



May 8, 2012

Jim Duffy
Air Resources Engineer
Alternative Fuels Section
California Air Resources Board (CARB)
jduffy@arb.ca.gov

Dear Mr. Duffy,

In December 2011, the California Air Resources Board (CARB) released two amendments to the Low Carbon Fuel Standard (LCFS), which would affect the LCFS's treatment of crude oil. The first amendment would set the carbon intensity of crude oil as a California average beginning in 2013. The second amendment would provide credit for crude oil produced using "innovative methods." Our organizations, the Center for Climate and Energy Solutions (C2ES) and the Great Plains Institute (GPI), suggest that CARB include provisions under both amendments to account for crude oil extracted through enhanced oil recovery with carbon dioxide (CO₂-EOR). In contrast to other oil production methods, CO₂-EOR projects should be credited for storing CO₂ captured from anthropogenic sources (power plants and industrial facilities) in closed-loop systems during operations and permanently in oil wells following the end of operations. Recognition of the CO₂ storage benefit should translate into a lower carbon intensity score for the oil produced by CO₂-EOR, which would benefit CO₂-EOR development and help quantify CO₂-EOR's environmental benefits in low carbon fuel policies in California.

On March 19, 2012, CARB released the Oil Production Greenhouse Gas Emissions Estimator (OPGEE) to calculate the greenhouse gas emissions of an individual oil project and the subsequent carbon intensity of the oil it produces. CO₂-EOR is a tertiary form of conventional production, and OPGEE should be able to assess most of CO₂-EOR's production practices. Yet, OPGEE does not include a provision for assessing how much CO₂ is stored by a CO₂-EOR project and crediting CO₂ storage in carbon intensity scores. While a CO₂-EOR project will have additional sources of emissions related to practices such as CO₂ compression, CO₂ injection, and CO₂ processing for reuse, it can store substantial amounts of CO₂ and make oil produced

from CO₂-EOR less carbon intensive when compared to oil produced by other techniques. While the exact amount of injected CO₂ varies among CO₂-EOR projects, a given project could inject between 0.2 and 0.8 metric tons of CO₂ per barrel of oil produced. Various estimates suggest that approximately 0.4 tons of CO₂ per barrel of oil are released through combustion. This means that CO₂-EOR can be an important technology in controlling overall emissions from transportation and is deserving of recognition under a low carbon fuel policy.

Determining the carbon intensity of CO₂-EOR should help it gain recognition as an innovative method of oil production under CARB's proposed amendment to the LCFS. Currently, CO₂-EOR accounts for 6 percent of U.S. domestic oil production and will grow in the near future. At least fifteen projects capturing CO₂ from anthropogenic sources for use in EOR will begin operations in the next five years, making CO₂-EOR an important driver of carbon capture and storage technology development and deployment.

Thank you for your consideration of our request. Please contact our organizations with any questions you may have.

Sincerely,



Judi Greenwald
Vice President, Technology and Innovation
Center for Climate and Energy Solutions



Brendan Jordan
Director of Bioenergy and Transportation
Great Plains Institute