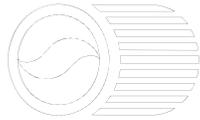


California Environmental Protection Agency



Air Resources Board

***Low Carbon Fuel Standard
Re-adoption:
Fuel Pathways and Producer
Facility Registration***

April 4, 2014

Fuel Pathways & Registration Agenda

- Background
- Program goals
- Tier 1 bin concept
- Alternatives to the tier 1 bin concept
- Tier 2 concept
- CA-GREET 2.0
- Next Steps

Background

- Two-tiered pathway and registration concept presented in the March 11th workshop
- This was a high-level, conceptual presentation designed to solicit feedback
- Much feedback received—both supportive and unsupportive of the concept
- Workshop for today will flesh the concept out further and seek additional feedback

Program Goals

- Reduce the number of producer-specific pathways
- Expedite the process of applying for conventionally produced first generation fuels
 - Starch- and sugar-based ethanol, bio- and renewable diesel, etc.
- Allow staff more time to focus on next-generation fuels
 - Next-generation fuels would come in under the tier 2 process

Program Goals

- The two-tiered approach staff proposed on March 11th is one approach to achieving the above goals
- Before deciding on a preferred approach, staff would like to understand the range of alternatives
- In and subsequent to this workshop, please share with us any alternative approaches you feel have promise

Tier 1 Bin Concept

- Providers of conventionally produced first-generation fuels would apply through the tier 1 process
 - Application process would be a simplified Method 2 application (discussed later in this presentation)
 - The CI from that process would place the applicant into a CI bin
 - All members of a tier 1 bin would have a CI equal to the midpoint of that bin
 - To avoid confusion, each fuel would have its own series of bins
 - This same application process would be used by certified producers seeking to move to a bin with a lower CI

Tier 1 Bin Concept

- Two major design considerations:
 - Bin width
 - CI calculation methodology
- Bin width considerations
 - Producers have argued for very narrow bins to preserve a return on incremental improvements
 - Bins that are too narrow would not reduce staff resource commitment:
 - As bins narrow, the more they begin to resemble producer-specific pathways.
 - Applications to move to a lower bin would become more frequent (lower bin within reach of everyone)

Tier 1 Bin Concept

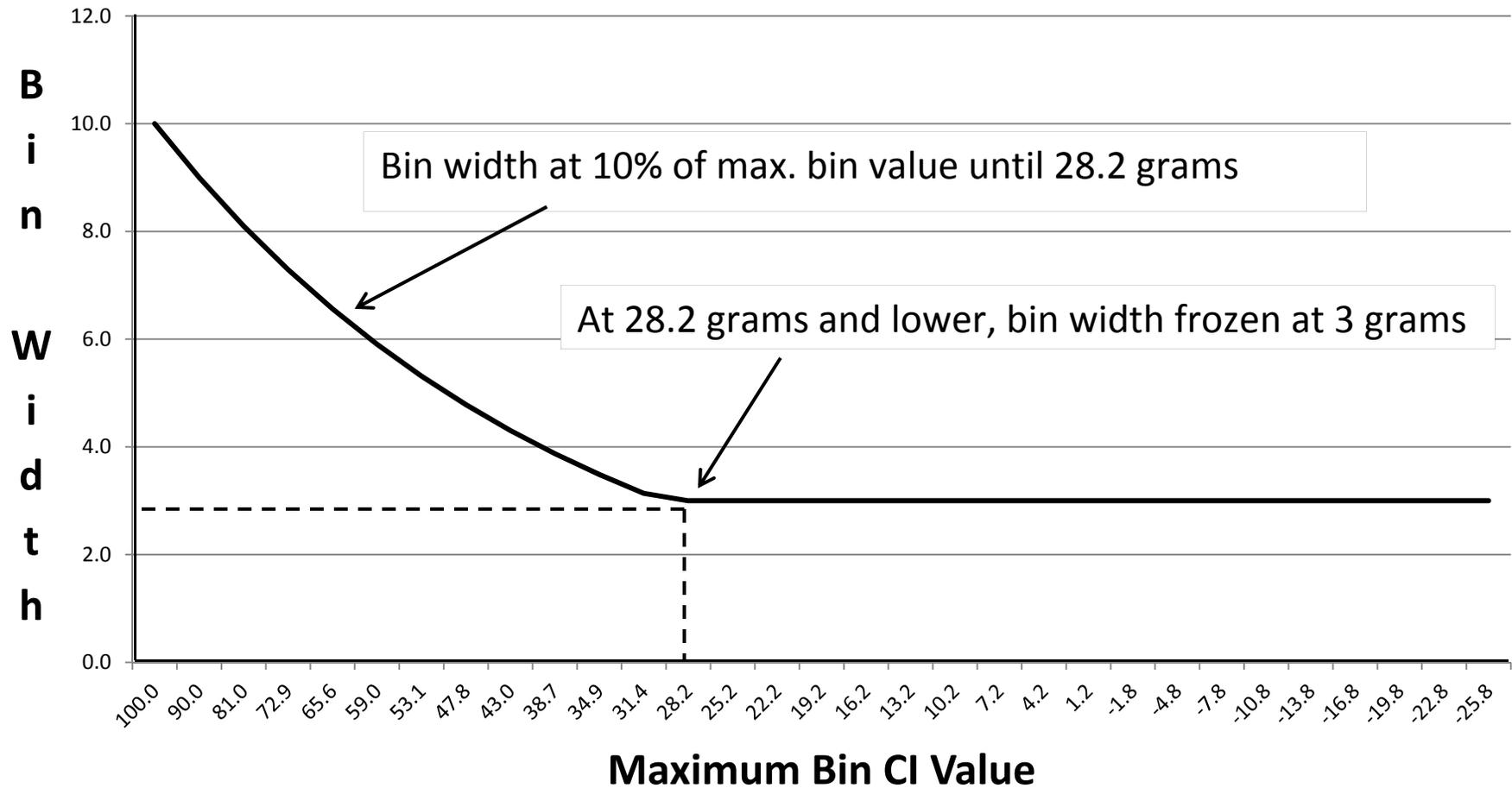
- One solution to the bin-width question: Design bins around a proportional substantiality requirement
 - Current substantiality requirement is fixed at 5 grams CO₂e/MJ for all fuels
 - This could be converted to a 10% requirement
 - Highest bin would run from 100 to 90 grams
 - Each subsequent bin would be narrower than the one above it (10% of the bin's upper-bound CI)
 - Preserves incentive for incremental improvement: as CI drops, lower CI bins are increasingly accessible

Tier 1 Bin Concept

- Problem develops at lowest CI range:
 - Bin width decreases asymptotically as CI approaches zero
 - Bin widths become minute, and CI ranges never go negative
- Solution: freeze bin widths at a reasonable value—
e.g. 3 grams
 - If bin widths are 10% of the upper bound of each bin and the bin series start at 100 grams, bin width hits ~ 3 grams at the bin that starts at 28.2 grams
 - This is illustrated on the next slide

Tier 1 Bin Concept

Bin Width Versus Bin Maximum Value
(All Values in gCO₂e/MJ)



Tier 1 Bin Concept

- If this system is to truly expedite application processing, it must
 - Provide for quick, definitive CI calculation
 - Stipulate that CIs calculated by approved the process are binding
- How these objectives would be met
 - CIs would be based on only the most relevant production data
 - Exceptions to the base CI calculation would be few, carefully defined, and subject to full verification
- Some elaboration in the next slide

Tier 1 Bin Concept

- “CIs would be based on only the most relevant production data”
 - Energy consumption
 - Fuel yields
 - Transport distances (feedstock and fuel)
 - Co-product types and yields
- “Exceptions to the base CI calculation would be few, carefully defined, and subject to full verification.” A few examples:
 - Adjustments to the cane mechanical harvest percentage
 - Dryness-based corn ethanol CIs
 - Rendering energy

Alternatives to the Tier 1 Bin Concept

- We are soliciting alternatives from interested parties
- To be helpful, these must meet the goals articulated above:
 - Reduce the number of producer-specific pathways
 - Expedite the process of applying for conventionally produced first generation fuels
 - Allow staff more time to focus on next-generation fuels
- To date, we are aware of two potentially viable alternatives

Alternatives to the Tier 1 Bin Concept

- Alternative 1: Staff develops and publishes full range of Method 1 pathways for all tier 1 fuels
 - Meets all goals except providing staff with more time to devote to tier 2 pathways
- Alternative 2: Staff uses the same simplified, binding CI calculation procedure described above, but the result does not place applicant in a bin
 - In combination with a proportional substantiality requirement, this could function much like the bin system (minus the bins).

Tier 2 Concept

- Two categories of fuels would fall into tier 2:
 - Next-generation fuels
 - Cellulosic alcohols
 - Waste-based fuels (alcohols, drop-ins)
 - Biomethane
 - Hydrogen
 - First-generation fuels produced using innovative methods
 - Carbon capture and sequestration
 - Renewable sources of process energy
 - Reduced emissions from feedstock production
 - Unforeseen innovations

Tier 2 Concept

- Tier 2 fuels would be subject to a more exacting version of the current Method 2 process
- CIs calculated using the same CA-GREET-based process as is currently used
- “More exacting” process needed because of new, unfamiliar pathway elements
 - New feedstocks and feedstock processing methods
 - New chemicals (e.g., enzymes) and organisms
 - New co-products and co-product handling (e.g., “lignin” from cellulosic production processes)

Tier 2 Concept

- Life cycle inventory data on these new pathway elements is probably in short supply
- The need to verify the data on which CIs are based becomes greater
- Verification may sometimes be through ongoing monitoring, akin to our current “prospective pathway” process

Tier 2 Concept

- Ongoing monitoring could be performed in connection with the monitoring, auditing, and certification processes staff is developing:
 - Third-party audits, possibly in connection with the sustainability certification process staff is developing
 - Ongoing production process monitoring similar to USEPA's quality assurance program (QAP)

CA-GREET 2.0

- Staff has evaluated the current GREET spreadsheet model from Argonne National Laboratory
- Staff is comparing CA-GREET 1.8b to Argonne GREET1 2013 and updating parameters. The result will be CA-GREET 2.0
- Staff is seeking input from internal and external stakeholders regarding the parameters that may be used in CA-GREET 2.0

CA-GREET 2.0

- GREET1 2013 has many new pathways and some pathways from CA-GREET 1.8b, but with more inputs and factors for consideration
- Staff is updating the electricity mix for U. S. pathways based on the most recent (2010) version of U.S. EPA's eGRID Subregion Resource Mix

CA-GREET 2.0

- Parameters to Revise
 - Staff are updating crude parameters using OPGEE v.1b
 - Staff are confirming natural gas pathway parameters to the extent possible
 - Tailpipe emissions based upon the 2011 EMFAC Model
 - Dairy digester flaring credit will be eliminated
 - CA-GREET 2.0 won't contain all future LCFS pathways.
 - Applicants must complete a full WTW life cycle analysis for these pathways using methods consistent with CA-GREET 2.0

CA-GREET 2.0

- Staff is soliciting relevant information from stakeholders:
 - Rendering energy for UCO and Tallow
 - Transportation modes and distances for UCO and Tallow
 - Shale gas extraction energy efficiency
 - More information will be sought in the future

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[**http://www.arb.ca.gov/fuels/lcfs/lcfs.htm**](http://www.arb.ca.gov/fuels/lcfs/lcfs.htm)

Thank You