Energy Intensive Industries

Overview and calculation

Chris Malins, Cerulogy

European Commission

Scope

This section applies to projects that produce principal products that substitute a product **whose conventional production is covered by Annex I of the EU ETS Directive** and any other **innovative processing of biomass feedstock to produce bio-based products and biofuels in bio-refineries**. Note the bio-electricity and bio-heat fall into the energy intensive industries category but that GHG reductions from those projects must be assessed using the methodology for renewable energy sources

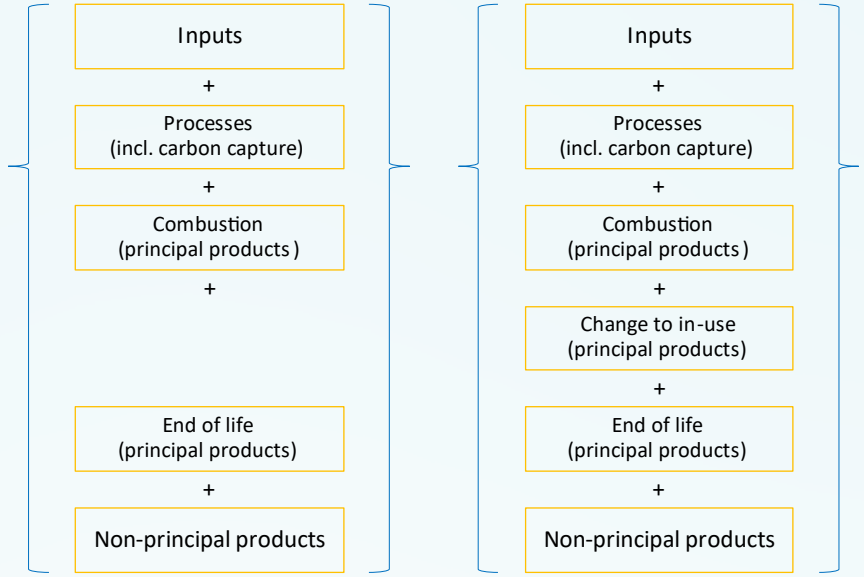
Examples of sectors producing products covered by Annex I	Examples of other EII products
Refineries	Manufacturing of components for electrolysers and fuel cells
Iron and steel	Bio-electricity
Non-ferrous metals	Bio-heat
Cement and lime	Bio-products
Glass, ceramics and construction material	CO_2 transport
Pulp and paper	CO_2 storage

Slido **#IF23Call**

European Commission

Boundaries

$$\Delta GHG_{abs} = \sum_{y=1}^{10} \left(\text{Reference } (Ref_y) - \text{Project } (Proj_y) \right)$$



- The system boundary must include:
  - The parts of an installation at which innovative practices are introduced
  - All processes downstream of that
  - Upstream processes controlled by the applicant, unless a reason is given to exclude such a process
- The system boundary may include processes at several physical locations
- In general, transport emissions are excluded, except:
  - CO2 transport for CCU/CCS
  - Distribution emissions for products substituting a physically different conventional product
  - Biomass/waste materials transported > 500 km
- Material/energy inputs coming from outside the system boundary must be included as inputs
  - Emission factors shall be taken from the input data hierarchy
  - Applicants may choose to bring other upstream processes into the system boundary and assess them directly

- Applicants must also consider:
  - Emissions from combustion of the principal products
  - Change to in-use emissions associated with the principal products
  - Emissions from end of life of the principal products
- If additional non-principal products are produced, they are given an emission credit

Slido **#IF23Call**

European Commission

Choosing the reference scenario

- Correctly establishing the reference scenario emissions is central to the application
- The reference scenario consists of the emissions associated with conventional production of a quantity products that performs an equivalent function to the principal products of the project
  - If the product is physically similar to the conventional product it replaces, the reference should include production of an identical quantity of product
  - If the product is physically different, the quantity considered in the reference scenario may differ from the quantity in the project scenario
  - E.g. if hydrogen is supplied to fuel cell vehicles the reference scenario includes the quantity of fossil transport fuel required to perform an equivalent transport service, based on an energy efficiency ratio
- There are nine cases for the reference scenario
- A product with multiple principal products may have to sum multiple reference cases

Reference cases

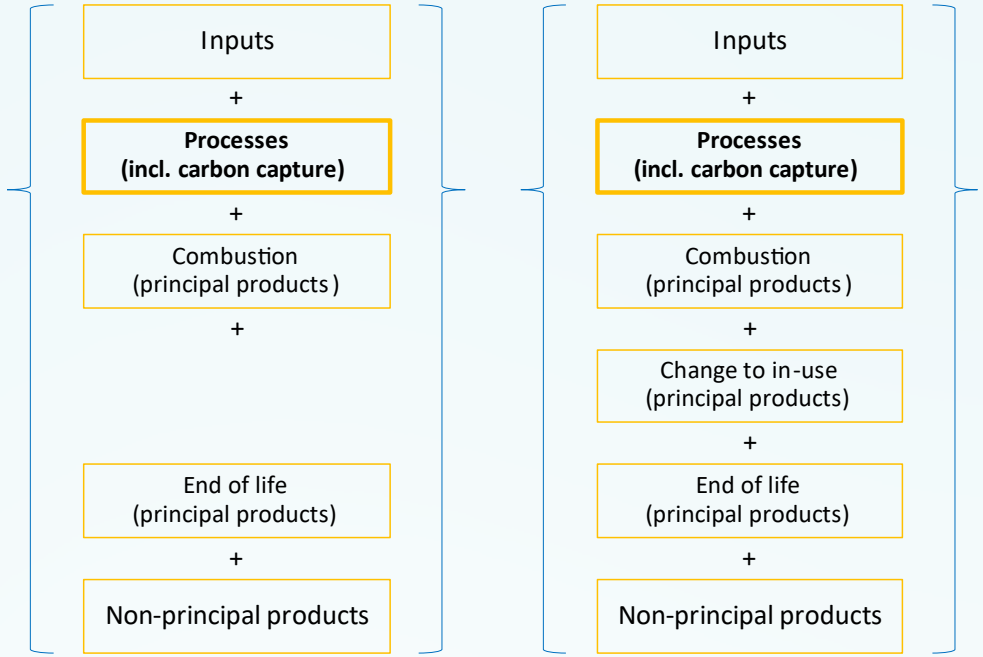
1. A relevant EU ETS product benchmark (or benchmarks) exists
2. An appropriate reference scenario can be constructed from a combination of EU ETS product benchmarks and other benchmarks sub-installation
3. Modifications to existing production systems
4. Transport fuel substitutes
5. Natural gas substitutes
6. The principal product can be synthesised from natural gas and a life-cycle emissions value is available in the data hierarchy
7. Direct air capture for CCS, and BECCS
8. Storage or transport of captured CO_2
9. The applicant proposes a reference scenario

Slido **#IF23Call**

European Commission

Processes

$$\Delta GHG_{abs} = \sum_{y=1}^{10} f \left(\text{Reference } (Ref_y) - \text{Project } (Proj_y) \right)$$



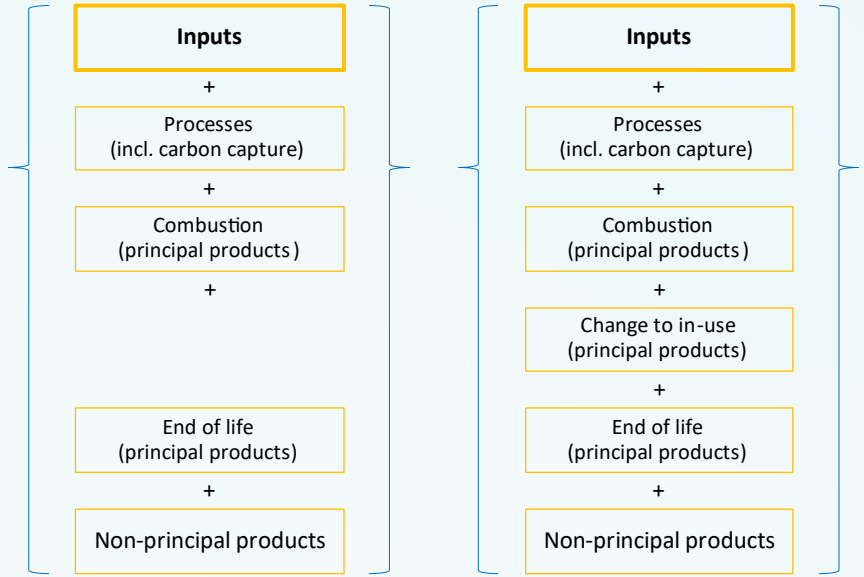
- The process emissions must include:
  - CO_2 from fuel combustion within the system boundary
  - Other emissions of CO_2, CH_4, N_2O within the system boundary
  - Transport emissions, where required
  - Emissions savings delivered by timed operation for electricity-consuming projects
  - Credit for carbon capture and storage or utilisation
  - Any change in emissions from waste processing

Slido **#IF23Call**

European Commission

Inputs

$$\Delta GHG_{abs} = \sum_{y=1}^{10} f \left(\text{Reference } (Ref_y) - \text{Project } (Proj_y) \right)$$



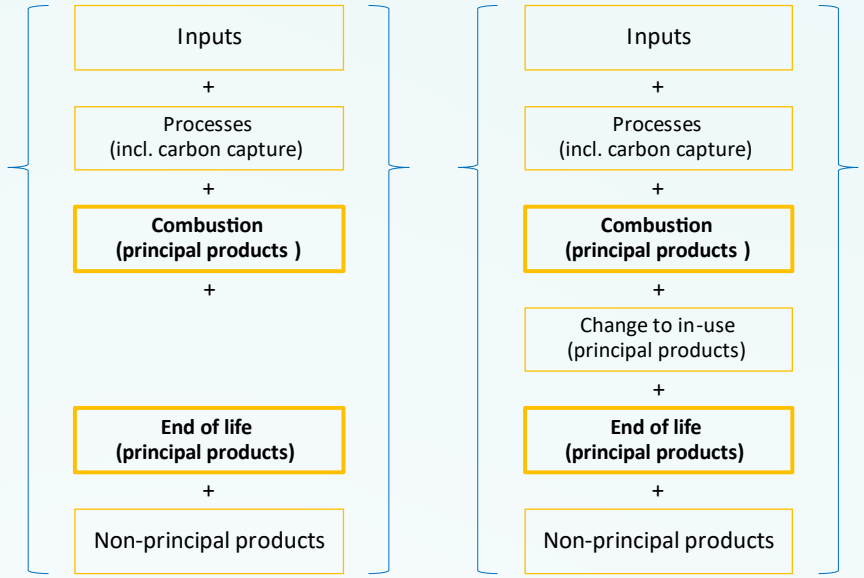
- All material and energy inputs entering the system from outside the system boundary, e.g. heat, electricity, chemicals, feedstock, biomass
  - Note: fossil fuels consumed within system boundary are dealt with under processes
- Some minor inputs may be disregarded as 'de minimis'
- Inputs are divided into 'elastic' and 'rigid'
- When rigid inputs (e.g., wastes) are consumed we expect an existing use or disposition to be changed
  - Emissions must be assessed based on increased use of replacement materials with elastic supply or by assessing emissions from change in disposition
- When elastic inputs are consumed, we expect more to be produced
- Input electricity: 0 gCO_2e/MJ
- Input heat: 62.4 gCO_2e/MJ
- Input biomass: RED II Annex V disaggregated defaults

- Other emission factors to be chosen from input data hierarchy (Appendix 1)
  - Justify choice
  - EU ETS benchmark values should not be used for input emission factors
  - May need to adjust to exclude carbon contained in the material, to avoid double counting
  - Emission factors including upstream fossil fuel extraction may be reduced by 15%

European Commission

Principal product combustion/end of life

$$\Delta GHG_{abs} = \sum_{y=1}^{10} f \left(\text{Reference } (Ref_y) - \text{Project } (Proj_y) \right)$$



- Where principal products contain carbon atoms, the eventual disposition of those atoms must be considered
- If a principal product will be combusted in-use (e.g., fuels), include combustion emission under principal product combustion
- If a principal product will not be combusted, must consider end-of-life
  - If carbon atoms will be recycled to new products, no end-of-life emission
  - If carbon atoms will remain incorporated in the material for at least 50 years, include end of life emissions equivalent to oxidation of 50% of contained carbon
  - Otherwise, end of life emission should assume oxidation of 100% of contained carbon

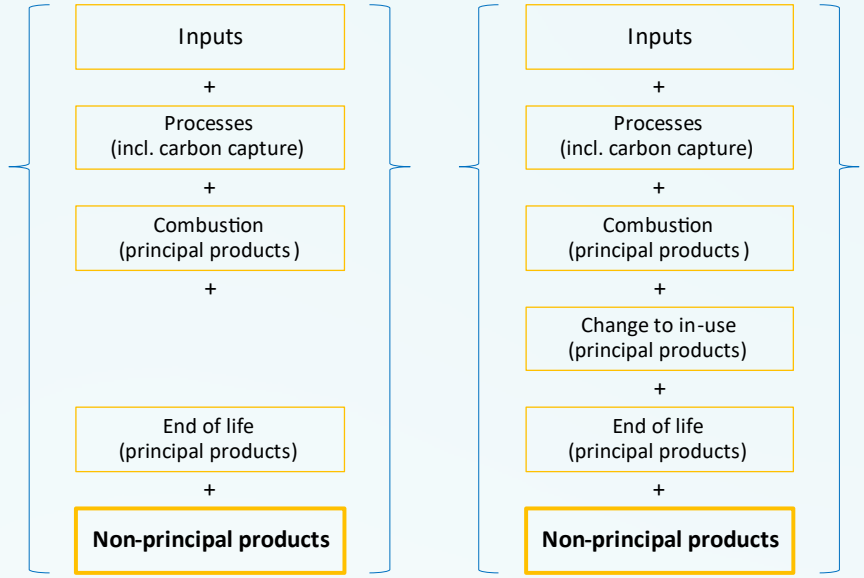
- Other reductions in expected end of life emissions compared to a conventional product may be included as a negative emission (credit) term

Slido **#IF23Call**

European Commission

Non-principal products

$$\Delta GHG_{abs} = \sum_{y=1}^{10} f \left(\text{Reference } (Ref_y) - \text{Project } (Proj_y) \right)$$



- Some processes produce more than one product
- If you count a second product from your project as co-principal, then production of an equivalent amount of conventional product should be added to the reference scenario
- If you treat it as non-principal, then a credit may be included in the non-principal products section
  - Use an emission factor from the input data hierarchy

- In some cases, a conventional reference process will produce a non-principal product
  - Include a non-principal product credit in the reference scenario

Slido **#IF23Call**

European Commission