



Low-Carbon Cement Protocol Workgroup Meeting Notes and Takeaways

Workgroup Meeting Date: 3/17/2023

Link to review recording: <https://youtu.be/vTbKZuAaPf8>

Workgroup Members in attendance:

Name	Organization	Present (P)/Absent (A)
Adam Swercheck	Lehigh Hanson (Secondary)	P
Christina Theodoridi	NRDC	A
Danny Gray	ECO Materials	P
David Bangma	Ash Grove	P
David Perkins	Lehigh Hanson	P
Eric Giannini	Portland Cement Association (Secondary)	P
Dale Prentis	Institute for Carbon management UCLA (Secondary)	P
James Carusone	Salt River Minerals	P
James Salazar (Concrete)	Athena Institute (Secondary)	A
Jamie Farny	Portland Cement Association	A
Jamie Meil (Cement)	Athena Institute	P
Jimmy Knowles	SEFA Group	P
Kayla Carey	ClimeCo (Secondary)	P
Lauren Kubiak	NRDC (Secondary)	P
Lauren Mechak	ClimeCo	P
Matthew Lemay	National Ready Mix Concrete Association	P
Miguel Angel Freyermuth	Ruby Canyon Environmental	P
Ram Verma	California Department of Water Resources	P
Seth Baruch	Carbonomics	P
Thomas Van Dam	Nichols Consulting Engineers (NCE)	P

Agenda:

- **Quantification:**

- o We have included the proposed methodology for quantifying the emission reductions from a low-carbon cement project. Emission reductions, and resulting carbon credits, are based on the difference between baseline and project emissions. Baseline and project emissions are calculated through a series of equations which will be presented for your review and

comment. We are proposing a hierarchy approach for data used in these calculations – ranging from plant specific data to EPDs or regional datasets.

- Please note we have adjusted the GHG Boundary for your review and comment. The updated copy includes end-of-life waste emissions to align with the cement EPD. We have also added this to the project emissions equation and drafted an equation to calculate these waste emissions. Your review and comments are appreciated.
- Additionally, we have adjusted the baseline emission equation to include CO₂ removals. Please review this addition and the associated additional equation for carbon sequestered in concrete. We appreciate your feedback.
- **Please come prepared to comment on these data collection methods from your perspective to help inform the availability and accuracy of these methods.**

- **Monitoring, Reporting and Verification (MRV):**

- Monitoring parameters outlines the necessary data to calculate baseline and project emissions. All monitoring parameters, with measurement methods and frequency, will be proposed for your review and comment.
- Reporting parameters are the requirements and guidelines on reporting rules and procedures for the low-carbon cement project. We have proposed project submittal documentation, record keeping requirements, reporting periods and verification site visits for your consideration and comment.
- The verification section of the protocol provides verification bodies with guidance on verifying GHG emission reductions associated with the project activity. For your review and comment, we have included the proposed list of eligibility, quantification, and risk assessment items that a verifier would be reviewing and checking during each verification period.
- **Please bring forward any concerns or challenges with the proposed list of monitoring parameters, reporting parameters or verification requirements.**

- **Follow-up Items:**

- **Project Ownership:** Based on our quantification and MRV discussion, does the group still believe that the default project owner should be the SCM/ACM producer with options to transfer rights to another entity in the supply chain (i.e., cement or ready-mix facility)? What documentation can be used to ensure the SCM/ACM product displaced PC cement within the concrete product (TBD)?
- **ASTM Standards:** Based on previous discussions, we have added a section (Section 3.6) to provide an overview of the ASTM International standards and requirements relevant to this protocol. We shared a table of SCMs/ACMs with their best associated ASTM standard for your review and comment.
- **Additionality:**
 - For the Legal Requirement Test, we are proposing that the North Carolina Coal Ash Management Act pose as an example of a project that would be deemed ineligible based on legal requirement. The Attestation of Voluntary Implementation form would remain the same to suffice the Legal Requirement Test.
 - Following our last discussion, we have attempted to expand on the Performance Standard Test with industry statistics and a proposed method to determine market permanence of new, novel products.
- **Leakage:** If time permits, we will begin a discussion on leakage and the potential concerns we will need to safeguard against. This may need to be an additional section within the protocol (TBD). Please bring forward your initial thoughts and comments.

Main Points of Discussion and Decisions Made in Meeting:

- **GHG Boundary**
 - **CO₂ Injection & Mineralization**
 - Some projects would be sequestering CO₂ and also lead to greater carbonation and sequestration during service, so how would that be accounted for? The GHG boundary as it is now only accounts for the SCM product itself, not for the mineralization of CO₂ in concrete or the CO₂ capture process.
 - Idea is that the CO₂ removal would be in addition to the PC displacement, meaning the CO₂ capture would be an additional aspect of the quantification.
 - Members of the workgroup commented that a significant amount of additional information would be required and that it would be onerous and difficult to prove mineralization unless an LCA or EPD was produced for generic concrete and then one concrete using an SCM that would increase carbonation.
 - Mineralization takes place within the existing boundary and carbon capture would be outside of the current boundary - how would we assess the emissions from carbon capture? Suggestions that it would be treated similarly to the mined and transport emissions but also notes that it could be another quantification or protocol.
 - **SSR10 & 11**
 - Current boundary is very cementitious focused, not concrete focused, which may be an issue if we're using concrete EPDs in the baseline. Debate as to whether SSR 10 and 11 should be included in the GHG boundary.
 - Members of the workgroup comment that it would be best to have verification up to the point of the ready-mix facility.
 - Some work group members commented that SSR 10 could be very different depending on where SCMs are sourced and on average. There will potentially be a significant difference for these innovative products vs Portland cement due to sourcing locations of by-product or natural products. SSR11, the emissions from mixing at ready-mix concrete facilities will probably be the same or deminimis, but by including it in the boundary, we're making sure that the SCM is actually being used and that the batch ticket will be produced at that point.
 - Other comments from the workgroup noted a potential 1:1 replacement. We need to know how much cement vs fly ash vs slag is used in a typical mix and then in the SCM mix. The SCM numbers will be 15-20% in a mix used on average and it will be fly ash. We need to be able to validate that at the end-user of the concrete plant. Potential for an Attestation Form to meet this concern.
- **Quantification:**
 - **Does the group generally agree with the use of Portland cement as the baseline? Where would Portland limestone cement come into play?**
 - Portland limestone cement is starting to take up a larger market share
 - We could assume that we're displacing cement at a high level, maybe proportional to the market share of Portland cement vs Portland limestone cement to create a market baseline.
 - Discussed how to best capture this in the baseline - will require more thought, especially if we want to account for this transition and change to the baseline scenario in the future.
 - Noted that we could revisit and update the baseline based on market shares as needed over time with a 2.0 update as more data becomes available.

- **Would facility-level data ever be made available to SCM producers and if the EPDs would work as emission factors?**
 - Leave data hierarchy as is, with option 1 still included, while knowing that the regional average EPDs/industry-wide data will more likely be used.
 - Product-specific EPDs are facility-level and facility-specific data for those particular products. However, the group doubts SCM producers will know whose cement their SCMs will be replacing. Therefore, using regional/industry-wide average may make more sense and simplify this whole process.
 - Comments from the workgroup that EPDs are third party verified and could be used for product emission factors.
 - Reserve isn't familiar with the details of how EPDs. We'll have to look closer at EPDs to see how they align or do not align with our quantification approaches.
 - Will need to review and discuss use of EPDs at next meeting.
- **Quantifying CO₂ captured and permanently removed through mineralization and/or injection**
 - Workgroup notes that equation generally makes sense and did not flag any concerns during the meeting.
 - Concerned that there's no accounting of fugitive emissions during the mineralization process.
 - Accounting for capture and curing would be difficult to quantify and track within this protocol.
 - CO₂ capture and compression emissions would be considered the same as mining and manufacturing any SCM—need to discuss further.
- **End of Life Waste Emissions**
 - Need to review whether EPDs account for displacement of waste for SCMs derived from waste products (like fly ash).

Pending Questions for the Workgroup:

- **GHG Boundary:**
 - Revisit inclusion/exclusion of SSR10 and 11 from the verification standpoint.
 - CO₂ removals/injection: if included, is there anything outside the current GHG boundary (origin of CO₂) that needs to be added?
 - Need to decide if fly ash scarcity is a fair assumption that all SCMs will be displacing Portland cement.
- **Quantification**
 - How should the baseline be looked at for Portland cement vs Portland limestone cement and how should it be updated over time?

Action Items for the Reserve:

- Considering a market-based approach to the baseline for Portland limestone cement—could this be updated over time as it replaces Portland cement?
- Review EPD production guidelines for product-specific and regional/industry-wide EPDs.
- CO₂ additives vs concrete, maybe use carbon star, assume that CO₂ capture emissions are the same as mining for an SCM – Reserve to review inclusions of removals in more detail.
- Transportation and mining, can we streamline that verification process if occurring at multiple locations – take a conservative approach.
- Review overarching alignment of EPDs with offset accounting.
- Investigate whether EPDs account for displacement of waste for SCMs derived from waste products (like fly ash).
- Review project emission quantification calculations to comment on the accuracy of various emission factors, emission types, etc.