

ConocoPhillips Detailed Comments

Proposed Regulation to Implement the Low Carbon Fuel Standard (LCFS)

Our overarching comment is that the proposed regulation has many areas that remain incompletely developed, as the following comments will identify. ConocoPhillips is extremely concerned about the implementation timeline given the areas that still need significant work. Specifically, the technological feasibility and economic analyses should be used to drive the regulatory process rather than trail the process.

The comments listed below re-iterate many of the written comments which were previously submitted in response to the earlier drafts of the proposed regulation (October 2008, December 2008, and January 2009). This attachment contains some “section by section” comments followed by specific comments that relate to the economic analysis evaluation, lifecycle analysis (LCA) pathways, etc.

Section 95480.1 Applicability

(b) Credit Generation Opt-in Provision for Specific Alternative Fuels

ConocoPhillips strongly opposes this section and recommends its removal. Not requiring all transportation fuels to comply with the LCFS will limit the availability of credits which may be needed to comply with the regulation. Allowing the listed alternative fuels to “opt-in” only if they choose to generate credits has the potential to limit credit supply and limits flexibility for other regulated parties, increasing costs and decreasing potential success of the program. Credit availability from all fuel provider sectors allows optimization of fuel supply and cost which directly benefits California consumers.

Section 95484 Requirements for Regulated Parties

(a) Regulated Parties

From our read of the latest draft it appears that when a regulated party transfers ownership to a party that is not a producer or importer, then the default case is that the transferor remains the regulated party (95484(a)(1)(B)(4)). This is a change from the December draft and ConocoPhillips questions the reasoning for this change. ConocoPhillips believes the point of compliance should be where parties have control over the fuel at the point of delivery to the consuming marketplace. Refiners or importers of the fuel who do not retain title when it is blended with renewable fuel downstream, have limited, if any, control over what the downstream party will choose to blend. The downstream party may make choices based on the lowest cost option versus what is needed to meet the California LCFS goals.

ConocoPhillips believes that a producer or importer of “finished fuel” should be able to retain the compliance obligation if the “finished fuel” from the production or import facility does or does not contain a renewable fuel with lower carbon intensity than the base fuel. The carbon intensity of the renewable fraction should be based upon the life cycle analysis for the individual renewable fuel pathway (examples include renewable gasoline, renewable diesel, etc). This provision is needed to assure that research in advanced renewable fuels continues and that those fuels are suitably deployed in California.

Section 95484(a)(1)(C)(2) appears to allow a supplier of oxygenate to be able to retain the compliance obligation. One potential outcome, if this were allowed, could be for an oxygenate producer to sell the oxygenate to a CARBOB producer or importer, keep the “credit” and then either sell that “credit” to a party other than the one that purchased the oxygenate or who supplied the CARBOB. Even of greater concern would be if the oxygenate producer retained associated “credits” for purposes of either raising “credit” value or demand for oxygenate product.

ConocoPhillips recommends that this section be removed and that the carbon intensity (CI) associated with the oxygenate be transferred (by default) along with the oxygenate consistent with federal approaches in the RFS programs.

(c) Compliance and Progress Reporting Requirements

As commented previously, ConocoPhillips sees the proposed requirement for quarterly reporting as unwarranted and burdensome. CARB has not justified the benefit of this new reporting burden on industry. As the LCFS is an annual program, the Agency should not require reporting more frequently than annually. CARB's proposed reporting requirements include providing the Executive Officer with copies of product transfer documents (PTDs) when transfer of compliance obligation occurs. The Agency should not require physical copies of PTDs to be provided. Rather, the Agency should build reporting formats that would include information on who the transferee is and retain the right to request documentation if necessary.

ConocoPhillips seeks clarification regarding terms and requirements in Table 4 (Summary Checklist for Reporting). The terms "blendstock", "blendstock feedstock" and "feedstock origin" are not applicable regarding the production of CARBOB and CARB diesel. It is also not clear why in previous versions of the table, certain fields were "optional" and now they are "required". Please explain. ConocoPhillips believes that every element of "required" reporting must have a direct regulatory compliance purpose (as opposed to "information gathering").

(d) Recordkeeping and Auditing

(2) Evidence of Physical Pathway

This section will require clarification as to what appropriate documentation is. It is unclear whether or not actual volumes of the alternative fuels must be blended in California. A demonstration of a physical pathway appears to be sufficient. California must be clear regarding this requirement as individual company interpretations can result in incongruent compliance approaches and competitive consequences.

If CARB requires the volume of the alternative fuel to be blended into California fuels for credit against state LCFS obligations, this will lead to increased emissions associated with increased transportation to get the fuels to California ("shuffling"). The Federal EPA is currently working on rulemaking to implement the provisions of the Energy Independence and Security Act of 2007. Recordkeeping and auditing provisions of the California LCFS should synchronize with the Federal provisions in this area as much as possible to avoid multiple systems. For example, the current RFS uses Renewable Identification Numbers (RINs) to track volumes of renewable fuel used for compliance with the RFS. The RINs identify the production facility where the renewable fuel was produced and the type of renewable fuel. It would be advantageous for California to build upon that system rather than creating a need for new documentation for reporting purposes.

ConocoPhillips also supports the concept of registrations of biofuels producers and importers outlined in the WSPA comments.

Section 95485 LCFS Credits, Deficits, and Incremental Obligation

(b) Credit Generation Frequency

ConocoPhillips recommends allowance of early credit generation on 2010 should the rule be adopted for 2010 implementation. As proposed, full reporting is required in 2010; therefore, sufficient information would be available to determine credit generation. ConocoPhillips also recommends removing the word "quarterly" (credits should be allowed to be generated on annual basis as well).

(c)(1) Credit acquisition, banking, borrowing, and trading

ConocoPhillips supports this proposed language and appreciates staff incorporating many of our February 13, 2009 comments. Companies should be allowed to utilize their credit bank and other available credits in the most cost effective manner.

(c)(2)(A) Credit acquisition, banking, borrowing, and trading

ConocoPhillips opposes this section. The one-way limit on credit trading (LCFS credit may be exported for compliance with other greenhouse gas reduction initiatives, however, credits generated from outside the LCFS program cannot be used in the LCFS) constrains optimization and limits the cost effectiveness of the program. This isolation concept is also counter to AB32 which requires "...the state board to adopt rules and regulations... to achieve the maximum technologically feasible and cost-effective greenhouse gas emission reductions..." The Bill also authorizes "... the state board to adopt market-based compliance mechanisms..." Allowing exchange of credits between programs will result in reductions where they are the most cost-effective and will accrue benefits to California citizens. Given the current economic situation and constraints, it is an extremely important factor to minimize the economic impact to businesses and consumers as the result of these new program adoptions.

Section 95486 Determination of Carbon Intensity Values

In assessing the carbon intensities for all fuels, fuel components and feedstocks (including crude sources), CARB should consider other regulatory CO2 control programs (current and future, domestic and international) in evaluating LCA pathway elements. These elements may include operational controls, offsets, etc. It is important that the agency not pick "winners and losers" (not only for finished fuels, but for feedstocks as well).

One specific area of concern involves the production and use of Canadian oil sands. CARB needs to recognize locally imposed controls into their LCA. Local controls may include operational requirements and the ability to provide/obtain offsets, etc. If CARB fails to recognize these controls, the California LCFS will impose demerits on oil sands regardless of local control measures established for local carbon management. This situation may result in "double demerits" where the benefits of a local control measure (required by Canada (for example)) are not recognized by the California program. This imbedded "deselect" or "double demerit" for oil sands will lead to problematic trade considerations and will no doubt result in "crude shuffling".

Section 95489 Regulation Review

Periodic reviews of the regulation are essential. We strongly encourage CARB to include stakeholders and other agencies (such as the CEC) in the review process. Achieving the compliance goals of the LCFS will be very dependent on development and commercialization of new technologies. It is imperative that the Agency periodically assess the progress of these technologies and make adjustments in compliance schedules and requirements as necessary based on the outcome of the review process.

General

Economic Analysis

ConocoPhillips believes that economic analyses and the associated technological feasibility studies should "drive the process". We believe these assessments should be the basis for policy and regulatory decisions and should be completed and reviewed before regulations are proposed and adopted.

ConocoPhillips has serious concerns regarding CARB's current "Estimated Alternative Fuel Costs" and "Feedstock Costs". We believe incorporation of more recent information (including preliminary results from a joint study by the National Renewable Energy Laboratory, the Iowa State University and ConocoPhillips) is warranted.

ConocoPhillips supports the WSPA comments regarding the economic analysis. We support the conclusions reached by Sierra Research and agree that CARB needs to incorporate the comments of one of your own peer reviewers (Dr. John Reilly of MIT).

In addition, CARB Staff has indicated that the LCFS will result in lost revenues to Government. We request that CARB provide cost estimates of these revenue losses during the periodic program reviews.

Fee Schedule

During the January workshop CARB mentioned a "Fee Schedule" as one of the items that is "left to be addressed". ConocoPhillips objects to the idea of fees associated with LCFS program. Please provide justification for this concept.

LCA

Listed below are comments regarding the LCA pathways that CARB has provided. The first section deals with more general comments followed by comments regarding specific pathways.

General Comments

- 1) Land Use Change (LUC)
 - a. CARB should work with the Federal EPA to harmonize the LCA methodologies and accounting approaches including LUC. If the two agencies use different approaches, it could lead to additional costs as fuels would be "shuffled" in order to meet the Federal versus the California requirements.
 - b. Regardless of uncertainties surrounding LUC, ConocoPhillips believes that LUC should be included in the determination of Carbon intensity values and should be reevaluated as part of the periodic review process.
 - c. For biofuel pathways, indirect land use change (LUC) appears to have a significant impact on "default" CI values (99.4 gCO₂e/MJ for U.S. average corn ethanol with LUC versus 69 gCO₂e/MJ without LUC). The science for LUC is still evolving. Many models use highly averaged input data which may lead to significant variations in the results. The baseline year and the time periods for discounting LUC vary between federal and state analyses. ConocoPhillips urges CARB to work with the Federal EPA to the maximum extent possible in order to harmonize the modeling work associated with both the Federal RFS program and the California LCFS. . Failing to do so will not only result in the "shuffling" mentioned above but also administrative and implementation complexities as regulated parties attempt to comply with differing programs.
 - d. A potential inconsistency was observed in the definition of indirect LUC. Current models, including the GTAP model used in the California LCFS, define indirect LUC as market-induced impact on the use of certain types of lands that occur elsewhere (predicted using economic correlations) and the resulting carbon intensities due to change in soil management or land conversion. However, the LUC models do not seem to have the capability to track how the converted lands are used after their conversion, especially those outside the U.S. For example, if the expansion of corn ethanol in the

U.S. causes certain acres of a land to be converted elsewhere in the world, by definition, corn ethanol in the U.S. would carry an indirect burden of carbon intensity from that land conversion. However, if the converted land is then used to grow biomass for fuel production, this carbon intensity should be directly accredited to the fuel product, instead of being indirectly allocated to U.S. corn ethanol. Our concern is that without better definition of terms and in the absence of a defined "baseline year", there is the potential for double counting of LUC impacts.

- 2) The significant figures used in the analyses to determine the carbon intensities of various fuels are inconsistent as shown in public documents. The number of significant figures can result in important implementation/compliance results and must be corrected. This comment is consistent with comments from various peer reviewers.
- 3) Definitions and terminologies need to be consistent. For example, the terms "Total Energy Use" and "Total Energy" have been repeatedly used in several documents without differentiation. It was not clear whether these two terms were equivalent. Additional clarification and consistency are necessary.
- 4) Various typographical errors were observed between the numbers and the formulas listed in various spreadsheets compared to the write-ups presented in text format. These errors must be corrected.

Specific LCA Pathway Comments

- 1) CARBOB and Diesel Pathways
 - a. For petroleum fuel pathways, an inconsistency was observed in the allocation of energy and emissions for crude recovery and transport between CARBOB and diesel. The same energy input, 80,345 BTU/MMBTU was used for crude recovery for CARBOB and ULSD pathways. Based on LCA principles, total energy use and emissions for crude recovery and transport should be allocated between co-products derived from the crude oils (predominately CARBOB and ULSD). The allocations can be made by mass fraction, energy content, market value or substitution. Based upon public information, U.S. refineries produce more gasoline than diesel (volume ratios approximately 2 to 1). Therefore the number for crude recovery should not be the same for CARBOB and ULSD.
 - b. The information for fuels derived from heavy crude oils, in specific the Canadian oil sands, needs to be updated. Based on the two recent LCA studies sponsored by Alberta Energy Research Institute, the default values for oil-sand derived fuels in the GREET model were over-simplified and less accurate compared to those estimated using actual field data. In addition, the studies showed CI values for oil sands-derived fuels varied with the technologies applied in oil sands production, upgrading and refining. The gap between conventional and heavy crude oil pathways does not appear to be as large as reflected in the CARB's analysis.
- 2) CNG Pathway
 - a. For the compressed natural gas (CNG) pathway, the assumption that all natural gas would come from the U.S. seems inaccurate. Some natural gas and the marginal gas will come from liquefied natural gas (LNG). Evaluation of LNG should be included in the CNG pathway, or be established as a separate pathway.
 - b. In our opinion, the carbon intensity for gathering, processing, treating, transmission, and distribution of U.S.-based natural gas appear to be optimistic.
- 3) Hydrogen Pathway
 - a. For the hydrogen pathway, the draft does not address the issue of steam production and how it might be credited. Large central hydrogen facilities can

utilize by-product steam and receive credit, whereas on-site (local) hydrogen production might not. Steam utilization directly impacts the process efficiency, hence the carbon intensity values for hydrogen production. Typically, steam methane reformers utilize steam by-product which would have an energy efficiency around 70% (a value close to 60% should be used for processes that could not utilize the steam by-product). Such differentiations are critical and should be stated in the pathway document.

- b. The assumption for hydrogen compression efficiency (92%, Section 5.1) is very high. According to Praxair estimates (reference available) hydrogen compressor efficiency is typically 70%.
- 4) Electricity Pathway
- a. For the California electricity pathway, questions have been raised on the assumption for marginal electricity. It is expected that the use of plug-in hybrids will impact the production capacity in California, and additional electricity is needed. The source of fuel (natural gas or coal?) for marginal electricity has been debated. The current draft assumes 70% natural gas and 30% biomass but provides no explanation how the values were determined. The draft also assumes biomass would come from waste materials in agricultural and forest industries. A feasibility study is necessary to validate the assumption of 30% biomass for power production.
 - b. An additional concern for is the relatively high energy efficiency for biomass-based power production (i.e., 32% boiler efficiency for biomass as compared to 34% for natural gas). Biomass in general has a lower heating value because of higher moisture and oxygen contents, which means additional drying and higher feed rates are required. Both drying and higher feed rates will cause more process energy input and hence lower efficiency. In addition, additional units will be needed for the removal of dirt and other impurities and NO_x reduction due to the presence of nitrogen fertilizers. The above-mentioned and other technical feasibility issues in the use of biomass as boiler feed were not captured in the current draft.
- 5) Cellulosic Ethanol Pathway
- a. The energy inputs for biocatalyst (enzymes) production should be included. These enzymes can not be regenerated post fermentation processes, and need to be constantly replenished.
 - b. The assumption for ethanol yields, 90 gallons per ton biomass for both forest waste and farmed trees, is overly optimistic. The most recent NREL report uses an average value is 55-60 gallons/dry ton for wood as a feedstock.
 - c. The fermentation processes do not include nutrients – specifically DAP (Diammonium phosphate) and lime (for pretreatment and neutralization), which have both CO₂ and N₂O footprint in their manufacture
 - d. ConocoPhillips recommends that CARB incorporate the recent results (preliminary) from the NREL/Iowa State University/ConocoPhillips study regarding the production of cellulosic ethanol from corn stover.
- 6) Landfill Gas (LFG) Pathway
- a. For the land fill gas (LFG) to compressed natural gas (CNG) pathway, some of the key assumptions are very optimistic. For example, the gas compressor efficiencies for compressing land fill gas to pipeline-grade natural gas was assumed 98% (a very optimistic assumption).
 - b. Other data appear to be obtained from a single resource or personal communications. In this case, sensitivity analysis may be useful to demonstrate the impact of critical parameters, such as the types of feedstock, the preprocessing requirements, the technologies available for generating LFG, the separation and compression efficiencies for natural gas, the flue gas treatment, etc.
- 7) Corn Grain-Based Ethanol Pathway

- a. In this pathway, corn stover removal rate is reported as 1.889 tons/acre. This is ~ 70% higher than the average value (1.1 tons/acre) NREL has suggested for sustainable removal.
 - b. Higher stover removal rates would result in greater co-product credits and reduced CI values for corn ethanol.
- 8) Sugarcane Based Ethanol Pathway
 - a. For the sugarcane ethanol pathway, N₂O emission rates of 2% and 1.3% have been used interchangeably. The emission rate for N₂O is typically calculated as 1.3% of total nitrogen input. Global warming potential of N₂O is 300 times of that of CO₂. An error in the N₂O emission rate could cause a significant difference in the CI values.
- 9) Biodiesel and Renewable Diesel Pathways
 - a. For both the soy biodiesel and renewable diesel pathways, the default CI values for soy oil production (soybean farming, transport and oil extraction) appear to be different. These values should be the same as they represent the same soy oil feedstock.
 - b. For both the soy biodiesel and renewable diesel pathways, the energy use in soy oil extraction, 4,309 BTU/lb oil extracted was nearly half of the value reported in the 1998 NREL Urban Bus study (8008 BTU/lb of oil extracted). This number needs to be verified and the proper reference needs to be supplied.
 - c. The allocation of energy use and emissions to soybean meal co-product in soy biodiesel and renewable diesel pathways seems problematic and needs to be resolved. This inconsistency in co-product allocation has caused a significant impact on the CI values for soy biodiesel and renewable diesel. For example, more than half of the energy use in soy oil transesterification process, 167,986 BTU/MMBTU (46% of total energy use in the entire LCA), was assigned to soybean meal, which is not a co-product of this step. This problem was due to the mixed use of two sets of allocation fractions, sub-system-based and whole-system-based allocations at various LCA steps. The sub-system allocation fractions were applied in the soybean farming step; while the whole-system allocation fractions were used in the soy oil extraction and transesterification (hydrogenation for renewable diesel) steps. As a result, energy use and emissions were allocated to soybean meal twice in the LCA – one for soy oil extraction and the other for transesterification. This allocation methodology is incorrect by the LCA principles. Soybean meal is not a co-product of the transesterification process and should not claim any co-product credit in this step.
 - d. For the soy renewable diesel pathway, barge and heavy diesel trucks are used for the transport and distribution of renewable diesel. One of the advantages of renewable diesel fuel is its compatibility with existing pipelines. Therefore, transportation of renewable diesel via pipeline should be included in its LCA. This should result in lower carbon intensity for renewable diesel.