

RULE UPDATE

CARBON MINERALISATION USING REACTIVE MINERAL WASTE

PUBLICATION DATE – 18/11/2025

VERSION - V1.0

RELATED DOCUMENTS

– [Carbon Mineralisation using Reactive Mineral Waste \(V2.0\)](#)

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SUMMARY

This Rule Update is applicable to the methodology for [Carbon Mineralisation using Reactive Mineral Waste \(V2.0\)](#). Firstly, the update strengthens project sink calculations for aqueous state/slurry carbonation by accounting for CO₂ loss during the reactor startup and shutdown processes (previously thought to be negligible). The inclusion of this new parameter increases the accuracy and conservativeness of the calculation of the net removals. Secondly, the Rule Update includes provisions for reversal mitigation while the Reversal Risk Assessment for Mineralised Carbon is in development.

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1 | ACCOUNTING FOR CO₂ LOSS DURING AQUEOUS STATE/SLURRY CARBONATION

1.1 | Consideration of parameter

1.1.1 | In V2.0 of the methodology for [Carbon Mineralisation using Reactive Mineral Waste](#), the mass of CO₂ exiting the carbonation process during aqueous state/slurry carbonation ($m_{CO_2,i,d}^{lost}$) was considered negligible, as per para. 5.6.8:

5.6.8. | "For input to Equation 3, the mass of CO₂ exiting the carbonation process during direct aqueous state/slurry carbonation, $m_{CO_2,i,d}^{lost}$, is negligible as the inflow of CO₂ is optimized to prevent bubbling and CO₂ release from the tank (see Annex 1 for further information). Direct aqueous state/slurry carbonation shall be referred to as slurry throughout the text for simplification."

1.1.2 | However, pilot studies (Neustark) have shown that this would not always be the case. There may be a loss of CO₂ during the operational flooding of the reactor with gaseous CO₂ during the startup and shutdown processes (Figure 1). This loss shall therefore be accounted for and deducted from the total mass of CO₂ injected into the reactor in order to determine the amount of CO₂ stored ($PS_{CO_2,i,d}$).

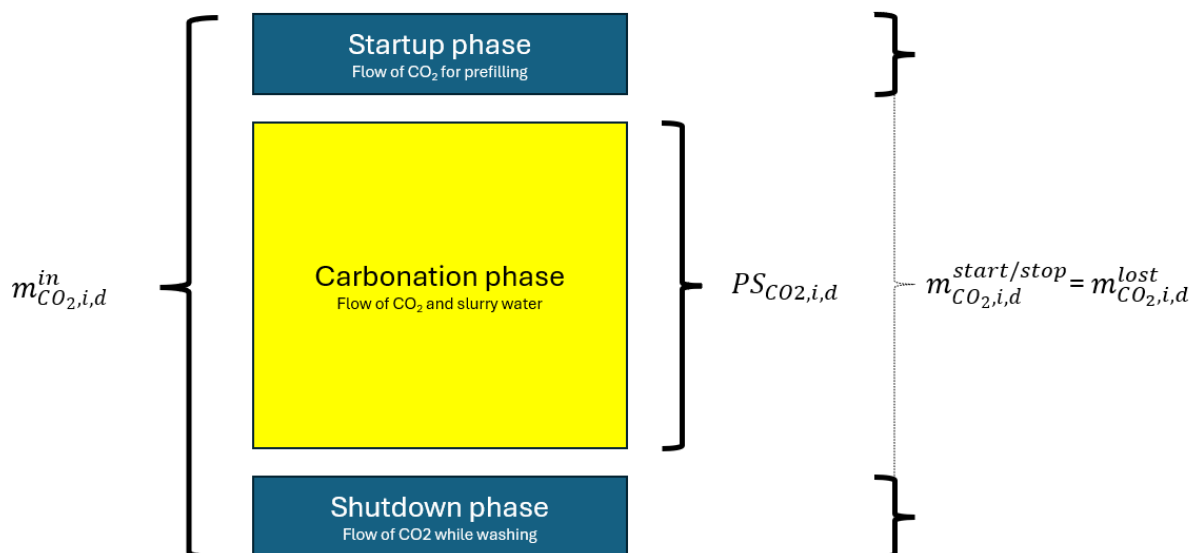


Figure 1. The CO₂ injected ($m_{CO_2,i,d}^{in}$) shall comprise the stages of startup, process carbonation and shutdown of the system.

- 1.1.3 | A parameter accounting for the loss of CO₂ during the startup and shutdown processes ($m_{CO_2,i,d}^{start/stop}$) shall hence be included as per Section 1.2 for all activities involving aqueous state/slurry carbonation.

1.2 | Inclusion of parameter

- 1.2.1 | To account for CO₂ loss during the startup and shutdown processes, the following text shall supersede para. 5.6.8 in V2.0 of the methodology for [Carbon Mineralisation using Reactive Mineral Waste](#):

For input to Equation 3, the mass of CO₂ exiting the carbonation process during direct aqueous state/slurry carbonation ($m_{CO_2,i,d}^{lost}$) shall consider eventual losses of CO₂ during the reactor startup and shutdown processes, $m_{CO_2,i,d}^{start/stop}$. Any other losses are considered negligible as the inflow of CO₂ is optimized to prevent bubbling and CO₂ release from the tank (for further information see Annex 1 in V2.0 of the methodology for [Carbon Mineralisation using Reactive Mineral Waste](#)). Direct aqueous state/slurry carbonation shall be referred to as slurry throughout the text for simplification.

$$m_{CO_2,i,d}^{lost} = m_{CO_2,i,d}^{start/stop}$$

Where:

$m_{CO_2,i,d}^{start/stop}$ = Mass of CO₂ used during the reactor startup and shutdown processes which was not stored in material *i* and grain size *d* during the monitoring period *y* (t CO₂).

- 1.2.2 | The following details shall be used for the monitoring of $m_{CO_2,i,d}^{lost}$.

Parameter ID	22
Data/Parameter:	$m_{CO_2,i,d}^{start/stop}$
Data unit:	t CO ₂
Description:	Mass of CO ₂ used during the reactor startup and shutdown processes which was not stored in material <i>i</i> and grain size <i>d</i> during the monitoring period <i>y</i> (tCO ₂).
Source of data:	On-site measurements. The gas flow rate is measured through a calibrated mass flow meter (e.g. see Parameter 13 in V2.0 of the methodology for Carbon Mineralisation using Reactive Mineral Waste). In case the gas is not pure CO ₂ (CO ₂ concentration below 98%), the composition may be measured with a corresponding device.
Measurement procedures (if any):	See Parameter 13 in V2.0 of the methodology for Carbon Mineralisation using Reactive Mineral Waste

QA/QC procedures:	Measured results shall be cross-checked with previously obtained results.
Monitoring frequency:	At the start and stop of plant operation, aggregated to the total amount per monitoring period.
Any comment:	-

2| REVERSAL MITIGATION

2.1 | Temporary measures for reversal mitigation

2.1.1 | In V2.0 of the methodology for [Carbon Mineralisation using Reactive Mineral Waste](#), reversal mitigation requires evaluation of the activity according to *TOOL X: Reversal Risk Assessment for Mineralised Carbon*, as per para. 5.10.2 and para. 5.10.3:

5.10.2 | *"The project developer shall determine the potential risk of reversal at each verification following TOOL X: Reversal Risk Assessment for Mineralised Carbon (in development)."*

5.10.3 | *The project developer shall contribute GS-VERs to the Gold Standard buffer pool corresponding to the highest of the following options:*

- a. *The reversal risk score determined per TOOL X: Reversal Risk Assessment for Mineralised Carbon (in development), or*
- b. *The default value of 2.5% of the CO₂ removals."*

2.1.2 | While *TOOL X: Reversal Risk Assessment for Mineralised Carbon* is in development, activity developers shall demonstrate that there is no significant risk of carbon being rereleased at the product's end of life, as per para. 5.10.1 in the methodology for [Carbon Mineralisation using Reactive Mineral Waste](#), and a default buffer contribution of 2.5% of GS-VERs shall be applied.

2.1.3 | The number of GS-VERs to be transferred to the buffer pool shall be rounded up to the nearest whole number.

DOCUMENT HISTORY

Version	Date	Description
1.0	18/11/2025	First Version