nonconformances

- Correctable Errors (modeled after MRR)
 - Correctable errors in the submitted Fuel Pathway Application/Report identified by the verifier would be noted in the verifier's issues log (visible to ARB and responsible entity) and fixed by the responsible entity in the final submittal to ARB prior to issuance of a validation/verification statement
 - Failure to fix correctable errors results in **Adverse** statement
 - Correctable errors identified in the submitted Quarterly Fuel Transactions Reports would be noted in an issues log (visible to ARB and responsible entity) and would follow existing reports corrections procedure
- If nonconformance with requirements to capture valid data, then use specified missing data substitution procedures
 - Staff is seeking to develop similar missing data substitution provisions as in MRR § 95129

Correctable errors means errors that affect CI data, fuel quantity data, or project data in the submitted application/report that result from a nonconformance with this regulation. Truncations, rounding, or averaging are not considered errors and therefore do not require correction.



Verification Outcomes – Part I

Verification Statements	Validation of Fuel Pathway Application/ Verification of Operational CI Calculation
Positive	The verification body can say with reasonable assurance that the site-specific CI data is free of material misstatement and that the calculated CI conforms to the regulatory requirements
Qualified Positive	<p>The verification body can say with reasonable assurance that the site-specific CI data is free of material misstatement and contains no correctable errors, but the site-specific CI data may include one or more nonconformances that cannot be corrected and does not result in a material misstatement</p> <ul style="list-style-type: none"> • An example of a nonconformance that could result in a qualified positive validation statement is when the entity has missing or invalid data, but has correctly used an acceptable missing data substitution method
Adverse	The verification body attests that it cannot say with reasonable assurance that the submitted site-specific CI data is free of material misstatement, or attests that the site-specific CI data contains correctable errors, or both

The verifier would evaluate validity of the site-specific operational data submittal, whereas ARB would separately determine whether the calculated CI is in compliance with the certified CI.



Examples of Verification Outcomes: Fuel Pathway (CI)

Certified CI (gCO ₂ e/MJ)	Operational CI Calculation (gCO ₂ e/MJ)	Verified CI (gCO ₂ e/MJ)	Verification Statement	ARB Evaluation of conformance with certified CI value
20	18	18	Positive	<u>ARB determines CI is in compliance with certified CI value.</u> Entity reporting can continue to produce and sell fuel using such FPC. No credit adjustments required.
20	18	18	Q. Positive	<u>ARB determines CI is in compliance with certified CI value.</u> Entity reporting can continue to produce and sell fuel using such FPC. <u>Serves as a record of data collection problems.</u> No credit adjustments required.
20	18	20/16	Adverse	<u>ARB determines CI is likely in compliance with certified CI value.</u> Incorrect report would result in ARB investigation. Entity may be required to submit corrected report and reverify.
20	22	22	Positive	<u>ARB determines CI is NOT in compliance with certified CI value.</u> Fuel cannot continue to be sold using such FPC. New CI application required. Credits may be adjusted to reflect actual CI.

Correctable errors identified during verification may be fixed and a positive verification statement issued. Failure to fix correctable errors identified would result in an adverse statement. Modeled after MRR.



Verification Outcomes – Part II

Verification Statements	Verification of Fuel Quantities by FPC
Positive	The verification body can say with reasonable assurance that reported fuel quantity per FPC per quarter is free of material misstatement and that the data conforms to the regulatory requirements
Qualified Positive	The verification body can say with reasonable assurance that reported fuel quantity per FPC per quarter is free of material misstatement and contains no correctable errors, but the data may include one or more nonconformances that does not result in a material misstatement
Adverse	The verification body attests that it cannot say with reasonable assurance that each reported fuel quantity per FPC per quarter is free of material misstatement, or attests that the data submitted in the reports contains correctable errors, or both

A petition process would be available to responsible entities whose verifiers are intending to submit an adverse validation/verification statement and who cannot reach agreement with their verification body on necessary corrections to address findings of nonconformance.



Verification Frequency and Credit Generation

Alternative Fuels, Gasoline, and Diesel

- Q4 LRT and Annual CI Report deadline: March 31st
- Annual LRT Report deadline: April 30th
- Verification Deadline: August 31st (for both types of verification)
 - Staff proposes reduced verification frequency for alternative-fuel-based crediting for production facilities that generate $\leq 6,000$ credits in a calendar year
- Credit issuance: on a quarterly basis after quarterly report deadline

MCON reports: verification deadline April 30th

Refineries and Innovative Crude Credits

- Project operators would be able to set their own timing for verification (providing that the verification commences after the data quarter subject to verification has closed)
- Credit issuance: after receiving a positive or qualified positive verification statement



Requirements for Verification of Certain Feedstock

- Staff is drafting risk assessment and sampling requirements for verification of certain feedstocks that staff considers higher risk for mischaracterization or quantification errors
- Staff would designate “specified source feedstocks” for which verification requires chain-of-custody evidence from the point of origin to the fuel producer to demonstrate accurate feedstock characterization
- Staff would specify the recordkeeping requirements for upstream feedstock chain of custody documentation and—for less transparent supply chains—additional verification risk assessment and sampling requirements
- Some feedstock suppliers may elect to obtain separate verification services to reduce the potential for multiple verifications when they supply multiple fuel production facilities or if they want to substantiate CI claims that are lower than the standard values used in CA-GREET



Accreditation and Oversight

- Likely to be consistent with MRR (§ 95132), Cap-and-Trade Program, and ISO 14065 and 14064-3
 - Staff would audit subset of responsible entities, including those with positive and qualified positive verification outcomes and audit verification bodies
 - Staff anticipates QAP providers and accounting firms that provide attestation engagement services under U.S. EPA RFS would apply
 - MRR and Offset verification bodies would also be eligible to apply
- Considering establishing selection criteria for International Certification Systems and minimum requirements for cooperating certification bodies to offer LCFS validation/verification services as an add-on to their certification services
- If errors discovered after positive or qualified positive validation/verification, ARB may set aside prior validation/verification statement and require reverification by a different verification body, consistent with MRR



Conflict of Interest Assessment, Disclosure, and Monitoring

- Verifier impartiality is critical to provide confidence in data quality:
 - Considering similar requirements as in MRR §95133 and Cap-and-Trade §95979
- To mitigate potential bias due to longstanding familiarity with client operations:
 - max continuous relationship of six consecutive years of LCFS validation/verification services
 - new six-year period could be restarted after three-year break
- To ensure verifiers and verification bodies do not provide services considered high risk of potential conflict of interest to their LCFS verification clients, a look-back period would be phased in
 - three-year look-back during 2019 and 2020
 - five year look-back after 2020



Conflict of Interest Assessment, Disclosure, and Monitoring (continued)

- Staff is considering a list of prohibited LCFS verification client services, consistent with MRR §95133(b) and Cap-and-Trade §95979(b)
- Examples of potential for high conflict of interest may include:
 - engaging in LCFS market activities,
 - providing internal fuel audit services such as reviewing LCFS data before it is submitted to ARB,
 - submitting LCFS data to ARB,
 - recommending CI-reducing actions, or
 - calculating CIs for validation/verification clients
- Verification bodies would be required to monitor and disclose emerging conflicts for 12 consecutive months after submitting validation or verification statements



TOPIC # 4 LCA MODELING TOOLS AND PATHWAY CERTIFICATION



Updates to CA-GREET

- Draft CA-GREET 3.0 posted for stakeholder review
- CA-GREET 3.0 is based on Argonne National Laboratory's GREET1 2016
- Significant changes by ANL in GREET 2016 include:
 - Updates to methane venting and flaring emissions from natural gas systems
 - Updates to several alternative jet fuel (AJF) pathways, especially renewable jet fuel (RJF) pathways
 - Farming energy and fertilizer use in agricultural production of corn, soybean, willow, miscanthus, and switchgrass
 - Crude oil mix supplied to U.S. refineries (impacts alternative fuel transport CIs)

Updates to CA-GREET (continued)

- California-specific modifications included or envisioned:
 - 2016 electricity grid resource mixes from e-GRID (2014) ^[1]
 - Tailpipe emission factors from ARB EMission FACtors (EMFAC2014) model ^[2]
 - Baseline fuel CIs will be updated using the new OPGEE and CA-GREET models, with the 2010 California crude slate
 - Others as appropriate based on available data
- Please review and provide feedback on the draft model

^[1] <https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid>

^[2] <https://www.arb.ca.gov/msei/categories.htm#emfac2014>

OPGEE revision

Low Carbon Fuel Standard § 95489 (C)(3)

“Revisions to the OPGEE model, addition of crudes to Table 8*, and updates to all carbon intensity values listed in Table 8 will be considered on a three-year cycle through proposed amendments of the Low Carbon Fuel Standard regulation”



*Table 8: Carbon Intensity Lookup Table for Crude Oil Production and Transport

OPGEE v2.0 improvements

- Major updates
 - Oil sands mining and upgrading
 - Drilling and hydraulic fracturing
 - CO₂ enhanced oil recovery (EOR)
- Miscellaneous Updates
 - Country average flaring intensity updated
 - Treatment of offshore production improved
 - Transport by truck added
 - Emission factors and fuel cycle emissions updated to GREET 2016
 - Treatment of coproducts revised
 - New updates based on stakeholder feedback
 - Solar steam generation added
 - Duct firing option for steam generation added

Major Effects on OPGEE CI Values

OPGEE Revision	Directional Effect on CI
Oil sands mining and upgrading	Increase
Treatment of offshore production	Decrease
Drilling and hydraulic fracturing	Slight decrease for non-fracked crudes Slight increase for fracked crudes
Update flaring volumes	Varies by country
Treatment of coproducts	Increase for fields exporting NG
Fuel cycle emissions	Increase for fields importing NG

Crude Oil Carbon Intensity

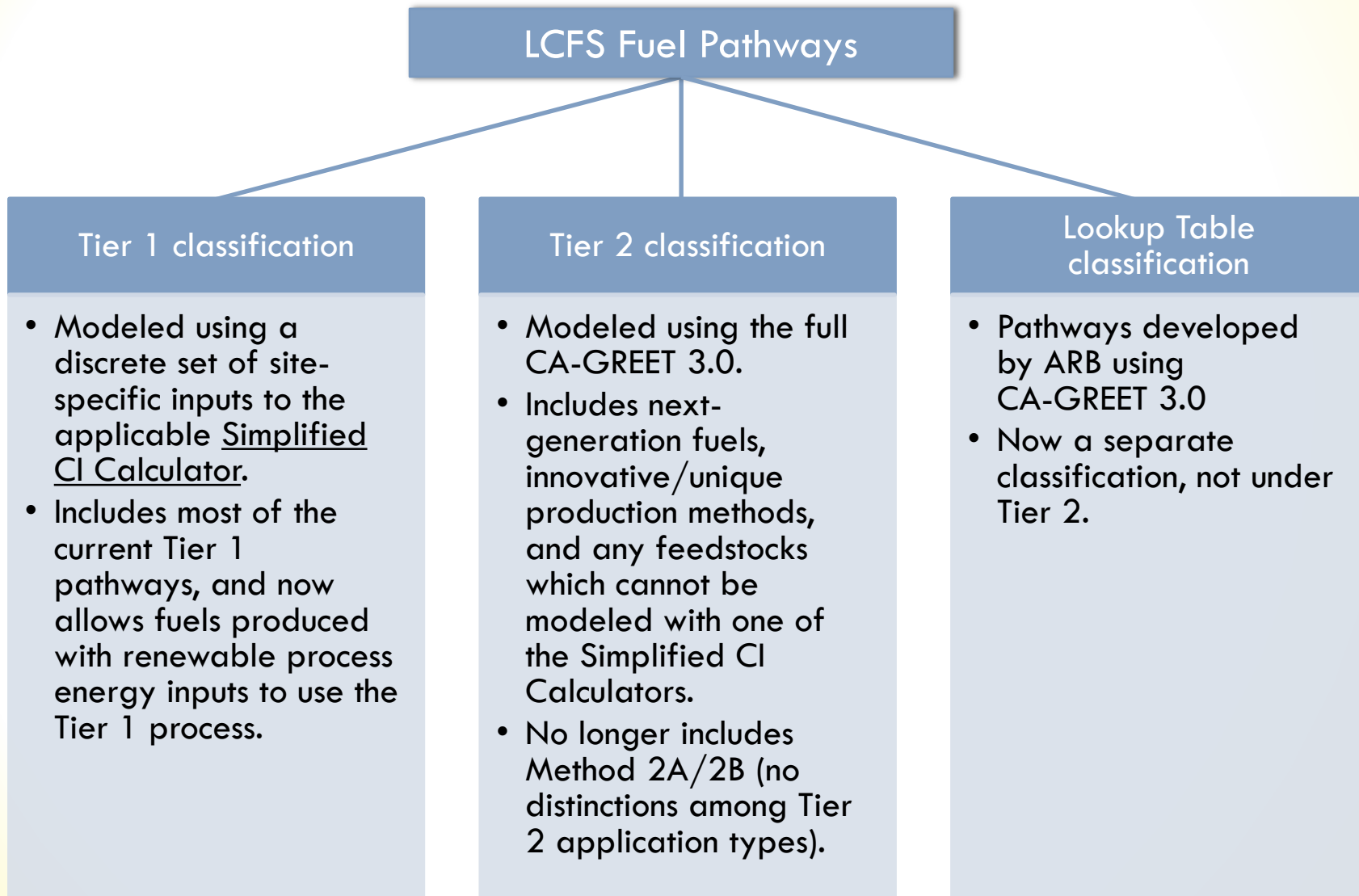
- Draft 2010 California Baseline Crude Average CI

	OPGEE v1.1	OPGEE v2.0
CI (g CO ₂ e/MJ)	11.98	12.31

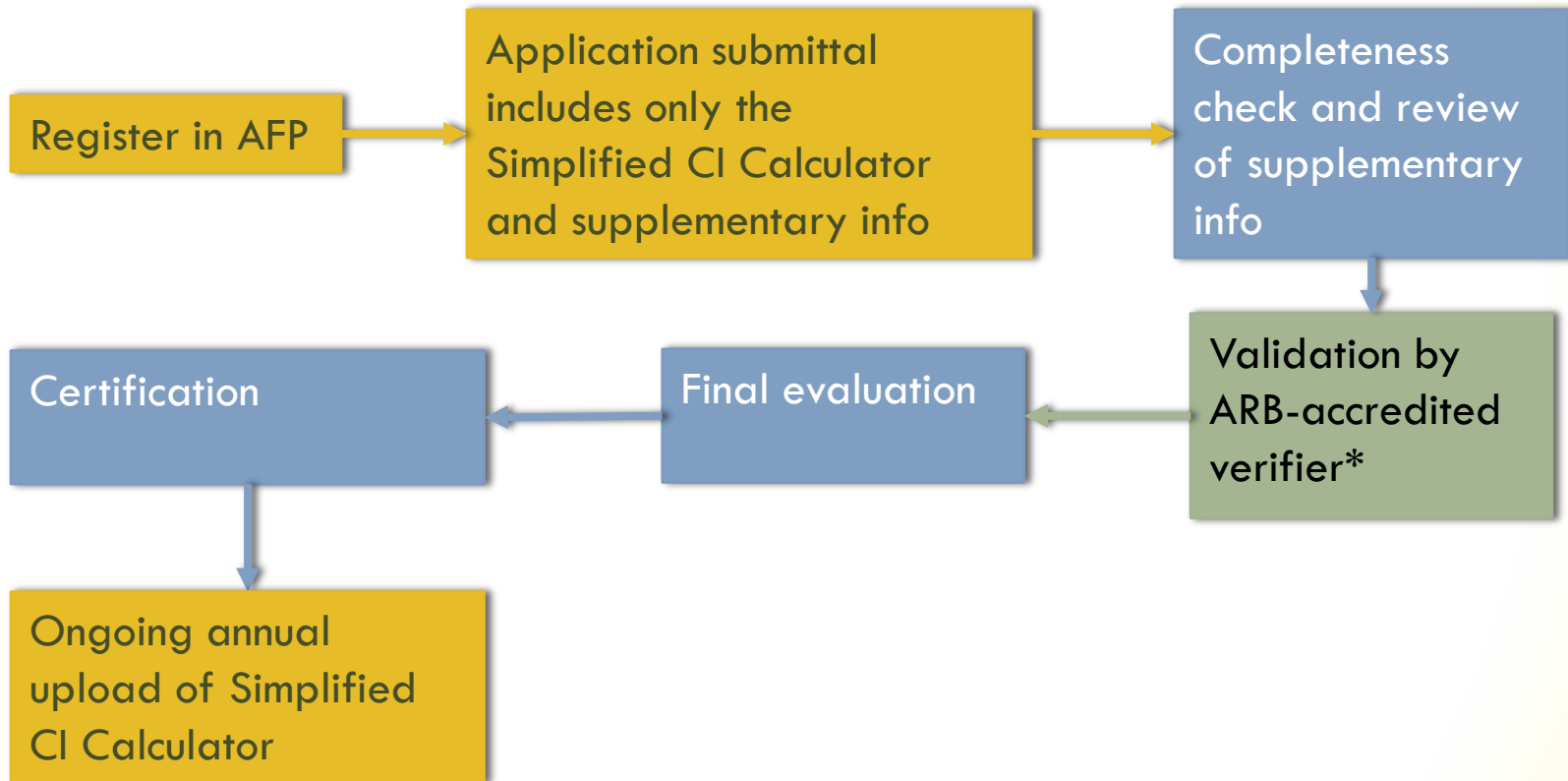
- Crude Lookup Table* CI Values
 - Update oil field operational data to year 2015
 - New oil fields to be added
 - Draft CI values will be posted for discussion at a later workshop

* Table 8 in the current Regulation

Fuel Pathway Classifications



Tier 1 Pathway Certification Process



* Applicants would need to generate and maintain a monitoring plan, which would be submitted to the verifier prior to the start of validation services

Tier 1 Application Requirements

- Fuel-specific Simplified CI Calculators will replace the current CA-GREET-T1 calculator and the operational data summary template, expediting the application and evaluation process.
 - Applicants will no longer submit invoices and receipts to the Alternative Fuels Portal (AFP). These will be submitted to verifiers for validation and ongoing verification, and to ARB upon request.
- Supplemental Information is limited to supporting evidence for select parameters, including:
 - Alternative forms of process energy.
 - Downstream energy consumption for any additional processing of fuel, by-products and co-products after leaving production facility site.
 - User-defined emission factors for regions not currently included in the Simplified CI Calculators (electricity mix, upstream crude and natural gas parameters).



New Draft Simplified CI Calculators for Tier 1 Ethanol Pathways

- Revised draft Simplified CI Calculator for starch ethanol now includes corn fiber ethanol produced via the Edeniq process
 - Would allow producers of Corn and Corn fiber ethanol to apply using the Tier 1 framework for both fuels
- New draft Simplified CI Calculator for sugarcane-derived ethanol now available
 - Combines sugarcane juice and molasses pathways into one FPC per facility, due to minimal CI difference between the feedstocks
- Please review the draft calculators and provide feedback

Discussion Paper and new draft Simplified CI Calculators available for download at:

https://www.arb.ca.gov/fuels/lcfs/lcfs_meetings/lcfs_meetings.htm



Lookup Table Pathways

Fuel	Pathway Description
CARBOB	CARBOB - based on the average crude oil supplied to California refineries and average California refinery efficiencies
Diesel	ULSD - based on the average crude oil supplied to California refineries and average California refinery efficiencies
Compressed Natural Gas	Fossil Natural Gas – Pipeline Average North American Natural Gas to CNG
Propane	Fossil LPG from crude oil refining and natural gas processing used as a transport fuel
Electricity	California average grid electricity supplied to electric vehicles
	Electricity that is generated from 100 percent solar or wind supplied to electric vehicles
Hydrogen	Hydrogen from central reforming of fossil-based NG (with gaseous transport)
	Hydrogen from central reforming of fossil-based NG (with liquefaction, transport, and re-gasification steps).
	Hydrogen from central reforming of biomethane derived from landfill gas (with gaseous transport)
	Hydrogen from central reforming of biomethane derived from landfill gas (with liquefaction, transport, and re-gasification steps)
	Hydrogen from electrolysis using California average grid electricity
	Hydrogen from electrolysis using solar- or wind-generated electricity

- Removal of existing biomethane pathways from anaerobic digestion of food waste and wastewater treatment plant sludge.
- Addition of fossil CNG, fossil propane, renewable electricity, and hydrogen via electrolysis.



Lookup Table Pathway Certification Process

- Most Lookup Table pathway applicants will be able to register directly in the LCFS Reporting Tool (LRT) and begin reporting fuel quantities without submitting data in the Alternative Fuels Portal (AFP). This includes:
 - CARBOB & Diesel
 - Fossil CNG & Fossil Propane
 - Grid Electricity
 - Hydrogen from Steam Methane Reformation (SMR) of Natural Gas
- Applicants for Renewable Electricity and Renewable Hydrogen Lookup Table pathways would first need to register in the Alternative Fuels Portal (AFP) and submit supporting data/documentation to justify renewable inputs.
 - Submittal would consist of invoices or metering records to substantiate the type, source, and quantity of the renewable energy used to generate the fuel



Lookup Table Pathway for Grid Electricity for EV Charging

- Staff is considering using a new source of resource mix data for the Lookup Table Pathway for California grid average electricity used to calculate credits for electric vehicle charging.
 - Reviewing the CEC's Quarterly Fuel and Energy Report as one potential data source.
- Would enable an annual update to reflect the rapidly evolving portfolio of electricity generating resources in California.

QFER Total electricity system power data:

http://www.energy.ca.gov/almanac/electricity_data/total_system_power.html



TOPIC # 5 CREDITING PROVISIONS FOR CRUDE PRODUCTION AND REFINERIES



Innovative Crude Provision

- Addition of detailed reporting requirements for solar/wind electricity and solar steam projects
- Revision to credit calculation for solar steam
 - Include additional bins for steam quality
 - Updated avoided emissions values using OPGEEv2.0
- Considering allowing third-party co-applicants (e.g. solar steam or solar electricity providers) to opt-in and receive credit upon written agreement with crude producer



Additional Bins for Steam Quality in the Solar Steam Credit Framework

Steam quality	Avoided emissions (gCO₂e/bbl solar steam)
95% and above	32,069
85% to <95%	30,191
75% to <85%	28,312
65% to <75%	26,433
55% to <65%	24,554

Renewable Hydrogen Refinery Credit Pilot Program

- Simplify credit calculations for steam methane reforming (SMR) by directly comparing the carbon intensity of fossil natural gas with that of renewable natural gas
- Clarify that all possible renewable hydrogen pathways are eligible, including renewable electrolysis
- Clarify that program is applicable to renewable hydrogen produced on-site at a refinery and hydrogen purchased and used in a refinery



Other Refinery Provisions

- Eliminate low complexity/low-energy-use refinery specific incremental deficit calculations provision
 - Provision expired on January 31, 2016 and no applications received
- Refinery Investment Credit Pilot Program (RICPP)
 - Recognize GHG reductions from carbon capture and sequestration
 - Considering stakeholder meetings and potentially workgroups to improve this provision
 - Refinery involvement needed for progress on this provision
 - Requesting stakeholder feedback on improvements to make the credit calculation more clear and workable



Carbon Capture and Sequestration (CCS)

- CCS can reduce fuel production emissions from:
 - Biofuels, refineries, and crude oil
- “CCS protocol” in development
 - Draft August-September, workshop to follow
- CCS protocol to be considered as part of LCFS Board Hearing
- Seeking feedback on:
 - Criteria pollutant emissions impacts from CCS
 - Number and type of potential CCS projects through 2030
 - Impacts of including provision for direct air capture

TOPIC #6 CREDIT TRANSACTIONS



LCFS Credit Transactions

- For better recordkeeping, staff is considering adding options for reporting of different types of credit transaction agreements.
- This will allow for reporting of credit transaction agreements involving:
 - Future credit deliveries
 - Multiple credit transfers
 - Explanation of zero price credit transfers
- This will result in better quality of LCFS credit activity information published by ARB.

Exchange Based Trading

- Staff is exploring potential participation of entities providing exchange clearing services in the LCFS program.
- Would allow for exchange based trading of LCFS credits.

Staff requests stakeholder feedback on the potential participation of trading exchanges in the LCFS program and the role they might play in facilitation of LCFS credit transactions.

Would the proposed verification program make exchange trading of LCFS credits more feasible?



REQUEST FOR ALTERNATIVES



Request for Alternatives

- Pursuant to SB 617^[1] and the California Environmental Quality Act (CEQA)^[2], ARB welcomes public input on alternatives to the regulation amendments discussed in this workshop and the Concept Paper.
- In particular, ARB encourages public input on alternative LCFS approaches that:
 - may yield the same or greater benefits than those associated with the proposed regulation, or
 - may achieve the goals at lower cost.

[1] Under SB 617 http://www.dof.ca.gov/research/economic_research_unit/SB617_regulation/view.php
See also the Department of Finance's implementing regulations Cal. Code Regs., tit. 1, §2000-2004

[2] CEQA and ARB's Certified Regulatory Program (Cal. Code Regs., tit. 14, §15251(d); Cal. Code Regs., tit. 17, §§ 60000–60008)



Request for Alternatives

- Please ensure that your submission discusses the alternative's ability to fulfill the purposes of the draft regulatory proposal as ARB has presented it.
 - To submit an economic alternative for ARB to consider for analysis in its SRIA
 - Please submit the quantities of low-CI fuels used each year to comply with the alternative, as well as the associated cost/benefit information and their sources, to enable comparison of economic impacts. Please also submit a clear description of the basis for any cost calculations.
 - To submit an environmental alternative for ARB to consider for analysis under CEQA
 - Please state the potentially significant adverse environmental impact(s) your alternative is seeking to address, and discuss how your proposed alternative would avoid or substantially lessen that impact while meeting most of the draft staff proposal's basic purposes.

Submit an Alternative

- ARB will consider all alternatives provided in deciding which alternatives will be carried forward for more detailed analysis as part of the rulemaking process.
- The deadline for submission of alternatives relating to economic impacts is *Monday, August 21, 2017*.
- Alternatives may be submitted via email to LCFSworkshop@arb.ca.gov



THANK YOU!

Feedback should be sent to
LCFSworkshop@arb.ca.gov
by September 4, 2017

Posted information from today's working meeting can be found at
https://www.arb.ca.gov/fuels/lcfs/lcfs_meetings/lcfs_meetings.htm

