Technical Workshop on Draft Methodology for Calculation of GHG emission avoidance

First Call for proposals under the Innovation Fund

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Context

- Low-carbon projects in energy-intensive industries, including substitute products and Carbon capture and utilisation (CCU);
- Carbon capture and geological storage (CCS);
- Renewable energy (RES) projects;
- Energy storage projects;
- Production of components for innovative RES and energy storage technologies.

Scope

- Support IF applicants estimate GHG emission avoidance over the first 10 years of operation.
- Form the basis of the scoring of the selection criterion “effectiveness of GHG emission avoidance”
- Serve as KPI for project monitoring
- Serves as the basis of disbursements of grants, as projects that reach >75% of the projected emissions avoided over the first 3-10 years of operation will receive 100% of the grant.

Main Principle

Emissions savings from projects applying for funding under the Innovation Fund will be the difference between:

- the emissions from the project activity, and
- the emissions that would occur in the absence of the project.

Use

- Get consensus on how the methodologies shall be shaped so that they are:
  - sufficiently robust to reflect the emissions occurring in both reference and projects scenarios,
  - not disproportionate complicated to discourage applicants or generate administrative burden for MRV and evaluation purposes.

Workshop Objectives
Potential approaches for quantification of GHG emissions savings

CCS, Renewable energy, Energy storage
Potential approaches for quantification
Carbon Capture and Storage (CCS)

Key issues:
1. How boundaries should be defined for project and reference scenarios?
   - shall emissions due to capture, transportation and injection be excluded for simplification or included to allow for a more consistent comparison with other IF projects?
2. Which simplifications are possible for emissions and conversion factors?
   - Would it possible to adopt standard ratios of emissions per tonnes CO₂ stored for the potential new sources (e.g. injection)?
3. What should be required from participants at the application phases and during monitoring
   - Consider the MRV challenges if the scope of the quantification is expanded
   - Are emissions or capture efficiency expected to change over time?

Potential approaches for quantification

NER300: GHG savings equals to the CO₂ stored plus knowledge-sharing requirements for the other emissions

Sensible simplifications: GHG savings equals to the CO₂ stored, minus emissions for CO₂ capture, transport by pipeline and injection

Detailed: GHG savings equals to the CO₂ stored, minus emissions for CO₂ capture, transport by pipeline, road tanker or ship and injection
### Potential approaches for quantification

**Renewable energy projects**

#### Key issues:

1. **How boundaries should be defined for project and reference scenarios?**
   - Which upstream (capital goods, raw material extraction/production, transport), downstream (e.g. decommissioning, use) and on-site emissions (fuel use at power plant, on-site transport, fugitives) sources should and could be included?
   - When defining reference scenario, should the most conservative emission factors be adopted (e.g. fuel oil for heating), a blend or the most likely alternative (e.g. gas for heating) or the real fuel being replaced from the reference scenario?

2. **Which simplifications are possible for emissions and conversion factors?**
   - Shall emission factors vary to match regional context (i.e. some MS are still more reliant on fossil fuels than others so reference fuel would differ)?

3. **What should be required from participants at the application phases and during monitoring**
   - Consider the MRV challenges based on the proposed boundaries
   - For project involving retrofit/capacity added to an existing plant, how should the energy generated be measured?

<table>
<thead>
<tr>
<th>Potential approaches for quantification</th>
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<tbody>
<tr>
<td><strong>NER 300</strong>: Amount of renewable energy produced plus knowledge-sharing requirements for the emissions due to the project</td>
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<td><strong>Simplified</strong>: RE displaces the energy (and associated emissions) produced at the conventional plant</td>
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<tr>
<td><strong>Sensible simplifications</strong>: Comparison of most significant emission sources within the project boundaries, with a pre-defined reference scenario and factors</td>
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<tr>
<td><strong>Detailed</strong>: Comparison of cradle-to-grave (or to-gate) emissions for reference and project scenarios</td>
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Potential approaches for quantification
Renewable energy projects, bioenergy projects

REDII at a Glance

**Boundaries of quantification of savings:**
- Extraction or cultivation of raw materials;
- Carbon stock changes caused by land-use change;
- Processing;
- Transport and distribution;
- Fuel in use;
- Soil carbon accumulation via improved agricultural management, where applicable / CO₂ capture and geological storage / CO₂ capture and replacement.

**Emissions that can be deemed as zero:**
- Fuel in use for biofuels and bioliquids. For biomass fuels, only CO₂ shall be deducted.
- Life-cycle GHG emissions up to the process of collection of wastes and residues, and residues from processing.
- Indirect land-use change emissions for biofuels, bioliquids and biomass fuels produced from selected feedstock categories.

**Key issues:**

1. **How boundaries should be defined for project and reference scenarios?**
   - Which boundaries and simplifications should be aligned to those from REDII having in mind the different use of the results?
   - For biomass carriers’ projects: If emissions from waste treatment are to be included in the reference scenario, shall we assume that waste would be composted, landfilled, incinerated or treated using the most likely treatment in the Member State?
   - If biogas to energy, should we assume that CH₄ would be directly released in the reference scenario or flared?
   - Combustion of fossil fuel from off-site transportation (bioenergy projects) shall be included or should be assumed that such emissions would also occur in the reference plant (e.g. leakage from gas pipeline if natural gas)?
Potential approaches for quantification
Renewable energy projects, geothermal energy projects

Key issues:
1. Which simplifications are possible for emissions and conversion factors?
   - If emissions from the operation of dry or flash steam geothermal plants due to release of non-condensable gases are to be included, would it be adequate to assume a fixed mass fraction of CO2 and of CH4 in the composition of the steam released?
   - If emissions from the operation of binary geothermal plants due to physical leakage of non-condensable gases and working fluid are to be included, would it be adequate to define a fixed loss (%) for the steam entering vs leaving the plant?
   - What about the quantity of working fluid leaked/reinjected, is this something that could be tied to the amount of energy generated so that applicants only have to monitor one parameter?
Potential approaches for quantification
Production of innovative components of renewable and storage technologies

Key issues:
1. **What should be required from participants at the application phases and during monitoring**
   - As GHG emission avoidance will depend on where and how the RES or energy storage components are used, should we require sales contracts for the produced units and use national grid GHG intensity to estimate the emissions saved depending on where the RE or storage units would be installed?
   - How to deal with units produced for non-EU countries? Shall IF be restricted to those components that are produced and which will deliver to EU?
   - How to avoid double claiming of emission savings, i.e. how to prevent that the buyer of the units does not apply for the IF itself?
   - How to deal with the uncertainty about securing the delivery of the planned components to the market?
   - How could project proponents monitor energy generated / stored in this case? What other parameters should be monitored?
Main principle behind GHG savings

Energy storage

**Basic assumptions**

- energy storage projects need to include storage of any energy type for later use
- energy storage projects may include conversion of one energy type into another (e.g. power-to-heat)
Potential approaches for quantification

Energy storage

Key issues:
1. Which approach is most adequate for the level of accuracy needed for scoring and MRV?
   - simplified, sensible simplification, detailed
2. Which use cases of energy storage units to treat separately?
   - grid purposes based on contract with TSO
   - integrating additional RE / avoiding curtailment
   - producing e-fuels from additional RE
   - balancing markets / wholesale markets
3. How can energy storage projects prove avoided emissions? What evidence for
   - for use for grid purposes,
   - for use of additional renewable energies,
   - to demonstrate that the storage was only (dis-) charged at certain times

Potential approaches for quantification

Simplified: Comparison based on annual amount of energy stored and average emissions factor (+ knowledge-sharing requirements during MRV)

Sensible simplifications: Comparison based on annual energy stored using emission factors depending on type of usage

Detailed: Comparison of reference and project scenarios based on an hourly charging and discharging profile
Cross-cutting challenges / decisions
GHG emission factors for usage/feed-in of grid-electricity

ELECTRICITY MIX CHANGES OVER TIME

PROJECTS WITH USAGE/FEED-IN OF GRID ELECTRICITY

- Electricity use may create emissions
- Electricity feed-in may reduce emissions
Cross-cutting challenges / decisions
Potential alternatives for use/feed-in of grid electricity

Key issues:
1. Which GHG emission intensities to use:
   - for additional renewable electricity production from wind or solar?
   - for market-dependent usage of grid electricity?
   - for market-dependent feed-in of grid electricity?
2. How should GHG emission factors of grid-based electricity be regionally disaggregated:
   - national, EU-wide or a mixture?

Temporal dimension of emission intensity of grid electricity

- Continuous / stochastic production/use of grid electricity: emission intensity may be averaged over the period of consideration
- Additional renewable electricity production from wind or solar: An appropriate GHG emission intensity to reflect the marginal emissions intensity of the electricity replaced needs to be identified.
- Market-dependent usage/feed-in of grid electricity: Appropriate GHG emission intensities both for usage and feed-in to derive the resulting avoidance needs to be identified.

Spatial dimension of emission intensity of grid electricity

- National: GHG intensity of the electricity consumed in the country of the plant
- EU-wide: GHG intensity of the electricity averaged for all EU
- Mixture: A (weighted) average of national and EU-wide
Cross-cutting challenges / decisions

Timescale and forecasting

Timescale for evaluation of GHG emission savings

- Requirements from the delegated regulation:
  - First ten years of operation, starting between 2022 and 2027 (earliest and latest possible date of entry into operation)
  - Perspective on 2050, to evaluate the contribution of projects to the overarching EU ambition of climate neutrality in 2050

Challenges for GHG emission savings forecasting

- GHG emission savings from usage/feed-in of grid electricity **highly depend on future development**, due to the anticipated RES and grid expansion
- forecast of future GHG emission intensities of grid electricity needed but in the EU and, in particular, its Member States is **highly uncertain**,
- If EU electricity will be completely “decarbonised” in **2050, no savings** would be achieved from grid-connected RES-E or energy storage projects.

Potential approaches for quantification

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<th>Yearly forecast:</th>
<th>based on baseline emissions, for the first ten years of operation</th>
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<tr>
<td>2030 forecast:</td>
<td>typical date at which projects in the first call will be in operation and for which the EU has clear targets</td>
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<td>in addition:</td>
<td>2050 forecast, to be considered also under degree of innovation criterion</td>
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Key issues:

1. Which timescale(s) to consider in proposals?
2. How should the future development of the electricity mix be reflected?
3. How should the requirements differ for the 1st and 2nd stage of application, reducing burden at the first stage to encourage applications?
Cross-cutting challenges / decisions

Summary

**Timescale for GHG emission savings to be evaluated**

- 2030, typical date at which projects in the first call will be in operation and for which year the EU has clear targets;
- Yearly forecast based on yearly baseline emissions, e.g. for the period 2022 (earliest possible date of entry in operation) to 2037 (latest possible date of entry into operation);
- 2050, to evaluate the contribution of projects to the overarching EU ambition of climate neutrality.

**GHG emission savings forecasting**

GHG savings from grid-connected electricity projects are expected to reduce over time, given the anticipated uptake of renewable energy in Europe due to national RE targets. If it is assumed that EU electricity will be completely "decarbonised" in 2050, no savings would be achieved from grid-connected electricity renewable or energy storage projects. However, in that case the decarbonisation would not happen. Therefore, to encourage the RE uptake should the uptake itself be disregarded from GHG savings forecasting for IF application purposes?

**Application phases**

How should the requirements for project applicants differ for the first and second phases of application with the views of reducing burden at the first phase to encourage applications? Specifically, which simplifications to quantification could be proposed for:

- first phase (e.g. annual savings only and use of default EF),
- second phase for the projects that have been pre-selected (e.g. total GHG savings for the first 3 to 10 years, taking into consideration the expected penetration of RES)?

**Emission factor for grid-connected electricity projects**

- Regional component may reflect the regional RES generation and its potential curtailment on the level of Member States, but it may benefit/reward Member States that have a dirtier energy matrix, discouraging applications from cleaner Member States.
- EU-wide average reflects that the marginal power plant is often located in another EU Member State given the high integration of EU electricity markets.
Break-out session
Summary of Technical Workshop discussions

**Boundaries**
- Preference for a comparison of most significant emission sources within the project boundaries, with a pre-defined reference scenario
- Sources for inclusion to be defined based on a cut-off % for the lifecycle emissions

**Simplifications**
- Alignment with RED2, where possible
- Use of fixed ratios and fuel related factors
- Interest in granting some flexibility for applicants

**Grid factor**

**Forecasting**
- No consensus. What makes sense for one set of projects, might not make sense for others

**Application Requirements**
- First phase: GHG displaced by the RE generated / stored, CO2 stored for CCS. One year fully operational.
- Full: GHG considering main emissions sources, 10 years period

**Timescale**
- Hourly calculations for storage can be replaced by simplifying assumptions, but may be optional.
- Need to consider the variations in project lifetime and implementation curve.

- National vs. EU-wide emission intensity → preferences differ among participants
- Marginal vs. mean emission intensity → complexity to be checked versus robustness
Summary of Technical Workshop discussions – Energy storage

Key issues:

1. **Which approach is most adequate for the level of accuracy needed for scoring and MRV?**
   - to take into account emissions from charging favoured by most
   - complexity of hourly calculations is partly seen as too high
   - broad variety of use cases needs to be considered, while cases with no GHG emission avoidance may need to be cut off

2. **Which use cases of energy storage units to treat separately?**
   - multiple outcomes (electricity, heat, hydrogen) and multiple users (industry, transport) important to cover
   - usage based on contract with TSO relevant only in some MS
   - balancing markets differ between MS, look at IE and UK
   - integrating additional RE and avoiding curtailment are key
   - e-fuels as a storage to be consistent with other purposes
   - arbitrage usage of storage of little relevance in the near future

3. **How can energy storage projects prove avoided emissions?**
   - for use of additional renewable energies, not all certificates of origin sufficient; PPAs may be one appropriate evidence
   - evidence for avoidance of curtailment challenging; one option to consider is to derive benchmarks from balancing markets
   - individual information required to demonstrate that the storage was only (dis-)charged at certain emission intensities
   - an option for MRV to be explored is to use the same baselines as in the application process.

4. **Which GHG emission intensities to use for market-dependent usage/feed-in of grid electricity?**
   - hourly spread important to consider; maybe only optional

5. **How should GHG emission factors of grid-based electricity be regionally disaggregated?**
   - national perspective may create an appropriate regional spread
   - EU-wide consideration more in line with long-term development
Thank you