



Department of Environmental Quality

Low Carbon Fuel Advisory Committee October 14, 2010

High Carbon Intensity Crude Oils (HCICO)

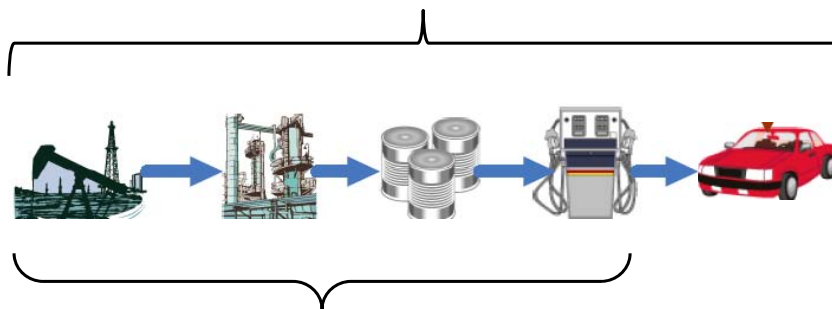
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Department of Environmental Quality

What is a High Carbon Intensity Crude Oil?

Well-to-Wheel



Production & Transportation



Method of Crude Extraction

- Thermal Enhanced Oil Recovery:
 - Hot Water Injection
 - Steam Injection
 - In-situ combustion
- Bitumen Mining



Venezuelan Orinoco Belt



- 21,357 square miles
- 1,200 billion barrels available
- 513 billion barrels (~40%) economically recoverable
- “Extra heavy crude”
- Enhanced oil recovery techniques



Canadian Athabasca Oil Sands



- 54,000 square miles
- 1.7 trillion barrels available (2nd behind Saudi Arabia)
- 173 million barrels (~10%) economically recoverable
- Bitumen
- Surface mined
- Steam injection
- 1 billion ft³/day natural gas usage = 40% Alberta's demand

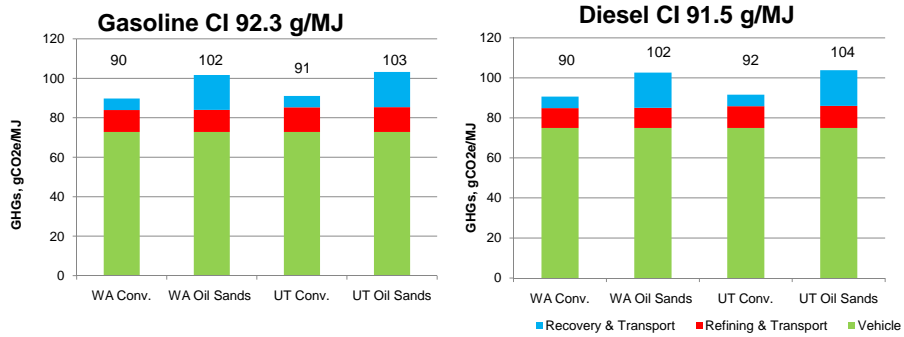


Flaring Rate

- Gas associated with oil extraction comes to the surface
- Lack of gas collection infrastructure or a nearby gas market
- Released into the atmosphere either un-ignited (vented) or ignited (flared)
- Russia, Nigeria, Iran, Iraq, Algeria, Kazakhstan, Libya, Saudi Arabia, Angola, Qatar
- Worldwide, approximately 150 billion m³ of gas flared annually, equal to 25% of US gas consumption
- 390 million tons of CO₂



Draft Baseline Carbon Intensity Values



Future Treatment of HCICO

- Option 1: Use Existing Lookup Table
- Option 2: Period Update of Lookup Table



Option 1 – Use Existing Lookup Table

- Use the CI values in the lookup table for all petroleum crudes
- Use throughout program period (2012 – 2022)



New Source of HCICO

What is a new “source”?

- Development of new area for production
- Different extraction method
- Change in the flaring rate of the country of origin



Is it a New Sub-Pathway?

Each pathway is a unique combination of feedstock and fuel.

Each sub-pathway takes into account the different processes and sources of process energy for making a fuel.

- Example: Corn ethanol produced using the wet mill process instead of dry mill process
- Example: Corn ethanol produced using natural gas instead of coal
- Example: Oil sand development in a different location within Canada
- Example: Oil Sand development using new extraction technology



Option 1a: Existing Lookup Table w/o New Fuel Sub-Pathway

- Treated as an increase in production of existing sources.
- Use the CI values in the lookup table for all petroleum crudes
- Use throughout program period (2012 – 2022)

Considerations:

- Treats all crudes equally
- Minimal resource to implement
- Overestimates actual reduction of GHG



It's a New Sub-Pathway, but...

Significance Threshold

- New sub-pathway due to new or improved process for existing fuel-feedstock combination. Must meet two thresholds:
 - Minimum threshold for improvements in carbon intensity of 5 gCO₂e/MJ
 - Minimum fuel volume threshold of 1,000,000 gallons per year in Oregon



It Really is a New Sub-Pathway

Minimum Threshold

- Threshold for consideration is a change in direct carbon intensity of 5.0 gCO₂e/MJ or 10%, whichever is less.

Establish New Fuel Sub-Pathway

- Regulated party to submit updated OR GREET spreadsheet for new process



Option 1b: Existing Lookup Table w/ New Fuel Sub-Pathway

- Regulated party will have to manage new sources and existing sources separately.
- New crude use CI established in new fuels pathway procedures.
- Existing crudes use current lookup table.

Considerations:

- Treats new crudes and existing crudes differently.
- Significant resource to establish new CI.
- Does not account for increases in production from existing sources.
- Overestimates actual reduction of GHG, but not as much as Option 1a.



Option 2: Periodic Update of Lookup Table

- Re-evaluate mix of petroleum fuels every 3 years
- Update lookup table

Considerations:

- Treats all crude sources consistently.
- Does not require new sources to establish individual CI.
- Moderate resources (may need rulemaking).
- May increase compliance burden if CI increases.



Risk from Crude Shuffling

- Option 1a – no risk
 - HCICO not penalized
- Option 1b – moderate risk
 - HCICO is penalized by higher CI
 - Limited to new crudes and not to existing crudes
- Option 2 – low risk
 - HCICO averaged w/ non-HCICO so effect dampened



Discussion Objective

Should Oregon's LCFS program treat high carbon intensity crude oils differently in the future than traditional petroleum crudes?

- Option 1a: Existing Lookup Table w/o New Fuel Sub-Pathway
- Option 1b: Existing Lookup Table w/ New Fuel Sub-Pathway
- Option 2: Periodic Update of Lookup Table