

# The GHG emission avoidance calculation in practice

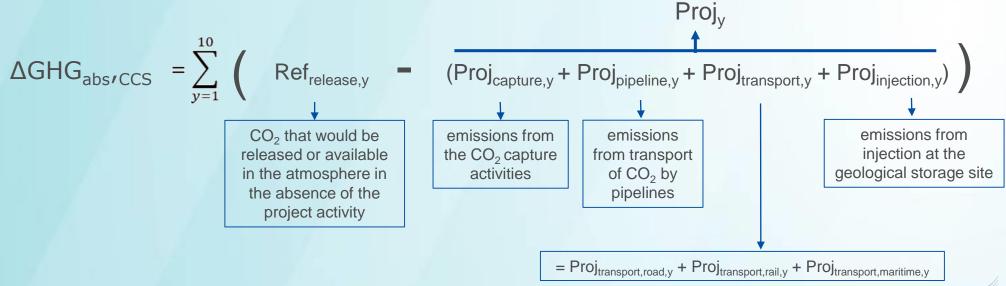
Carbon capture and storage

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### Carbon Capture and Storage (CCS)

- Capturing and compressing CO<sub>2</sub> from point sources or the air for injection in a storage site.
- Applications can be submitted by any players in the CCS supply chain (demonstrating the provision of the remaining services).
- <u>EII and RES projects with CCS component:</u> CCS part is calculated according to this section and introduced in EII/RES GHG calculations.
- No difference between CO<sub>2</sub> captured from fossil and biogenic sources. Biogenic CO<sub>2</sub> credit given to the emitting facility.





### Proj<sub>transport,y</sub> calculation

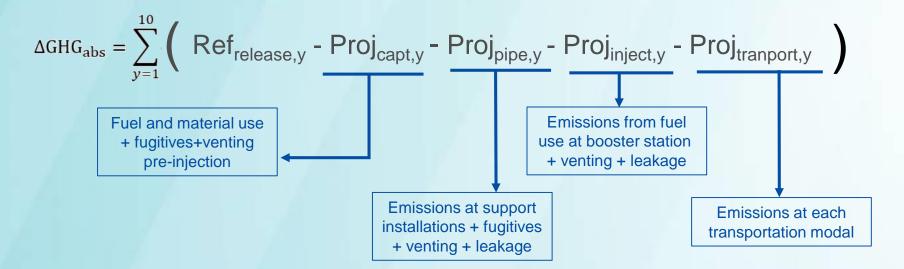
Parameter	=	Equation
Proj <sub>transport,y</sub>	=	Proj <sub>transport,road,y</sub> + Proj <sub>transport,rail,y</sub> + Proj <sub>transport,maritime,y</sub>
Proj <sub>transport,road,y</sub>	=	$\sum_{L=1}^{T} (Kroad_{,L} * CO_{2road,L} * EFroad * 10-3)$
Proj <sub>transport,rail,y</sub>	=	$\sum_{L=1}^{T}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



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

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

- Description: Project intends to build a special transport system to transport large volumes
  of CO<sub>2</sub> by pipeline to the storage site
- 2. Sector classification: Ell /other / CO2 transport&storage
- 3. GHG calculation: CCS, Section 3 of Methodology
- 4. Reference: CO<sub>2</sub> released to the atmosphere



5. Data: CO<sub>2</sub> 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.



## 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<sub>2</sub> released
- 2. Sector classification: EII / cement & lime / cement
- 3. GHG calculation: EII, Section 2 of Methodology with CCS (Section 3) integrated.
- 4. Reference: cement EU ETS benchmark

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

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

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

- The full amount of CO<sub>2</sub> generated by the project as a **positive term** (even though some of this CO<sub>2</sub> is to be captured)
- The CCS credit calculated according to section 3 of Methodology (CCS) as a **negative** term (i.e.: Ref<sub>release,y</sub> Proj<sub>y</sub>, where Ref<sub>release,y</sub> is the CO<sub>2</sub> that would be released in the absence of the project and Proj<sub>y</sub> the emissions due to the CO<sub>2</sub> capture, transport and storage)



# Carbon Capture and Storage (CCS) Example: waste to energy plant with CO<sub>2</sub> capture and storage

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

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

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<sub>2</sub> generated by the project with an emission factor of zero and the fossil CO<sub>2</sub> generated as a positive term (even though some of this CO<sub>2</sub> is to be captured).
- The CCS credit calculated according to section 3 of Methodology (CCS) as a **negative** term (i.e.: Ref<sub>release,y</sub> Proj<sub>y</sub>, where Ref<sub>release,y</sub> is the CO<sub>2</sub> that would be released in the absence of the project (fossil and biogenic) and Proj<sub>y</sub> the emissions due to the CO<sub>2</sub> capture transport and storage)

Potential clerical or manifest error: double-counting biogenic emissions.



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

- 1. Description: Project intends to remove CO<sub>2</sub> from ambient air and store it
- 2. Sector classification: EII / Other / CO2 storage
- 3. GHG calculation: CCS, Section 3 of Methodology
- 4. Reference: CO<sub>2</sub> removed from the atmosphere

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

$$\Delta \text{GHG}_{abs} = \sum_{y=1}^{10} \left( \begin{array}{c} \text{Ref}_{\text{release,y}} & -\text{Proj}_{\text{capt,y}} -\text{Proj}_{\text{pipe,y}} -\text{Proj}_{\text{inject,y}} -\text{Proj}_{\text{tranport,y}} \\ \end{array} \right)$$

$$Amount of CO_2$$

$$removed from$$

$$atmosphere$$

$$Fuel and material use$$

$$+\text{fugitives} + \text{venting} +$$

$$\text{leakage}$$

Relative GHG emission avoidance will be set at 100% to grant DACCS with an advantage over conventional CCS



#### Net carbon removals

Without permanent geological storage: relative GHG emission avoidance (e.g.: CCU)

#### **GENERAL RULES**

- Total project emissions should be **negative**.
- Negative emissions can only be claimed excluding any credit for timed operation.
- Non-principal products are not allowed to be the only source of negative emissions in the project.

#### With permanent geological storage:

• Total project emissions (should be negative)

DACCS: -∆GHG<sub>abs,CCS</sub>

**BECCS**: total project emissions with the CCS term integrated

- Relative net carbon removals:  $\Delta GHG_{abs,CCS} / \Sigma Ref_{release}$  (NOT necessarily the same value as the "relative GHG emission avoidance" explained in 1.1.2. of the GHG methodology) where:
  - DACCS: for the purpose of crediting carbon removals, the exact value should be calculated following the formula (note that for the main GHG calculation, this value was set as 100%)

#### > BECCS:

- $\Delta$ GHG<sub>abs,CCS</sub>: calculated based **ONLY** on the **BIOGENIC** fraction of the CO<sub>2</sub> emitted by the plant (i.e.:  $\sum$ Ref<sub>release</sub> in equation 3.1 the Methodology considering only the biogenic fraction of CO<sub>2</sub>) and that will be captured by the CCS facility (credit cannot be claimed for the fossil fraction of the CO<sub>2</sub> emitted (e.g.: WtE plant using waste from fossil and biogenic sources)).
- ∑Ref<sub>release</sub>: calculated as the sum of the TOTAL CO₂ emissions by the plant (i.e.: biomass and fossil, if applicable) and that will be captured by the CCS facility

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