

Article

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Measure greenhouse gas (GHG) emissions with Carbon Footprint Counter app

The Carbon Footprint Counter application uses the GHG Protocol to measure carbon emissions on enterprises. The GHG protocol establishes comprehensive global standardized frameworks to measure and manage greenhouse gas (GHG) emissions from private and public sector operations, value chains and mitigation actions.

Building on a 20-year partnership between World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD), GHG Protocol works with governments, industry associations, NGOs, businesses and other organizations. (source: <https://ghgprotocol.org/about-us>).

The Carbon Footprint Counter app uses the InterSystems IRIS to deploy REST APIs and SQL database to manage the carbon emission inventory on enterprises. The frontend is Angular 12 with PrimeNG framework (open source leader to Angular).

Emission Factors

To measure the company carbon emissions the App stores 300 emission factors distributed into 4 segments (stationary, mobile, transportation and purchased electricity). Each factor, like natural gas, gasoline, bus transportation, aviation transportation, car trips, etc, has reference values to calculate co2, ch4 and n2o emissions. See:

The screenshot displays the Carbon Counter application interface. On the left, a sidebar contains navigation links for 'FOOTPRINT EVENTS' (Stationary Combustion, Mobile Combustion, Transportation, Purchased Electricity) and 'EMISSION DATABASE' (Emission Unit, Emission Segment, Emission Type, and Emission Factor). Below these links, summary statistics are shown: CO2 Emissions: 161.317818, CH4 Emissions: 0.117004, and N2O Emissions: 0.066301. The main content area is titled 'Manage Emission Factors' and includes a search bar with the text 'gasol'. A table lists various emission factors with columns for 'Name' and 'Emission Type'. The table contains eight rows of data, each with a green edit icon and an orange delete icon. At the top of the main area, there are '+ New' and 'Export' buttons. A settings gear icon is located on the right side of the table.

Name ↑↓	Emission Type ↑↓
Aviation Gasoline	Petroleum Products
Motor Gasoline	Petroleum Products
Motor Gasoline - Gasoline Passenger Cars	Mobile Fuel
Motor Gasoline - Gasoline Light-duty Trucks (Vans, Pickup Trucks, SUVs)	Mobile Fuel
Motor Gasoline - Gasoline Heavy-duty Vehicles	Mobile Fuel
Motor Gasoline - Hybrid (Gasoline) Passenger Cars	Mobile Fuel
Motor Gasoline - Gasoline Agricultural Equipment	Mobile Fuel

Emission Factor Details

Name: Aviation Gasoline

Emission Type: Coal and Coke

Emission Unit: mmBtu

HHV: 0,12

CO2: 69,25

CH4: 3

N2O: 0,6

Biogenic CO2:

AR4: 69,504

AR5: 69,493

Fuel Efficiency:

Second Unit:

CO4 Kg:

NO2 Kg:

Source: EPA, Emission Factors for Greenhouse Gas Inventories, Table 1 Stationary Combustion Emission Factors, March 9, 2018 (<https://www.epa.gov/climateleadership/center-corporate-climate-leadership-ghg-emission-factors-hub>).

Cancel Save

Stationary Emissions

The GHG Protocol defines stationary as fuel consumption at a facility to produce electricity, steam, heat, or power. The combustion of fossil fuels by natural gas boilers, diesel generators and other equipment emits carbon dioxide, methane, and nitrous oxide into the atmosphere. You can register your stationary emissions on Stationary Combustion menu and UI:

Stationary Emission Details

Facility ID: Car 1

Year: 2.022

Fuel: Fuel Gas

Amount: 3,200

CO2: 188.80000000

CH4: 0.00960000

N2O: 0.00192000

Cancel Save

Mobile combustion emissions

The GHG Protocol defines mobile combustion as fuel consumption by vehicles that are owned or leased by the company. Combustion of fossil fuels in vehicles (including cars, trucks, planes, and boats) emits carbon dioxide, methane, and nitrous oxide into the atmosphere. You can register your mobile emissions on Mobile Combustion emissions menu and UI:

The screenshot shows the Carbon Counter app interface. On the left, there is a sidebar with 'FOOTPRINT EVENTS' (Stationary Combustion, Mobile Combustion, Transportation, Purchased) and 'EMISSION DATABASE' (Emission, CO2 Emissions, CH4 Emissions, N2O Emissions). The main area displays a '+ New' button and an 'Export' button. A modal window titled 'Mobile Emission Details' is open, showing the following fields:

Facility ID	Year	Fuel	Amount
Car 1	2022	Electricity - Mobile - Electric Vehicle	200

Below the main table, there are three smaller input fields for CO2, CH4, and N2O emissions:

CO2	CH4	N2O
0.07981818	0.00000354	0.00000074

At the bottom right of the modal, there are 'Cancel' and 'Save' buttons.

Transportation emissions

The GHG Protocol defines transportation as Fuel consumption by vehicles used to conduct company-financed travel. Examples include commercial air travel and use of rented vehicles during business trips (travel using company-owned/leased vehicles). You can register your transportation emissions on Transportation emissions menu and UI:

The screenshot shows the Carbon Counter app interface. On the left, there is a sidebar with 'FOOTPRINT EVENTS' (Stationary Combustion, Mobile Combustion, Transportation, Purchased) and 'EMISSION DATABASE' (Emission, CO2 Emissions, CH4 Emissions, N2O Emissions). The main area displays a '+ New' button and an 'Export' button. A modal window titled 'Transportation Emission Details' is open, showing the following fields:

Year	Description	Fuel	Amount
2022	Transportation by car	Passenger Car A	1,000

Below the main table, there are three smaller input fields for CO2, CH4, and N2O emissions:

CO2	CH4	N2O
0.34300000	0.01900000	0.01100000

At the bottom right of the modal, there are 'Cancel' and 'Save' buttons.

Electricity emissions

The GHG Protocol defines Electricity emissions as energy purchased from your local utility (that is not combusted on-site). Examples include electricity, steam, and chilled or hot water. To generate this energy, utilities combust coal, natural gas, and other fossil fuels, emitting carbon dioxide, methane, and nitrous oxide in the process. You can register your transportation emissions on Electricity emissions menu and UI:

The screenshot shows the Carbon Counter app interface. On the left, there's a sidebar with categories like FOOTPRINT EVENTS, EMISSION DATABASE, and CO2 Emissions. The main area displays a 'New' button and an 'Export' button. A modal window titled 'Electricity Emission Details' is open, showing a form with fields for Facility ID (1), Year (2022), Energy (China Northeast Grid), Amount (1,200), CO2 (3.00000000), CH4 (0.00000000), and N2O (0.00000000). The N2O field is highlighted with a blue border. At the bottom right of the modal are 'Cancel' and 'Save' buttons.

Calculation of total carbon emissions

The application computes all emissions registered:

CO2 Emissions: 161.317818

CH4 Emissions: 0.117004

N2O Emissions: 0.066301

Take action

Now, your company can get your annual carbon emissions and take actions to compensate your emissions. Buy carbon credits, make donations to WWF, Greenpeace and other institutes. Calculate now using <https://openexchange.intersystems.com/package/Carbon-Footprint-Counter>.

[#Angular](#) [#REST API](#) [#InterSystems IRIS](#)

[Check the related application on InterSystems Open Exchange](#)

Source

URL: <https://community.intersystems.com/post/measure-greenhouse-gas-ghg-emissions-carbon-footprint-counter-app>