

California Environmental Protection Agency



Air Resources Board

**Lifecycle Assessment of Crude Oil
Production within the
LOW CARBON FUEL STANDARD**

**Public Meeting
July 12, 2012**

Disclaimer

- The purpose of this meeting is to discuss the status of the methodology under development for determining the carbon intensity of crude oil.
- Comments made at or in response to this meeting will not be entered into the rulemaking record.

Overview

- Review of Crude Oil Provision Amendment
- Updates to OPGEE – Adam Brandt, Ph.D. and Hassan El-Houjeiri, Ph.D. (Stanford University)
- Preliminary 2010 Crude CI Estimates
- Field-Specific Flaring Estimates
 - Chris Elvidge, Ph.D., NOAA
 - Quinn Hart, Ph.D., UC Davis
- Next Steps

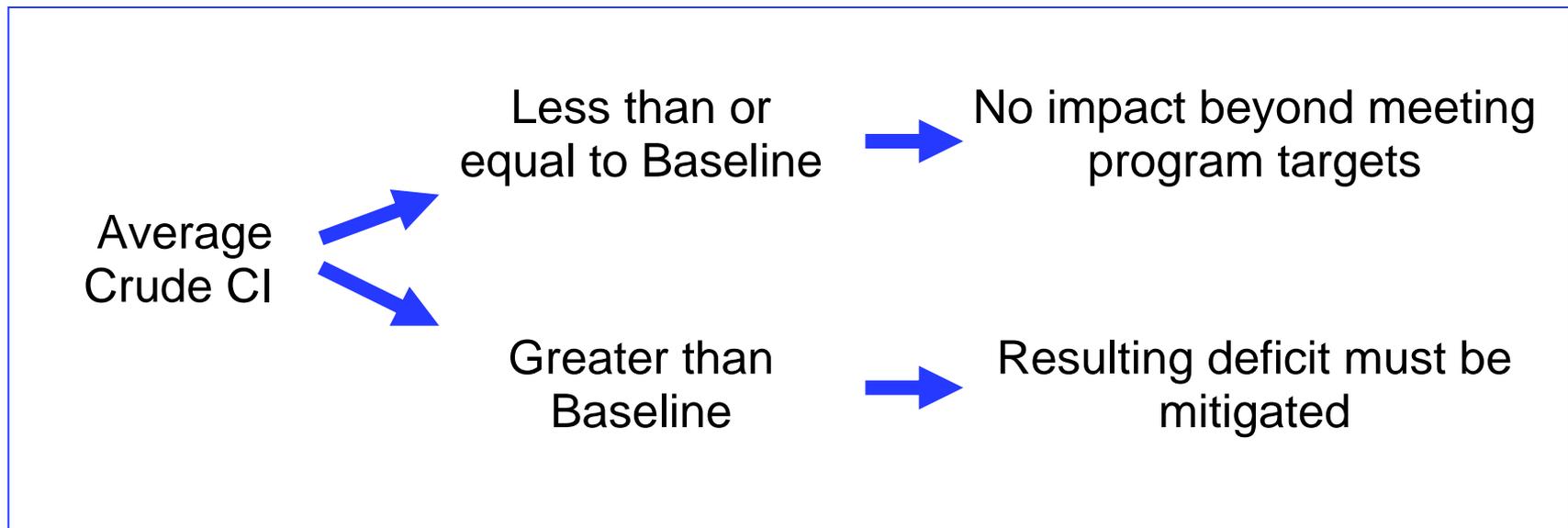
December 2011 Board Hearing

- Board approved with modifications proposed amendments to the LCFS Regulation
- Amendments include a complete revision to the treatment of crude oil
 - Replace the original CA Basket and HCICO provision with the CA Average approach
 - Include an “innovative method” credit provision

Approved Crude Oil Provision: California Average

- CA Average Approach begins 2013
- Calculates State average CI each year

Basic Approach



Crude Oil Carbon Intensity Determination

- Contract with Adam Brandt to develop a LCA tool for crude recovery and transport. Additional support from European Commission.
- Oil Production Greenhouse Gas Emissions Estimator or OPGEE will replace the calculation for crude production and transport CI in CA-GREET
- Update to a 2010 Baseline as part of a 15-day change this summer
- Starting in 2013, OPGEE will also be used to calculate the yearly Crude Average CI value.

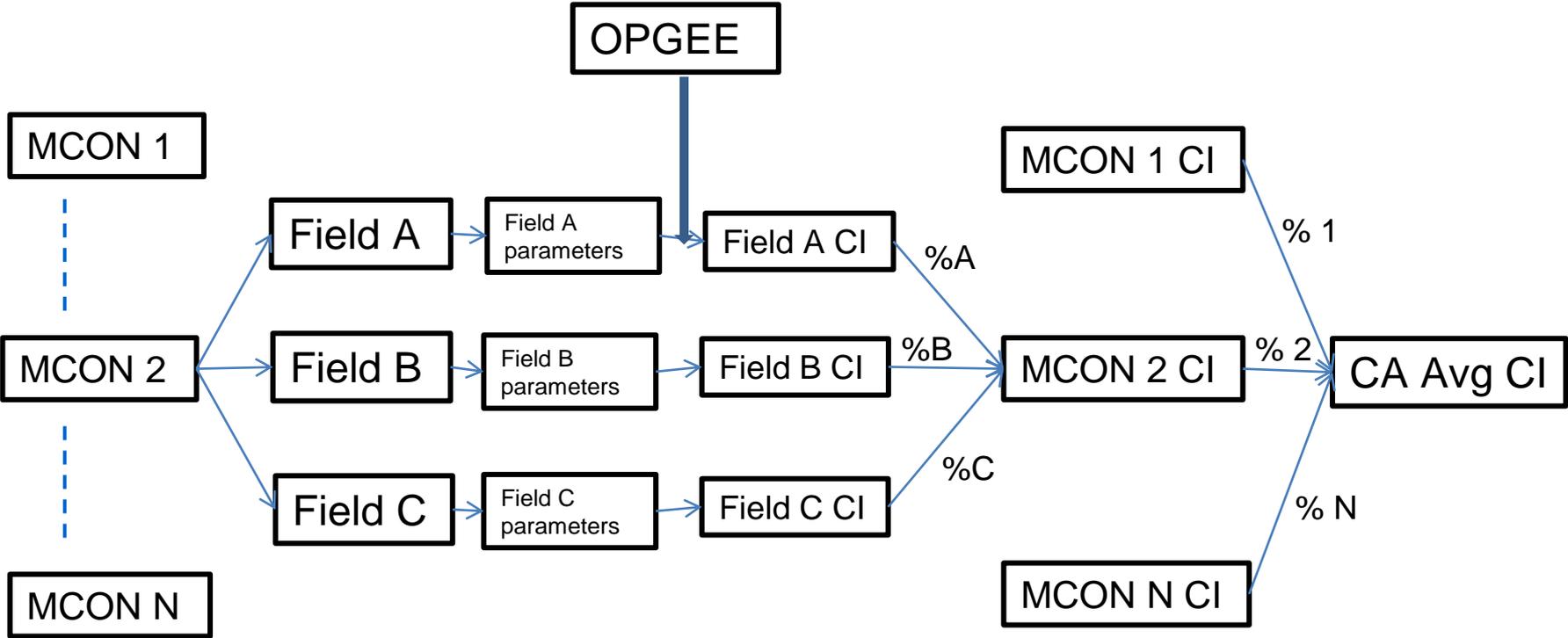
Prior Activities

- Fall 2011 – issued a scoping plan for OPGEE to stakeholders asking for input
- March 2012 – released a beta version of OPGEE and asked for comments on the model and field level crude production data.
- June 25 – released OPGEE Version 1.0 Draft version A and model documentation
- July 10 – released carbon intensity estimates and detailed model inputs
- July 12 – workshop

***Updates to the Oil Production
Greenhouse Gas Emissions Estimator
(OPGEE)***

Adam Brandt and Hassan El-Houjeiri
Stanford University

CA Crude Average Carbon Intensity



Preliminary 2010 Baseline Calculations

General Notes

- Crude storage tanks module turned off
- Transport Modes and Distances
 - All transport was assumed to be pipeline and/or ocean tanker.
 - Ocean transport was assumed to be by the shortest path
 - Length of an existing pipeline was used if known, otherwise estimate.
- Used country-average flaring rate estimates (NOAA) with a flaring efficiency of 95 percent
- Revised Water-to-Oil Ratio Smart Default

Field Level Data Sources

- IHS and Deloitte refused to sell data
- Oil companies have not provided any data
- California – Division of Oil, Gas, and Geothermal Resources (DOGGR)
- Alaska – Alaska Oil and Gas Conservation Commission (AOGCC)
- Canada – Energy Resources Conservation Board (ERCB)
- All Others – Oil and Gas Journal and various internet sources

California Crude Production Notes

- California field-level data from DOGGR:
 - Oil production and number of wells
 - Water and gas production
 - Water, gas, and steam injection
 - Field depth and API gravity estimates
 - Cogeneration steam production estimates
- Continental US average flaring rate.
- Assumed excess gas is exported

Alaska North Slope Production Notes

- Field-level data from AOGCC:
 - Field depth
 - Oil production, API gravity, and number of wells
 - Water and gas production
 - Water and gas injection
- Alaska-specific flaring rate.
- Assumed all power is produced on site.
- Assumed excess gas is re-injected.
- Special note: high gas production for Prudhoe Bay

Canada Production Notes

- Medium and light crude recovery modeled using the standard OPGEE framework.
 - Average WOR estimated using data from ERCB
- In situ TEOR (SAGD and CSS) and Bitumen Mining modeled using the Bitumen Extraction and Upgrading module.
 - SOR values obtained from ERCB reports

Other Imported Crude Production Notes

- Comprehensive field-level data was not available
- MCON blends were modeled using aggregated data available for the blend as well as model default values and other estimates. For example:
 - Estimate for oil production per well obtained using OGJ data.
 - If the field depth was not known, we assumed the average field depth for that country from OGJ data.
 - Field age determined from internet and OGJ sources.
 - Estimated WOR using the WOR/Field Age smart default
- Assumed all electricity is produced onsite for offshore fields.
- Assumed all excess gas is re-injected.

Preliminary CI Estimates

- Posted two documents at http://www.arb.ca.gov/fuels/lcfs/lcfs_meetings/lcfs_meetings.htm
 - Draft Crude Carbon Intensity Summary Tables
 - Excel file with detailed model inputs
- Preliminary Carbon Intensity Estimates
 - California production average: 12.1 g/MJ
 - Alaska North Slope: 14.5 g/MJ
 - Canada import average: 21 g/MJ
 - Other import average: 11.4 g/MJ
 - 2010 Baseline Crude average: 12.5 g/MJ

Satellite Estimates of Flaring Volumes

Chris Elvidge, Ph.D.
NOAA

Estimating Field-Specific Flaring Rates

Quinn Hart, Ph.D.
UC Davis

Next Steps

- Stakeholder comments due July 20 on OPGEE model and July 27 on MCON/field production data.
- Review stakeholder comments, revise OPGEE, and update carbon intensity estimates for 2010 MCONs
- Release OPGEE, documentation, 2010 Baseline calculations, and updated Compliance Schedule targets as part of 15-day change
- Review 15-day comments and revise OPGEE and 2010 Baseline calculations as necessary
- Issue another 15-day change notice if necessary

Innovative Methods Provision

- Evaluate stakeholder comments on criteria for determining what methods will be considered innovative
- Evaluate stakeholder comments on technologies that may be “innovative methods”
- Include revisions as part of 15-day change

Contact Information

- All comments should be addressed to:

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