

The GHG emission avoidance calculation in practice

Renewable electricity, heat and cooling, including production facilities of components for RES

Michele Canova, JRC.C.2, Joint Research Centre

Renewable electricity, heating and cooling | Example (1/2)

Potential manifest error: unrealistic, too simplistic and/or non evidenced approach to estimate on-site emissions.

Potential clerical error: omission of $Proj_{elect,y}$ (given that $E_{Electricity,proj} = zero$).

1. **Description:** The project foresees the innovative conversion of biogenic residues into heat, which will be sold to a nearby cement industry currently purchasing heat from a coal-fired CHP plant, and to the city where the project is based as district heating
2. **Classification:** EII → Other → Heat
3. **Methodology section:** RES, Section 4 of GHG methodology
4. **Reference:** Heating is supplied by natural gas boilers

$$\Delta GHG_{abs} = \sum_{y=1}^{10} (Ref_y - Proj_y) = \sum_{y=1}^{10} (Ref_{heat} - Proj_{onsite}) = \sum_{y=1}^{10} Ref_{heat} - \left(Proj_{FF,stat,y} + Proj_{FF,mob,y} + Proj_{elect,y} \right)$$

5. Data:

- $Q_{FF_stat/mob,y}$ = Quantity of fossil fuel type FF combusted in stationary or mobile sources at the project site in year y, in litres or m^3 .
- EC_y = Amount of electricity imported from the grid and consumed at the project site in year y, in MWh.

Renewable electricity, heating and cooling | Example (2/2)

And where

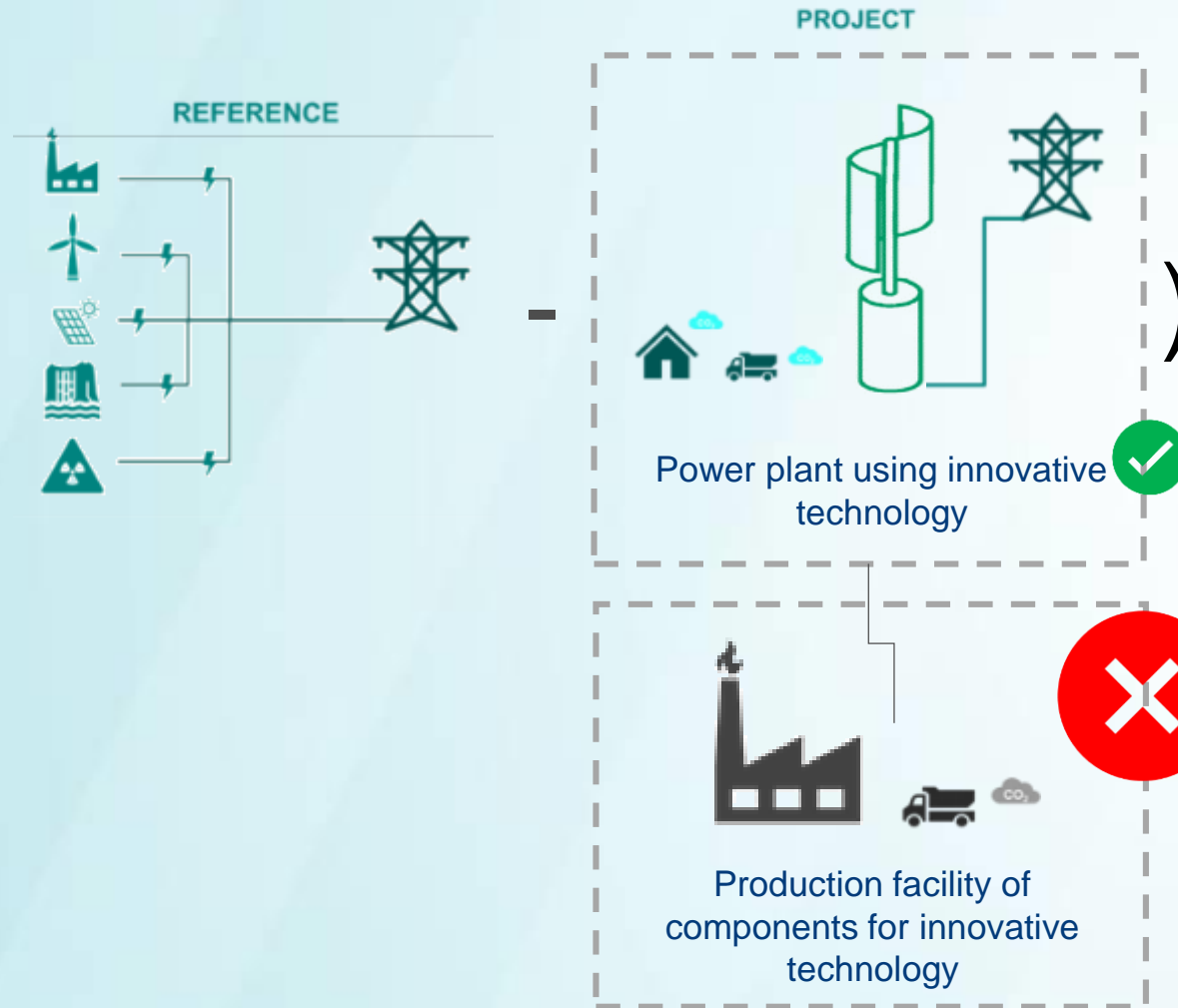
$$\text{Ref}_{\text{heat}} = P_{\text{heat}} * \text{PLF} * T_y * \text{EF}_{\text{NG}} / 0.90$$

Data:

- P_{heat} = Installed capacity, i.e. maximum thermal power output, in Watts.
- PLF = Plant Load Factor, i.e. plant's capacity utilisation, in %
- T_y = operating hours in year y, in hours

Production facilities of components for RES and energy storage

$$\Delta\text{GHG}_{\text{abs}} = \sum_{y=1}^{10} (\text{Ref}_y - \text{Proj}_y) = \sum_{y=1}^{10} (\quad)$$



GHG avoidance will be equal to the emissions saved by the innovative technology when operating

Emissions due to the manufacturing are **out of the scope of GHG avoidance calculations**

Production of components for RES

Example: blades for floating wind turbines for RES electricity

Potential manifest error: unrealistic and non-evidenced number of blades sold; components not sold on the EU + NO + IS market.

1. **Description:** Project envisages production of an innovative blade for use in floating wind power plants; the innovative blade has a higher capacity factor than a conventional blade.
2. **Classification:** Renewable energy → wind energy → electricity
3. **Methodology section:** RES, Section 4 of GHG methodology
4. **Reference:** Electricity is supplied by the EU grid mix (reference year 2030)

The applicant will have to demonstrate the existence of a buyer of the technology (i.e. a company that will run the floating wind power plant) to ensure the accountability over the promised GHG avoidance

$$\Delta\text{GHG}_{\text{abs}} = \sum_{y=1}^{10} (\text{Ref}_y - \text{Proj}_y) = \sum_{y=1}^{10} N_y * \text{CS} (\text{Ref}_{\text{elec}} - \text{Proj}_{\text{onsite}}) = \sum_{y=1}^{10} \text{CS} * \text{EG}_{\text{elec},y} * \text{EF}_{\text{elec},\text{ref}} - \text{Proj}_{\text{onsite}} * N_y * \text{CS}$$

$$\text{CS} * P_{\text{elec}} * \text{PLF} * T_y * \text{EF}_{\text{electricity},\text{ref}} - \text{Proj}_{\text{onsite},\text{total}}$$

Example:

$$0.6x(100 \text{ MW} + 300 \text{ MW} + 400 \text{ MW} + \dots + 400 \text{ MW}) * 45\% * 8400 \text{ hours/year} * \text{EF}_{\text{grid},\text{ref}} - \text{Proj}_{\text{onsite},\text{total}}$$

Applicants will have to present the rationale for the projected performance of the component as well as of other components that will be needed at the power plant, but not necessarily manufactured at the same facility.

See also the GHG calculator example: Renewable electricity and renewable heating

CS is the innovative components' cost as a fraction of the total capital cost

Evidenced assumption of the total capacity installed until Years 1 – 10

Average capacity factor achieved

Assumption of operating hours

Q&A Session

Take out your mobile device

Go to www.sli.do

Enter the code #IFSSC2021

Ask your question or vote for an existing one

