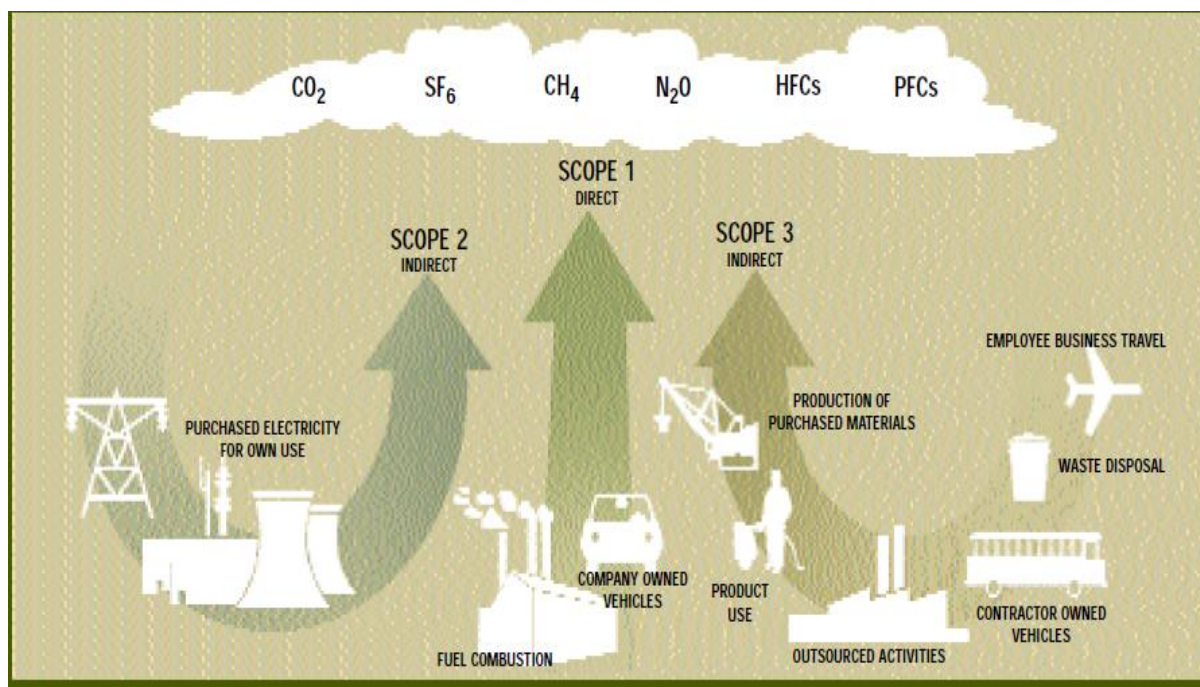


GHG Tool Manual:

By using the Green House Gas Protocol (A Corporate Accounting and Reporting standard), all the Emissions, which are result of Institution related activities are categorised in to three different scopes. The three scopes are explained by the following figure.



Scope 1: Direct GHG Emissions

Direct GHG emissions occur from sources that are owned or controlled by the company, for example, emissions from combustion in owned or controlled boilers, furnaces, vehicles, etc.; emissions from chemical production in owned or controlled process equipment. Direct CO₂ emissions from the combustion of biomass shall not be included in scope 1 but reported separately. GHG emissions not covered by the Kyoto Protocol, e.g. CFCs, NO_x, etc. shall not be included in scope 1 but may be reported separately.

Scope 2: Electricity Indirect GHG Emissions

Scope 2 accounts for GHG emissions from the generation of purchased electricity consumed by a company. Purchased electricity is defined as electricity that is purchased or otherwise brought into the organizational boundary of the company. Scope 2 emissions physically occur at the facility where electricity is generated.

Scope 3: Other Indirect GHG Emissions

Scope 3 is an optional reporting category that allows for the treatment of all other indirect emissions. Scope 3 emissions are a consequence of the activities of the company, but occur from sources not owned or controlled by the company. Some examples of scope 3 activities are extraction and production of purchased materials; transportation of purchased fuels; and use of products and services.

GHG accounting in Educational Institutions

From the above definitions the scope 1,2 &3 for Educational organisation are drawn as follows

Scope 1:

1. Fuel consumed by institute owned vehicles
2. Direct fuel combustion (A. DG-sets, B. Cooking activities)
3. Fugitive Emissions (From refrigerant Used. Leakages and Leftover refrigerant)

Scope 2:

1. Electricity Purchased
2. Renewable Energy -Onsite Generation, wheeled (has to be offset)

Scope 3:

1. Faculty and student Transport (other than college owned vehicles-i.e. Public transport, Share, Contract or Owned by students/faculty).
2. Supplies Transport (Transport of stationary, Food or any other material)
3. Material Used (Paper, Charts, Cardboards, Plastic bags, paper bags)-lifecycle approach
4. Food (production, processing) items used
5. Food waste (organic waste)
6. Outdoor Travels by faculty, students and management (for Institutional activities)
7. Events conducted outside the Organisational Boundary (Institutional activity)

Excel Tool:

The Excel Tool is developed in such way to help Institutions in collecting data and then to parallelly calculate the Emissions.

This tool consists of 16 Work sheets. The following information in detail explains about each work sheet (what is the formulae, how to enter data etc...)

Work Sheet1: It gives what are all activities considered for GHG accounting in the Educational Institution by defining the Institutional and Operational Boundaries. Activities are listed under the Scope of Emission they come Under.

And the considered Emission Factors are tabulated. An Emission factor is defined such that it gives the Carbon equivalent emissions from a particular fuel or activity that leads to GHG emissions.

Work Sheet2- Emissions: This sheet gives the Monthly and Total emissions in a year.

Work Sheet3- DG set & LPG: This sheet gives the Total emissions from the Usage of Diesel (for DG sets) and LPG (for Cooking and lab activities/other activities).

Formulae Used: Emissions = Activity data * Emission Factor

Activity data: Enter Monthly usage of Diesel (in litres) and LPG (in kg) in their respective columns

Note: Do not enter Anything in the Emissions column

Work Sheet4- Scope1-2&3 wheeler: This work sheet consists of Two Tables (Table1 for 2-wheeler and Table 2 for 3-wheeler). This sheet gives the Total monthly emissions from the Two and Three wheelers owned and used by the Institution.

Formulae Used: Emissions= Distance travelled * Emission Factor (in kgCo2/km)

Where,

$$\begin{aligned} \text{Emission Factor (kgCo2/km)} \\ = (\text{Emission Factor of fuel used})/(\text{Fuel efficiency of vehicle}) \end{aligned}$$

Data:

Step1: In category column choose the type of 2-wheeler from the drop-down list (scooter, motor cycle) in case of 2-wheeler and Write the name of the vehicle in case of 3-wheeler.

Step-2: In Fuel used Column, Choose the type of fuel from the drop-down list.

Step-3: In fuel efficiency Column, enter the mileage of the vehicle (i.e. Km/lit or kg)

Step-4: Enter the total distance travelled by the vehicle in the particular month.

Step-5: (optional) If the number of vehicles is more, then add the rows and copy the formulae.

Note: Do not enter anything in the Emission factor column and Emissions column.

check the cell representing total has the sum function, that consisting of all the row values of Emissions column.

Work Sheet5- Scope1-Freight& Bus-Transport: This work sheet consists of two tables (Table1 for Freight Vehicles and Table2 for Bus Transport) and gives the Total monthly emissions from the Freight vehicles and Bus transport, Owned and used by the Institution.

Formulae Used: Emissions= Distance travelled * Emission Factor (in kgCo2/km)

Where,

$$\begin{aligned} \text{Emission Factor (kgCo2/km)} \\ = (\text{Emission Factor of fuel used})/(\text{Fuel efficiency of vehicle}) \end{aligned}$$

Data:

Step1: In category column choose the type of Freight vehicle from the drop-down list (LDV, MDV, HDV) in case of Freight vehicles and Write the name of the vehicle in case of Bus-transport.

Step-2: In Fuel used Column, Choose the type of fuel from the drop-down list.

Step-3: In fuel efficiency Column, enter the mileage of the vehicle (i.e. Km/lit or kg)

Step-4: Enter the total distance travelled by the vehicle in the particular month.

Step-5: (optional) If the number of vehicles is more, then add the rows and copy the formulae.

Note: Do not enter anything in the Emission factor column and Emissions column.

check the cell representing total has the sum function, that consisting of all the row values of Emissions column.

Work Sheet6- Scope1-Four-wheeler: This work sheet consists of two tables (Table1 for Four-wheeler (except hybrid vehicles) and Table2 for Four-wheeler-hybrid vehicles) and gives the total monthly emissions from the Four wheelers.

Formulae Used: Emissions= Distance travelled * Emission Factor (in kgCo2/km)

Where,

$$\begin{aligned} \text{Emission Factor (kgCo2/km)} \\ = (\text{Emission Factor of fuel used})/(\text{Fuel efficiency of vehicle}) \end{aligned}$$

Data:

Step1: In category column choose the type of Four-wheeler from the drop-down.

Step-2: In Fuel used Column, Choose the type of fuel (or fuel combination in case of hybrid) from the drop-down list.

Step-3: In fuel efficiency Column, enter the mileage of the vehicle (i.e. Km/lit or kg). In case of hybrid vehicles, the fuel efficiency of the vehicle for both the fuels should be entered in their respective column.

Step-4: Enter the total distance travelled by the vehicle in the particular month. In case of hybrid vehicles, enter the total distance travelled using each fuel in the respective columns.

Step-5: (optional) If the number of vehicles is more, then add the rows and copy the formulae.

Note: Do not enter anything in the Emission factor column and Emissions column.

check the cell representing total has the sum function, that consisting of all the row values of Emissions column.

Work Sheet7- Scope1-Fugitive Emissions: This sheet gives the Total emissions due to the usage and Leakage of Refrigerants in Air-conditioning systems and Refrigeration systems.

Formulae Used: Emissions= (Refrigerant serviced + Refrigerant disposed) * GWP

Where,

Refrigerant serviced is the amount of refrigerant refilled.

Refrigerant disposed = (Total full charge of retiring equipment)- Refrigerant recovered from retiring equipment).

GWP- Global Warming Potential (in terms of carbon equivalent)

Data:

Step1: In the Refrigerant Column write down the refrigerant used.

Step2: From the below table write down the GWP of the respective refrigerant in the GWP column.

Step3: In the refill column enter the amount of refrigerant used to service the equipment.

Step4: In case of retiring equipment, enter full charge of the equipment and the amount of refrigerant recovered in the Full charge and Recovered Columns respectively.

Step-5: (optional) If the number of vehicles is more, then add the rows and copy the formulae.

Note: Do not enter anything in the Emissions column.

check the cell representing total has the sum function, that consisting of all the row values of Emissions column.

Work Sheet8- Scope2: This sheet gives the total emissions from the electricity purchased from the grid (here the renewable energy utilised is mentioned in the offset emissions column to show the shift and impact on total emissions, but it does not offset from the total emissions.

Formulae Used: Emissions = Electricity purchased from Grid * Emission Factor (kgCo2/kWh)

Data:

Step1: Enter the No. of Units of Electricity purchased from Grid in electricity purchased column.

Step2: Enter No. of units of Electricity produced through onsite Renewable energy in the Renewable Energy (onsite) column.

Step3: Enter No. of units of Electricity produced through offsite Renewable energy in the Renewable Energy (wheeled) column.

Note: Do not enter anything in the Emissions column.

check the cell representing total has the sum function, that consisting of all the row values of Emissions column.

Work Sheet9- Scope3- 2&3 wheeler: Formulae and steps to be followed for Data entry are same as for Work Sheet4.

Work Sheet10- Scope3- Freight & Bus-Transport: Same as Work Sheet5

Work Sheet11- Scope3- Four-wheeler: Same as Work Sheet6

Work Sheet12- Scope3- Public Transport & Air-Travel: This sheet consists of Two Tables (Table1 for Public Transport and Table2 for Air-Travel)

Public Transport: This sheet helps in calculating the emissions, that are a result of using the public transport by the students/staff/faculty as a means of commute to Institution.

Formulae Used: Emissions = Emission Factor * Distance * No. of Passengers * No. of days

Where,

Emission Factor (units) – kgCo₂/Pass. /km

Note: As the calculation is for one month, take the No. of days as No. of working days of the Institution in the particular month.

Data:

Step1: Choose the Fuel used in the vehicle from Drop down list (Diesel, EV) in the Fuel Category column.

Step2: Write down the route name in Route column (consider all the routes that comes under this route, i.e. for example Route A-B-C-D-E where distance between A-B is 8km, A-C is 10km, A-D is 17 km and A-E is 20km, then consider A-C as one route and A-E as second route, Thereby A-B comes under A-C and A-D comes under A-E respectively, based on the distance travelled choose the respective route).

Step3: Enter the distance (from the institution to destination area) in the Distance column.

Step4: Enter the No. of passengers travelling in that particular route in the No. of passengers' column.

Step5: Enter the working days of Institution in a particular month in No. of days column.

Step6: (optional) If the number of Routes is more, then add the rows and copy the formulae.

Note: Do not enter anything in the Emissions column.

check the cell representing total has the sum function, that consisting of all the row values of Emissions column.

Air-Travel: This table accounts the emissions from the Air-Travels made by Students/staff/faculty for the institutional work.

Formulae Used: Emissions = Emission factor * No. of passengers * distance travelled

Where,

Emission factor (units)- kgCo₂/ Pass. / km

Data:

Step1: Enter the two city names between which the Air-Travel is made in the Route Column

Step2: Enter the distance between the cities in the Distance Column

Step3: Enter the number of passengers made that travel in the No. of passengers' column

Step4: Enter the number of travels made in that particular route in the No. of Travels column.

Step5: (optional) If the number of Routes is more, then add the rows and copy the formulae.

Note: Do not enter anything in the Emissions column.

check the cell representing total has the sum function, that consisting of all the row values of Emissions column.

Work Sheet13- Scope3- Share Transport: This sheet gives the emissions accounted by share travels. (the travels made either to Institution or for any Institutional work).

Formulae Used: Emissions = Emission factor * Distance travelled

Data:

Step1: Choose the Category of Vehicle form the Drop-down list in the Category column.

Step2: Enter the model name of the vehicle in the model column

Step3: In the Fuel column choose the fuel used from the Drop-down list

Step4: Enter the approximate mileage of the vehicle in the Fuel efficiency column

Step5: In the Distance travelled column enter the distance of each trip.

Step6: (optional) If the number of Routes is more, then add the rows and copy the formulae.

Note: Do not enter anything in the Emissions column.

check the cell representing total has the sum function, that consisting of all the row values of Emissions column.

Work Sheet14- Scope3- Food Consumption: This sheet gives the emissions accounted from the production of Food materials that are used to cook food in the campus. (as the emissions from processing of food and transport of material are accounted in LPG usage and Freight transport, they were not considered here)

Formulae Used: Emissions = Emission factor (KgCo2/kg) * Quantity of Product used (kg)

Data: Enter the quantity of particular product used in the quantity column.

Note1: Do not enter anything in the Emissions column.

Note2: Consider Same kind of vegetables under one category (for example Cauliflower and cabbage comes under same category, all milk products come under one category).

Work Sheet15- Scope3- Paper Used and organic waste: This sheet consists of two tables (table1 for Paper Usage and Table2 for Organic waste) and used to account the emissions from the usage of paper and organic waste produced in the campus.

Paper Used:

Formulae Used: Emissions = Emission factor * Quantity of paper used

Data: Enter the quantity of paper used in the form of sheets, charts, text books and newspapers in their respective column.

Organic Waste:

Formulae Used: Emissions = Emission factor * Quantity of organic waste

Data: Enter the Organic waste landfilled and composted in the respective columns.