



EBR Development LLC



Mr. Samuel Wade
Chief, Transportation Fuels Branch
Industrial Strategies Division
California Air Resources Board
1001 I Street
P.O. Box 2815
Sacramento, CA 95812

October 20th, 2017

Dear Mr. Wade:

The undersigned organizations appreciate the opportunity to offer comments on the Preliminary Draft of Potential Regulatory Amendments to the Low Carbon Fuel Standard insofar as this draft pertains to Carbon Capture and Sequestration (CCS) technology.

We represent a diverse group comprised of industrial sources of greenhouse gases (GHGs), potential CCS project developers, technology providers, academics, and non-governmental organizations (NGOs). We are united in our view that deployment of CCS is critical to reaching California's GHG reduction

goals, and that the outcome of California Air Resources Board's (ARB) current effort to adopt a Quantification Methodology (QM) and regulatory requirements for CO₂ storage will, in great part, determine the extent to which CCS can play that role.

New section to allow for the use of CCS under ARB's upcoming rules (§95490)

We are pleased to see the preparatory work to modify the Low Carbon Fuel Standard (LCFS) regulation to allow for the use of CCS as a GHG mitigation option, and that the reference to a Board-approved quantification methodology has now been made specific in anticipation of this methodology's adoption next year.

We support the proposed eligibility for alternative fuel producers, refineries and oil and gas producers that capture CO₂ to receive credits [§95490(a)(1)(A)].

We also support proposed language that allows for captured CO₂ to be sequestered either on-site or off-site [§95490(a)(1)(A)]. This takes into account the important fact that the best geologic repository for CO₂ may not be located on-site.

CO₂ capture off-site should be eligible in some cases

However, we note that eligibility for CCS credits is limited to CO₂ that is captured on-site [§95490(a)(1)(A) and §95489(c)(1)(A)(2)]. We believe that there are cases where capturing off-site would meet the objectives of the program and as such should be allowed.

ARB should allow appropriate credit even if the CO₂ emissions are captured off-site, provided this leads to a lower-carbon energy input into the fuel supply chain of the crude oil.¹ ARB should seek further stakeholder input on this topic to discuss possible applications and modalities to establish a link between the implementation of capture off-site and the reduction in carbon intensity of the fuel that is finally produced.

Buffer Account

The Preliminary Draft of Potential Regulatory Amendments includes a provision for a share of credits from CCS projects to be held in the Buffer Account [§95486(a)(3)(B)]. We understand the intent behind the Buffer Account to be creating a form of an insurance pool against the risk of emission reversals from CCS projects. A similar approach is taken for forestry projects. We support the concept of a risk pool but urge ARB to clarify its intent regarding the share of emission reductions it intends to divert into this account. The nature of this provision could be dramatically different depending on the value of the proposed value "X". Even small variations in "X" could have a significant effect both on risk management but also on project economics.

ARB should explain how it intends to establish this level, and provide guidance on the range currently under consideration. We see a range of possible approaches here. If the intent is to hold sufficient credits from each operator individually for the eventuality of a reversal, "X" should be larger. If,

¹ Some, but not all, of the undersigned believe that credit under this section should be allowed for any anthropogenic CO₂ that is captured outside the crude oil production facilities for the purpose of injection in the oil field.

however, the intent is to create a form of insurance pool whereby CCS credit generators collectively cover a small number or low risk of eventualities by contributing as a group, then “X” should be smaller. This merits further discussion between ARB and stakeholders.

As a starting point for consideration, we emphasize that the mechanics of trapping CO₂ in the subsurface are vastly different than doing so through forestry. The risk of CO₂ release and credit reversal is lower, more concrete, and easier to manage. In addition, there are physical limits to how much CO₂ can be released – even deliberately – and how fast. Research and experience demonstrate low risk of releases to the atmosphere from geologic sequestration at properly selected and operated sites,^{2,3} and risk is likely to decline even further once injection ceases.⁴ The QM and Permanence Protocols now under development by ARB for CCS projects are designed to reinforce this low risk of reversal. We urge that these factors be considered when setting the level of contribution into the Buffer Account.

We recommend that the contribution level for each project and storage site into the Buffer Account be set based on its own risk profile. Sites with a higher risk profile should make larger contributions. In addition, we recommend that Buffer Account contributions function like an escrow account, whereby a portion of the credits set aside are returned to the project operator after data and experience demonstrate with a high degree of confidence that reversals are no longer possible. This is supported by the fact that typically risk will be greatest during the start of a project when data and experience are limited, and lowest later, especially after injection ceases and the pressure driver for CO₂ movement is taken away. Reaching certain landmarks in the Permanence Protocol and QM could be the trigger for release of credits.

We urge further discussion on the possibility of third parties, unrelated to the credit generator or project operator, causing a release of CO₂ through their actions in the future, inadvertently or deliberately. Given the operating time horizon of CCS projects that may well span decades, such eventualities are best dealt with through regulating those third parties against such releases and holding them responsible, rather than the credit generator or project operator.

We agree with the proposal in §95486(a)(2) that credits not be retroactive but believe that those credits represent real GHG reductions and could be diverted into the Buffer Account for CCS. §95486(a)(2) expressly forbids retroactive credits from innovative crude and CCS projects to be claimed. With that stated, we would like ARB to consider the timing of the fuel pathway process in relation to when credits can be placed in the Buffer Account. Twenty-four months of operational data is required for certified fuel pathways under §95488.5(a) and §95488.6(a), and 3 months of data is required for provisional pathways under §95488.8(c) to obtain a provisional fuel pathway score. Real GHG emission reductions would not result in credits into the Credit Bank and Transfer System while the projects are operating and waiting for fuel pathway finalization. Once ARB has finalized a pathway to the Executive Officer, these pre-approval emission reductions could be recognized with credits that are deposited into the Buffer Account.

² Bert Metz, Ogunlade Davidson, Heleen de Coninck, Manuela Loos and Leo Meyer (Eds.), *“IPCC Special Report on Carbon Dioxide Capture & Storage”*, 2005. Cambridge University Press, UK.

³ Rajesh Pawar, *“Recent advances in risk assessment and risk management of geologic CO₂ storage”* International Journal of Greenhouse Gas Control, vol. 40 (Sep. 2015): 292-311.

⁴ Due to the removal of the pressure driver, and due to the reinforcement of dissolution and mineral trapping.

At present, ARB has no specified time frame to review and approve fuel pathway applications. We recommend ARB to certify pathways within 6 months of submittal to avoid excessive numbers of credits being diverted to the Buffer Account as described in the preceding paragraph. This 6-month approval timeline lines up with previous treatment of provisional pathways under current LCFS regulation.

It is also implied under §95495(b)(6) that credits in this account can be used to “*address invalidated credits or uncovered deficits*”. We believe that the bulk of the buffer account credits would be coming from CCS projects in the future and that the burden of insuring the entire program for invalid credits or uncovered deficits should not be placed solely on CCS projects. Credits entering the buffer account from CCS projects should be used to satisfy deficiencies from those project types alone.

Refinery Investment Credit Limitation

Carbon capture and sequestration involves a combination of technologies that benefit from economies of scale, and that are not worth pursuing de minimis. In addition to the substantial capital investment at the capture plant, a CO₂ pipeline must be permitted and constructed, a suitable geologic reservoir must be characterized authoritatively⁵, and the right to inject acquired individually from all land owners whose property overlies the predicted extent of the CO₂ plume in the subsurface. Moreover, there are numerous sources of CO₂ at refineries. The best candidates for capture are the hydrogen production plant and the crackers. Combined, they typically amount to 20-25% of a refinery’s total CO₂ emissions. It would not make economic sense to pursue all the necessary steps described above but not capture the bulk of CO₂ emissions from those sources. A smaller-scale project would be extremely unlikely to be implemented, with a possible exception being the testing of new technologies at smaller scales.

However, the current LCFS regulation text imposes two restrictions on credits from CCS installed at refineries. §95485(d)(1) restricts the ability of a fuel reporting entity to using no more than 20 percent of credits generated through the Refinery Investment Credit to meet its annual compliance obligation. This would apply to CCS installed at a refinery as well. Concurrently, §95489(f)(1)(F) prevents the sale or transfer of these credits to any other party. Combined, those two provisions could mean that refinery CCS projects may need to be downsized significantly, potentially resulting in no major investments taking place using this technology.

Given the projected finalization of a QM for CCS in early 2018, ARB should reexamine whether the applicability of the two constraints in the provisions mentioned above would preclude or unduly limit the use of this technology, which can result in significant emission reductions, and whether these restrictions are appropriate in this case. We support modification of these two provisions as necessary in order to avoid this, provided this does not compromise the main compliance mechanisms under the program and the smooth functioning of the credit market.

Buyer Liability/Buffer Account Issue

Language under the Authority to Suspend, Revoke or Modify [§95495(b)(5)] suggests that ARB will impose a buyer liability for use of credits generated through CCS in the event these credits are later invalidated due to sequestered CO₂ being released to the atmosphere regardless of cause or fault of the operator. Other language under Generating and Calculating Credits and Deficits [§95486(a)(3)(D)]

⁵ This may involve drilling of new wells and the use of one or more direct measurement, geophysical or other geologic characterization techniques.

indicates the “person responsible for the reversal or credit invalidity” will be responsible to reimburse the program. We ask ARB to clarify its intent on this issue.

We thank ARB for its work on this topic, and stand ready to answer any questions.

Sincerely,

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⁶ The views of the researcher do not necessarily represent the views of Stanford University.