

Feedback on LCFS Workshop held April 18, 2014

Feedback provided here is generally organized by the topic area, consistent with the organization of presentations provided during the workshop.

Low complexity / Low energy-use refinery provisions

Proposals by ARB staff to develop the low complexity / low energy-use (“LC/LE”) refinery provisions appear to be both sensible and appropriate. A number of relevant points were made during the course of the workshop, which warrant the attention of ARB staff. One additional issue that may warrant staff’s consideration is the impact of the LC/LE provisions on policy-wide generation of LCFS credits and deficits. In particular, it seems appropriate for the CI reduction resulting from designating some refineries as LC/LE refineries should be balanced by a proportional increase in the CI assigned to non-qualifying refineries. This is because the average CI across all refineries should not change due to the designation of some refineries as LC/LE. As a result, it must be true that the average CI across non-LC/LE refineries should be higher than both the average CI of LC/LE refineries and the current average CI, which includes LC/LE refineries. Designating certain refineries as LC/LE should not, all else being equal, yield a net change in aggregate LCFS credit or deficit generation, because the LC/LE provisions do not produce actual emissions reductions, they simply regroup refineries according to their complexity and energy use.

For example, if the LC/LE refineries represent ~2.5% of the CARBOB pool and realize a CI reduction of ~5 gCO₂e/MJ, as indicated in the ARB staff presentation, then the CI of non-qualifying refineries should arguably increase by $[5 * 0.025 / (1 - 0.025)] \sim 0.13$ gCO₂e/MJ.

This is a small change in the CI for non-qualifying, but the aggregate impact on LCFS credit and deficit generation is significant and offsets the CI reduction recognized for LC/LE refineries. Adjusting the CI of non-qualifying refineries in this way will avoid the *appearance* of progress toward LCFS objectives when no real progress has been made (i.e., simply re-grouping refineries for accounting purposes, rather than actually reducing the CI of refining).

Separately, as noted during the workshop, the CI of refined fuels produced at a LC/LE (or any) refinery should be defined according to processing actually provided by refinery. If the refinery uses “intermediate feedstock”, which was previously processed at another refinery, the CI of products from that “intermediate feedstock” should reflect the processing to which the feedstock was subjected before delivery to the refinery producing the refined fuel blendstock. In principle, the use of such intermediate feedstock could be captured for accounting purposes using reporting mechanisms similar to what is used by refineries to report the sources of crude oil feedstock; however, tracking the crude oil source for intermediate feedstock delivered from an out-of-state refinery may yield some additional complexity.

Refinery emission provisions

The refinery emission proposals presented at the workshop appear to be both sensible and broadly consistent with the original LCFS policy design. The policy design originally proposed in 2007 allowed for

fuel producers (including refineries) to either adopt a default CI value or demonstrate that the fuel they produce has a CI value lower than the default value ([see recommendation 6](#)). My understanding is that industry stakeholders pushed back against the use of refinery-specific CI values because, among other things, it might create “winners” and “losers” based on investments made before the LCFS was established, which was viewed as being inequitable. The proposed refinery emissions provisions appear to support a shift back toward refinery-specific accounting, but only for actions taken after the LCFS policy and these proposed provisions have been adopted. This appears to be broadly consistent with the policy objectives, intent, and original design.

During the workshop ARB staff noted that there has been internal debate regarding whether emissions benefits under this provision should be assigned for any capital projects that reduce emissions, or only “innovative” projects that reduce emissions. I respectfully suggest that any projects reducing aggregate (net) refinery emissions should be credited under the proposed refinery provisions for the following reasons: (i) it would maintain the programs objective, scientific basis and credibility; (ii) it would reflect the technology-neutral basis of the program, as biofuel producers are not required to meet an “innovative” criteria in determining the carbon intensity of biofuels; and (iii) it would limit the need for complex, inherently subjective, and potentially arbitrary determinations regarding what qualifies as “innovative” and what does not.

One possible exception is that may be appropriate is to exclude projects that reflect routine maintenance activities, to the extent that CI reductions resulting from such projects will be reflected in the “average” CI contribution of refining toward CARBOB CI values. If the “average” CI of refined fuel blendstock will not be updated to reflect the evolution of refinery emissions over time, then it may be appropriate to include all projects under this provision, even those considered to comprise “routine maintenance” activities. This would ensure that the CI of refined fuels and blendstock accurately reflects the actual emissions profile of refinery operations.

It is also worth considering, as noted during the workshop, whether emissions impacts of projects related to capital equipment should be treated differently than other means of reducing refinery emissions, including those related to operational changes or changes to energy inputs (e.g., refinery use of biogas rather than natural gas). On the one hand, projects related to capital equipment are qualitatively different than other sources of emissions reductions. On the other hand, issuing LCFS credits in proportion to CI impacts from emissions reductions at the refinery (without changing the CI of associated CARBOB fuels) is not that different than issuing LCFS credits to refineries (or crude oil producers) for using (or producing) feedstock produced using “innovative methods of crude oil production”.

Generalizing from these examples—and building on comments made during the workshop—it may be sensible to capture the CI impacts associated with many types of actions that reduce (net) lifecycle refinery emissions using a mechanism like the proposed refinery emissions provisions (e.g., substituting biogas for natural gas inputs). This could support increased consistency within the LCFS and potentially across California’s climate policies (e.g., the Cap-&-Trade program would generally recognize any means of reducing net refinery emissions); it could support a more systematic shift back toward the default and opt-in provisions proposed in the original policy design; it could provide more systematic incentives for fuel CI reductions across fuel types and CI reduction strategies; and it could continue the policy’s minimization of confounding issues such as equity across refineries and product fungibility.

In this context, it seems worth noting that LCFS credits issued under the proposed refinery emissions provisions are different from compliance instruments issued under other climate policies. For example, emission accounting under the LCFS does not generally require tests of “additionality”—the LCFS is designed to regulate fuel carbon intensity in a technology-neutral manner. (The “innovative methods” provisions being a notable exception.) Lifecycle carbon intensity is what matters, not the means by which a particular fuel carbon intensity is achieved. The proposed refinery emission provisions may be confusing in this regard because they allow for the issuance of LCFS credits without changing the fuel CI value, which gives the appearance of an “emissions offset” program. Unlike emissions offsets, however, these provisions have been framed as providing LCFS credits equivalent to what would be generated if the resulting change in refinery emissions were reflected in the fuel CI value. Accordingly, the refinery emissions provisions are arguably designed to capture changes in fuel CI without the complexity and equity issues inherent to adopting refinery-specific CI values. Because fuel CI values are generally intended to be specified on a technology-neutral basis (see page 1 of the re-adoption concept paper, for example), and because the proposed refinery emissions provisions are intended to provide a simplified mechanism for capturing CI impacts of projects that reduce refinery emissions, there should be no need for complex assessments regarding the character of emissions reductions (e.g., “additionality”).

Innovative methods of crude oil production

Efforts by ARB staff to refine the “innovative methods” provisions are commendable. In particular, it is sensible and appropriate for ARB to explicitly expand the set of approved innovative methods of crude oil production, to enable crude oil producers to opt-in as regulated parties for the purpose of generating LCFS credits under the innovative methods provisions, and to streamline the approval process for producers adopting innovative methods of crude oil production. Several points from the staff presentation do stand out as warranting some additional consideration, however. These include: the standardization of comparison baselines; the maximum innovative credit available; and the proposed deferment of including CO2 capture integrated with CO2-EOR within the set of approved innovative methods of crude oil production. Each of these are discussed below.

Standardization of comparison baselines

Standardization of comparison baselines appears to be sensible for both streamlining the approval process and focusing attention on innovative aspects of crude oil production. That said, the comparison baseline plays a major role in defining the quantity of LCFS credits generated from implementing innovative methods of oil production. It therefore plays a major role in defining the policy incentive motivating adoption of such innovative methods. In this context, standardization of the comparison baseline warrants careful consideration in order to ensure that the standards effectively focus attention on innovation, ensure consistency with the balance of the program, and maintain the program’s scientific credibility.

For example, it’s not clear from the information provided that a natural gas fired, combined cycle power plant (“NGCC”) represents an appropriate comparison baseline for electricity generated onsite by crude oil producers. NGCC is generally used for large-scale, high utilization power plants, and may not be representative of conventional technologies used for onsite power generation in oil fields. I don’t have enough information regarding in-field practices to evaluate this, but note it as an example for illustration purposes. Moreover, if crude producers currently use electricity supplied from the power grid (rather

than power generated on-site), than adopting the carbon intensity of grid electricity would seem to be a more appropriate comparison baseline from a technical LCA perspective and would be more consistent with LCA assumptions adopted in the balance of the regulation.

In this context—and throughout ARB’s implementation of the LCFS—I respectfully submit that consistency and technical merit should be systematically prioritized in order to maintain the scientific credibility of both the LCFS and of ARB. This has generally been the approach adopted to date and there seems to be no reason to adopt a different approach in the proposed provisions.

Maximum CI reduction for credit generation

The proposal to establish a maximum CI reduction for the purpose of generating LCFS credits seems problematic for several reasons. Issuing LCFS credits or deficits on any basis other than the actual CI of fuel supplies undermines the program’s scientific credibility. Tying the issuance of LCFS credits and deficits to the policy-defined compliance schedule, rather than the actual emissions profile of fuel supplies, appears to be both arbitrary and inconsistent with regulatory intent and with the design of the balance of the program. Such a provision would represent an abrupt departure from the technically rigorous approach adopted throughout ARB’s implementation of the LCFS and would present a significant source of inconsistency.

At a more practical level, limiting credit generation for innovative methods of crude oil production, as proposed, would weaken the policy’s incentives for reducing fuel CI, directly contradicting the policy intent. The LCFS is explicitly structured as a “fuel neutral” performance standard that exclusively regulates lifecycle fuel CI. My understanding is that the innovative methods provisions were designed to maintain LCFS policy incentives to reduce the CI of crude oil production, even while incentives for crude oil shuffling are mitigated by assigning an average CI value to all crude oils used by refineries. Capping credit generation under the innovative methods provisions would substantially weaken incentives to deploy those innovative production methods capable of producing large CI reductions. This would compromise efforts to reduce the CI of crude oil production and refined fuels, directly contradicting both the intent of the innovative methods provisions and the central objective of the LCFS policy.

The proposed limitation on the LCFS credit generation potential of “innovative methods” would also increase compliance costs associated with achieving any particular CI reduction target. The LCFS structure as a fuel-neutral, market-based policy instrument directly supports economic efficiency. In particular, the policy incentives support least-cost compliance; however, capping the policy incentive available to certain low CI producers (e.g., by limiting LCFS credits issued under the innovative methods provisions) will result in unequal policy incentives across CI reduction strategies. Such an approach will likely shift the fuel mix away from the least cost portfolio of LCFS-compliant fuels, increase compliance costs, and decrease economic efficiency.

In response to questions posed at the workshop, ARB staff noted: (i) that the full CI reduction resulting from innovative methods of crude oil production would be reflected in computing the annual average CI value for crude oil supplied to California; (ii) that treatment of crude oil has always been differentiated from treatment of other fuels; (iii) that this reflects in part the policy’s objective to support a shift away from petroleum fuels; and (iv) that there was concern that adoption of “innovative methods” could create a flood of LCFS credits, thereby weakening the policy incentive to supply non-petroleum low

carbon fuels. These are all thoughtful points. My initial reactions to these comments are provided below.

Accounting for the full CI reduction achieved via innovative methods in determining the average CI of crude oil supplies while capping the quantity of LCFS credits issued under the innovative methods provisions seems problematic for at least three reasons. First, adopting multiple CI values for the same unit of crude oil creates inconsistency within the policy and compromises the policy's scientific credibility. If the CI of a particular crude is known, that value should be reflected consistently throughout the policy, not varied across multiple provisions of the regulation.

Second, granting LCFS credits according to the CI reduction resulting from innovative method while also reflecting this CI reduction in determining the annual average CI of crude oil supplies appears to effectively double count the CI reduction resulting from the innovative method. The annual average crude CI value defines the quantity of deficits generated by petroleum fuels. Using the reduced CI value resulting from adoption of innovative methods to calculate the average annual CI value for crude oil will effectively reduce both the number of deficits generated by petroleum fuels and the number of LCFS credits required to achieve compliance. It would effectively reduce demand for LCFS credits in proportion to the CI reduction achieved by the innovative methods. On the other hand, issuing LCFS credits equivalent to the CI reduction resulting from adoption of innovative methods will inject an equivalent number of LCFS credits into the program. This will increase the supply of LCFS credits and reduce the number of credits required from other low carbon fuel supplies to achieve compliance. The proposed approach would *both* reduce the number of deficits generated by petroleum fuel *and* increase the quantity of LCFS credits available, effectively double-counting the CI impact of innovative methods.

With this in mind, in order to maintain appropriate incentives for reducing the CI of all transportation fuels, I respectfully suggest the following:

1. That LCFS credits be issued under the innovative methods provisions in proportion to the actual CI reduction achieved using innovative methods of crude production; and
2. That the CI of the comparison baseline method (from which the CI reduction of innovative methods are measured) be used to compute the regulatory average annual crude CI value.

This would avoid a key pitfall of the current proposal—to reduce demand for low carbon fuels more than is warranted by CI reductions achieved through innovative methods (i.e., by both issuing credits and reducing deficits in proportion to the CI reduction). At the same time, issuing fewer LCFS credits than is warranted by the CI reduction achieved by the innovative method creates unequal value for CI improvements across fuel types, compromising the policy's fuel neutrality and economic efficiency. In particular, reducing the number of deficits generated by petroleum fuels supplied by all producers (e.g., by use the actual CI of crudes produce with innovative methods for computing the average annual crude CI) does not provide direct incentives for crude oil producers to develop and implement innovative, low carbon production methods. These incentives only come from the credits issued under the innovative methods provisions. Issuing LCFS credits under the innovative methods provisions in proportion to the CI reduction actually achieved is the only mechanism available for ensuring the LCFS policy incentives are effectively transmitted to oil producers.

Using the CI value associated with the conventional baseline from which the CI reduction of innovative methods are measured ensures that the CI reduction achieved is not double counted. Importantly, this differentiated treatment of crude oil CI values (i.e., issuing credits for the full CI reduction while using

the CI value of the comparison baseline to compute the average annual crude oil CI value) is not arbitrary, but coherently captures the emissions profile of crude production in a way that reflects innovative aspects of the production method without double counting the reduction. In principle, this approach will both extend appropriate LCFS incentives to innovative crude oil producers and preserve the strength of LCFS incentives for all other fuel suppliers.

ARB staff's comments regarding both the differentiated treatment of petroleum fuels versus other types of fuels and the policy motivation of fuel diversification away from petroleum fuels appears reasonable, but may be worth some additional consideration. My understanding is that that the differentiated treatment of petroleum fuels is motivated by technical and market considerations specific to petroleum fuels and that it was never intended to violate the policy's structure as a fuel-neutral performance standard. Suggesting otherwise could undermine the policy's scientific basis and the scientific credibility of ARB.

ARB staff's concerns that LCFS credit markets might be swamped by credits issued under the innovative methods provisions are understandable and suggest that the potential to reduce emissions from crude oil production may be substantially greater than was originally anticipated. If true, I would argue that this is an extremely positive result, evidencing the policy's power to stimulate innovation across all fuel supplies. Many policy critics argued that the policy effectively picked winners and losers by defining incentives in a way that limited potential contributions from petroleum fuels. The emerging potential of innovative methods of crude oil production directly contradicts such claims and represents an important victory for the policy.

I respectfully submit that the appropriate response to this recognition is to adopt an increasingly aggressive compliance schedule during the 2020-2030 period, not to devalue the credit generation potential of innovative methods, which risks undermining the policy's fuel neutrality and scientific credibility. I would further note that staff's current proposal would be more disruptive to LCFS credit markets than the approach suggested here, due to the double counting of CI reductions implicit to the current staff proposal.

Deferral of CCS integrated with CO₂-EOR as an innovative method of crude oil production

ARB staff's proposal to defer explicit definition of CCS integrated with CO₂-EOR ("CCS-EOR") as an innovative method may be intuitively appealing, but is inconsistent with the current regulation and creates unnecessary regulatory uncertainty. ARB staff indicated that this proposal reflects the need to establish appropriate measurement, reporting, and verification protocols ("MRVs") before credits can be generated with any innovative methods that include CO₂ capture and storage ("CCS"). This is reasonable; however, this requirement affects all innovative methods that include CCS, not only CCS-EOR, and this implicit requirement has not prevented explicit inclusion of production methods using CCS within the established innovative methods provisions. As a result, excluding CCS-EOR on this basis would be inconsistent with the established policy.

Deferring explicit inclusion of CCS-EOR within the innovative methods provisions creates unnecessary regulatory uncertainty. A decision to defer inclusion of CCS-EOR within the innovative methods provisions (because they will require development of appropriate MRVs) sends a very different message to market participants than explicitly including CCS-EOR with the requirement that appropriate MRVs will be required before credits can be generated. In the former case, energy markets have no assurance

regarding the policy treatment of fuels resulting from CCS-EOR projects. In the latter case, the market has a clear signal and basis for investing in development efforts, with an understanding that MRVs will be required in order to secure LCFS credits. Capital intensive energy projects, such as those required to implement CCS-EOR, take years to develop. As such, deferring inclusion of CCS-EOR within the innovative methods provisions risks creating long delays in the implementation of CCS-EOR projects. This has negative consequences for energy investments within California, due to the significant potential for CCS-EOR projects within California, and contradicts the policy intent for “early action measures”.

Moreover, the time required to develop effective CCS-EOR projects suggests that prolonging uncertainty regarding the regulatory treatment of crude oils produce via CCS-EOR will substantially delay potential contributions from such projects toward LCFS compliance and broader climate policy goals. For example, such a delay may require ARB to adopt a less aggressive compliance schedule for the 2020-2030 period, which would represent a lost opportunity for advancing California’s climate policy objectives. Moreover, potential for CCS-EOR projects to accelerate development of CCS technologies and infrastructure required to achieve California’s 2050 emissions targets suggests that near-term delays could negatively impact our ability to achieve long-term climate policy objectives.

For all of these reasons, I respectfully suggest that ARB staff amend their proposal to explicitly include CCS-EOR under the innovative methods provisions with a requirement that appropriate MRVs be developed and implemented before crudes produced from such projects are eligible to generate LCFS credits.