**Documentation:**

**GHG Tool**

**Aim:** Develop a responsive and flexible online tool, capable of measuring the CO2 emission of a determinate renewable energy per year, the equivalent amount of trees that will produce that amount of CO2 in their life cycle and the amount houses that will produce that amount of CO2 per year.

**Description:** When the tool is loaded, it will only show a drop-down menu and a simple general scheme of the life cycle of each renewable energy (Input/Processing/Output). The drop down menu will contain the following options: “Irradiation-Wind-Hydro”, Demolish wood, Sawdust and Manure. When you click in any of this option a form with some inputs will be loaded. Also, the general scheme of the life cycle will change into the specific one.

If the user clicks on “Irradiation-Wind-Hydro”, a form will appear asking for the expected annual production in MWhelectricity/year and the type of energy that it will be using (Wind, Hydro or Pv/Irradiation).

If the user clicks on “Demolish wood”, a form will appear asking for the expected annual output of the CHP plant (the MWhelectricity/year and GHJheat/year), three percentages of the wood weight lost between each stage, the percentage of moisture of the wood, the kilometers that a truck must drive in order to transport the material and temperature of useful heat at a point of delivery and the temperature of the surroundings.

If the user clicks on “Sawdust”, a form will appear asking for the expected annual output of the CHP plant (the MWhelectricity/year and GHJheat/year), the annual weight in kilograms of pellets used in the combustion stage, three percentages of the wood weight lost between each stage, the amount of electricity and/or gas used on the process (KWhelectricity/ton of pellets, MJgas/ton of pellets), two percentages that shows themoisture on the sawdust and on the pellets, the kilometers that a truck must drive to transport the material and the temperature of useful heat at a point of delivery and the temperature of the surroundings.

If the user clicks on “Manure”, a form will be loaded and it will ask the user for the expected annual output of the CHP plant (the MWhelectricity/year and GHJheat/year), the ton of manure used annually on the process, the m3 of biogas produced per ton of manure, three percentages of weight loss between each stage, the percentage of methane gas in the biogas.

the kilometers that a truck must drive in order to transport the material, the temperature of useful heat at a point of delivery and the temperature of the surroundings, and the emision of gases that are directly generated (kgCO2 / ton of transported manure, kgCH4 / ton of transported manure, kgN2O / ton transported manure).

After fulfilling all or partially the forms, the tool will proceed to do the calculations and update the result table.

**Formula of Wind-PV-Hydro:**

**C = (P \* x) / 1000**

* **P:** Annual production
* **x:** gCO2eq/kWh emitted by the system specific of each type of energy and country.

**T = (1000 \* C)/ eTree**

* C: tonCO2/year, The amount of CO2 produced in a year by the system.
* eTree: kgCO2eq/tree, kg of CO2 used by a tree in its life cycle.

**H = ( C \* 1000 ) / eHouse**

* C: tonCO2/year, The amount of CO2 produced in a year by the system.
* eHouse: kgCO2eq/house/year, estimated Kgs of CO2 produced by a house per year in a specific country.