Low Carbon Fuel Standard: lifecycle assessment modeling

Public Working Meeting for Stakeholder Groups
April 4, 2017

Participating Remotely

- Posted materials can be found on the LCFS Meetings webpage
  https://www.arb.ca.gov/fuels/lcfs/lcfs_meetings/lcfs_meetings.htm
- To ask questions or provide feedback during the working meeting
  - Email sierrarm@calepa.ca.gov
  - Participate via conference call
    - 888-566-6573 (domestic)
    - 1-312-470-7419 (international)
    - Participant code: 7817399
Outline

• Introduction
• Updates on LCFS Program Activities
• Potential Updates to CA-GREET
• Process for Updating OPGEE and the Crude Lookup Table
• Presentation by Stanford on Revisions to OPGEE
• Next Steps
Public Process (subject to change)

- Quarterly Workshops
- Workshops will focus on major program-related topics including:
  - Presentation of model updates
  - Findings from fuel-specific working meetings
  - Verification-related proposals
  - Consideration of post-2020 targets
- Public materials will include: preliminary draft regulatory text for discussion and informal feedback, findings of new/updated models.
- Next workshop tentatively scheduled for July 14
Working Meeting Update

- Focus on verification requirements & related improvements/streamlining to pathway application, evaluation, and reporting
- Several fuel-specific working meetings were held in December 2016, and Q1 of 2017:
  - Natural Gas and Biomethane
  - Electricity and Hydrogen
  - Potential Verifiers and Verification Bodies
  - Refinery Co-Processing
  - Ethanol
  - Biomass-based Diesel
  - Alternative Jet Fuel

Working Meeting Schedule

- Upcoming working meetings tentatively planned for the following dates:

<table>
<thead>
<tr>
<th>Topic/Fuel Type</th>
<th>Proposed Date</th>
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<tbody>
<tr>
<td>Natural Gas and Biomethane (follow-up meeting)</td>
<td>April 17</td>
</tr>
<tr>
<td>Biomass-based Diesel (follow-up meeting)</td>
<td>May 15</td>
</tr>
<tr>
<td>Refinery Co-Processing (follow-up meeting)</td>
<td>June 2</td>
</tr>
<tr>
<td>Gasoline, Diesel and Crude Oil (1st meeting)</td>
<td>June 2</td>
</tr>
<tr>
<td>Ethanol (follow-up meeting)</td>
<td>June 19</td>
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Meeting details and supporting documents available at: https://www.arb.ca.gov/fuels/lcfs/lcfs_meetings/lcfs_meetings.htm
Updates to CA-GREET

- CA-GREET 3.0 will be based on Argonne National Laboratory’s GREET1 2016
- A draft version expected to be released for stakeholder review and feedback in June/July 2017
- California-specific modifications envisioned:
  - Electricity grid resource mix from e-GRID 2014
  - Tailpipe emission factors from ARB EMission FACTors (EMFAC) model 2014
  - Natural gas emission factors based on updates from ARB OMMGG branch (expected Aug 2017)
  - California refinery crude slate
  - Others as appropriate based on available data
Updates to Pathway CI Analysis

- Staff is considering simplification for Tier 1 fuels by providing simple pathway application forms
  - Facilitates pathway CI application, evaluation, and verification
  - Eliminates intermediate steps to convert operational data to CA-GREET inputs
  - Clearly indicates user-input fields subject to verification
  - Limits CA-GREET expertise requirement for applicants
- Pathway application forms provided for Renewable Natural Gas, Biodiesel/Renewable Diesel and Corn/Sorghum ethanol (Cane ethanol in June 2017)
- For upcoming fuel specific working meetings, application forms will be updated to reflect stakeholder feedback
OPGEE revision as per LCFS regulation

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

Contract with Stanford Univ.

- PI: Adam R. Brandt
- Model improvements:
  - Oil sands mining and in-situ extraction
  - Bitumen upgrading
  - CO₂ enhanced oil recovery (EOR)
  - Hydraulic fracturing
  - Misc. updates
## Timeline for OPGEE revisions

<table>
<thead>
<tr>
<th>Proposed Date</th>
<th>Event Description</th>
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<tbody>
<tr>
<td>April 4</td>
<td>Present OPGEE revisions</td>
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<tr>
<td>May 4</td>
<td>Due date for stakeholder feedback</td>
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<tr>
<td>July 14 (tentative)</td>
<td>Present draft CI values at workshop</td>
</tr>
<tr>
<td>Late summer or fall</td>
<td>Present revised CI values based on stakeholder feedback</td>
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**STANFORD PRESENTATION ON REVISIONS TO OPGEE**