The GHG emission avoidance calculation in practice

Credit for carbon capture and storage

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Carbon Capture and Storage (CCS) - Carbon Capture and Use (CCU)

- Capturing and compressing CO_2 from point sources or the air for injection in a storage site or for incorporation into a product.
- Applications can be submitted by any players in the CCS supply chain (demonstrating the provision of the remaining services).
- EII and RES projects with CCS component: CCS part is calculated according to this section and introduced in EII/RES GHG calculations.
- No difference between CO_2 captured from fossil and biogenic sources. Biogenic CO_2 credit given to the emitting facility.

$$CC_{credit,y} = CC_{storage,y} + CC_{use,y} - (CC_{capture,y} + CC_{pipeline,y} + CC_{transport,y} + CC_{injection,y} + CC_{EHR,y})$$

- $CC_{capture,y}$: emissions from the CO_2 capture activities
- $CC_{pipeline,y}$: emissions from transport of CO_2 by pipelines
- $CC_{injection,y}$: emissions from injection at the geological storage site
- $CC_{EHR,y}$: emissions when storage is associated with EHR

$$CC_{transport,y} = Proj_{transport,road,y} + Proj_{transport,rail,y} + Proj_{transport,maritime,y}$$

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$CC_{transport,y}$ calculation

Parameter	=	Equation
$CC_{transport,y}$	=	$CC_{transport,road,y} + CC_{transport,rail,y} + CC_{transport,maritime,y}$
$CC_{transport,road,y}$	=	$\sum_{L=1}^{T} (Kroad_{,L} * CO_{2road,L} * EFroad * 10-3)$
$CC_{transport,rail,y}$	=	$\sum_{L=1}^{T} (Krail_{,L} * CO_{2rail,L} * EFrail * 10-3)$
$CC_{transport,maritime,y}$	=	$\sum_{L=1}^{T} (Kmaritime_{,L} * CO_{2maritime,L} * EFmaritime * 10-3)$

Carbon Capture and Storage (CCS) Example: transport and storage

Potential SIW: omission of project emissions (e.g.: transportation components), poor methodology to estimate leakages, etc.

1. Description: Project intends to build a special transport system to transport large volumes of CO_2 by pipeline to the storage site
2. Sector classification: EII /other / CO_2 transport&storage
3. GHG calculation: Section 3 of emissions avoidance calculation methodology

$$CC_{credit} = \sum_{y=1}^{10} \left(CC_{storage,y} - CC_{capt,y} - CC_{pipe,y} - CC_{inject,y} - CC_{tranport,y} - CC_{EHR} \right)$$

- $CC_{capt,y}$: Fuel and material use + fugitives+venting pre-injection
- $CC_{pipe,y}$: Emissions at support installations + fugitives + venting + leakage
- $CC_{inject,y}$: Emissions from fuel use at booster station + venting + leakage
- $CC_{tranport,y}$: Emissions at each transportation modal
- CC_{EHR}: Emissions from EHR

Data: CO_2 transferred to capture facility; quantity of fossil fuel consumed; for fugitives (unintentional), leakage events and venting (planned) it will depend on the monitoring plan to be proposed by the applicant, and method of quantification selected.

Note that…

- The applicant shall secure a buyer of their technology and cover the whole cycle from capture to storage in their submission, which shall be part of the boundaries of GHG emission avoidance calculation. Companies will be required to monitor and report on emissions across all stages.
- Applications can be submitted with or without a Consortium. It is up to the applicants and players to organise themselves and split the revenues and liabilities.

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Carbon Capture and Storage (CCS)
Example: cement plant with CO2 capture and storage

1. Description: Project intends to produce cement in an innovative way and capture and store some of the CO_2 released
2. Sector classification: EII / cement & lime / cement
3. GHG calculation: EII, Section 2 of Annex C with CC (Section 3) integrated.
4. Reference: Cement EU ETS benchmark

$$\Delta GHG_{abs} = \sum_{y=1}^{10} (Ref_y - Proj_y)$$

EII

$$= \sum_{y=1}^{10} \left(Ref_y - (Proj_{inputs,y} + Proj_{processes,y} + Proj_{eol,y} + Proj_{combustion,y} + Proj_{changeuse,y} + Proj_{non\text{-}principal,y} \right)$$

Aside from all the EII processes involved in the production of cement, introduce also:

- The full amount of CO_2 generated by the project as a **positive term** (even though some of this CO_2 is to be captured)
- The CC credit calculated according to section 3 (CCS) as a **negative** term

Carbon Capture and Storage (CCS)
Example: waste to energy plant with CO2 capture and storage

1. Description: Project intends to produce bio-electricity from a waste to energy plant and capture and store some of the CO_2 released
2. Sector classification: EII / other / electricity
3. GHG calculation: RES, Section 4 with CC credit (Section 3) integrated.
4. Reference: expected 2030 electricity mix

$$\Delta GHG_{abs} = \underbrace{\sum_{y=1}^{10} (Ref_y - Proj_y)}_{\text{RES}} = \sum_{y=1}^{10} \left(Ref_{electricity} - Proj_y \right)$$

Possibility to claim net carbon removals credit if the project emissions are negative

Aside from the RES project emissions involved in the production of bio-electricity, introduce also:

- The amount of **biogenic CO_2** generated by the project **with an emission factor of zero** and the **fossil CO_2** generated as **a positive term** (even though some of this CO_2 is to be captured).
- The CC credit calculated according to section 3 as a **negative** term

Potential SIW: double-counting biogenic emissions.

Carbon Capture and Storage (CCS)
Example: Direct air capture and storage (DACCS)

1. Description: Project intends to remove CO_2 from ambient air and store it
2. Sector classification: EII / Other / CO_2 storage
3. GHG calculation: CC, Section 3

Possibility to claim net carbon removals credit if the overall project emissions are negative

$$CC_{credit,y} = \sum_{y=1}^{10} \left(CC_{storage,y} - CC_{capt,y} - CC_{pipe,y} - CC_{inject,y} - CC_{tranport,y} - CC_{EHR,y} \right)$$

Amount of CO_2 stored

Fuel and material use + fugitives + venting + leakage

Relative GHG emission avoidance will be set at 200% to grant DACCS with an advantage over conventional CCS

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Net carbon removals

- Total project emissions should be negative
- Negative emissions can only be claimed excluding any credit for timed operation
- non-principal products cannot be the only source of negative emissions
- Direct air capture projects shall be given an adjusted relative emissions avoidance score of 200% even if they claim credit for timed operations.

$$\widehat{\Delta \mathrm{GHG}_{\mathrm{rel}}} = \frac{\Delta \mathrm{GHG}_{\mathrm{abs}} + \sum_{y=1}^{10}\left(\mathrm{TO}_{y}\right)}{\sum_{y=1}^{10}\left(\mathrm{Ref}_{y}\right)}$$

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