

## Julia 2030 Project / Use of public premises

### The description of the Climate Calculator

#### 1. Background

The Climate Calculator is a web application designed to help to calculate greenhouse gas emissions of offices, properties and individuals and to find ways to reduce the emissions. Climate Calculator was developed in 2003 – 2005 by World Wildlife Fund Finland (WWF) in co-operation with Helsinki University of Technology Lifelong Learning Institute Dipoli and Motiva Ltd. The Climate Calculator is owned by WWF and it is available on WWF's webpage [www.ilmastolaskuri.fi](http://www.ilmastolaskuri.fi).

The Climate Calculator can be used free of charge on the Internet and it is available in Finnish and in English. As an input to the Climate Calculator, only Finnish data can be used, as the calculator is based on Finnish national emission factors. Adapting the Climate Calculator to other countries requires that the national greenhouse gas emission factors of each country are defined and used.

The Climate Calculator was further improved during 2009 and 2010 in co-operation with Helsinki Region Environmental Services Authority HSY and WWF as part of the Julia 2030 project that is co-financed by EU Life+. The new Climate Calculator calculates the greenhouse gas emissions of waste processing and transportation more precisely. The Calculator also monitors the annual costs of electricity and district heating consumption, paper purchases and waste processing. The Finnish Environment Institute has estimated the greenhouse gas emission factors for various types of waste for the Calculator.

The Climate Calculator was also improved in 2010 by adding the calculation of greenhouse gas emissions of office appliances and furniture to it. The development work was done in co-operation with the Eco-support activity project and it was co-ordinated by the city of Helsinki. European Regional Development Fund co-financed this development project.

#### 2. The structure of the Climate Calculator

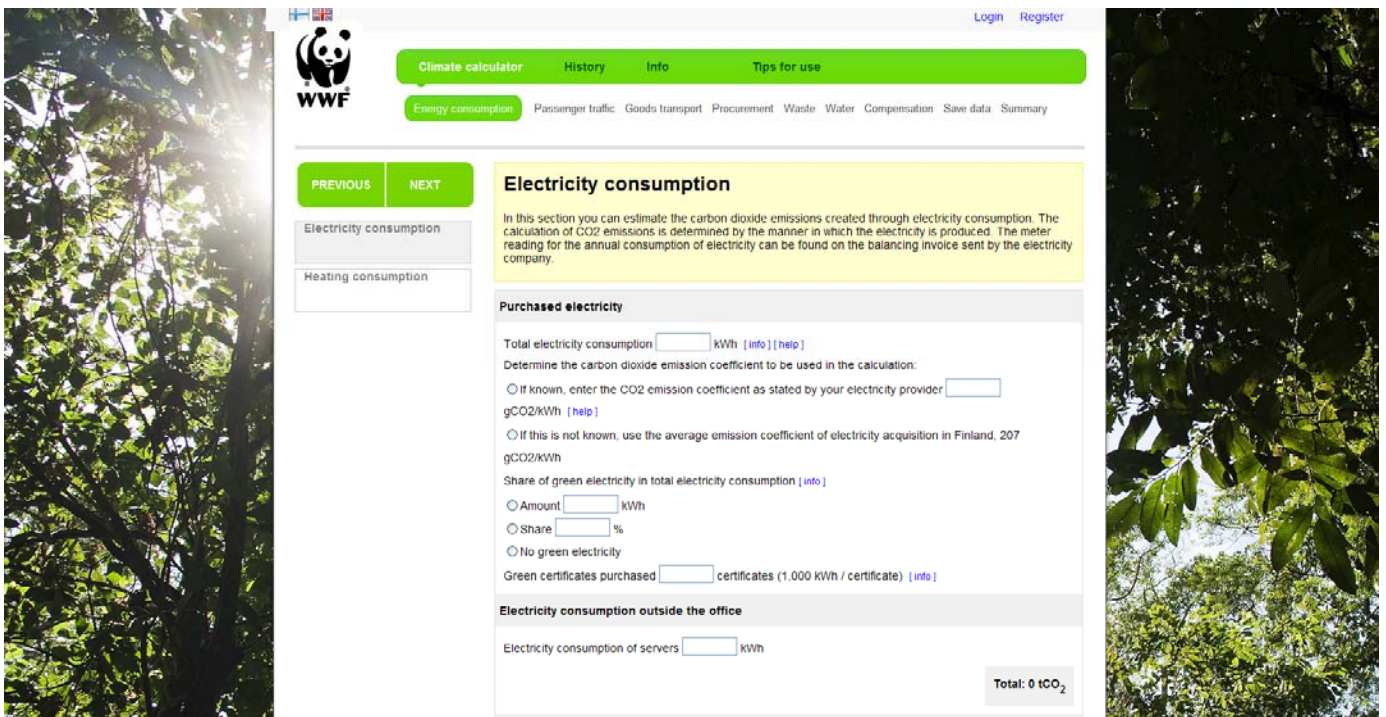
The Climate Calculator includes the greenhouse gas emission calculator and information on how to reduce the emissions. The Climate Calculator consists of nine different sections: Energy consumption, passenger traffic, goods transport, public procurement, waste, water, compensation, save data and summary.

Climate Calculator	History	Info	Tips for use
Energy consumption	Project background	Calculation Basis	
Passenger traffic	Original Climate Calculator project's working group	Tips for use	
Goods transport		Feedback	
Procurement		Climate Calculator project	
Waste			
Water			
Compensation			
Save data			
Summary			

Table 1. The main structure of the Climate Calculator.

Energy consumption	Passenger traffic	Goods transport	Procurement	Waste	Water	Compensation	Save data	Summary
Electricity consumption	Road traffic	Road transport	Paper consumption	Bio waste				
Heating consumption	Rail traffic	Rail transport	Office appliances	Recycled paper				
	Local public transportation	Air transport	Furniture	Cardboard				
	Air traffic	Water transport		Recycled carton				
	Water traffic	Transport of letters		Energy waste				
	Traffic between home and workplace			Mixed waste				

Table 2. The structure of the Climate Calculator.

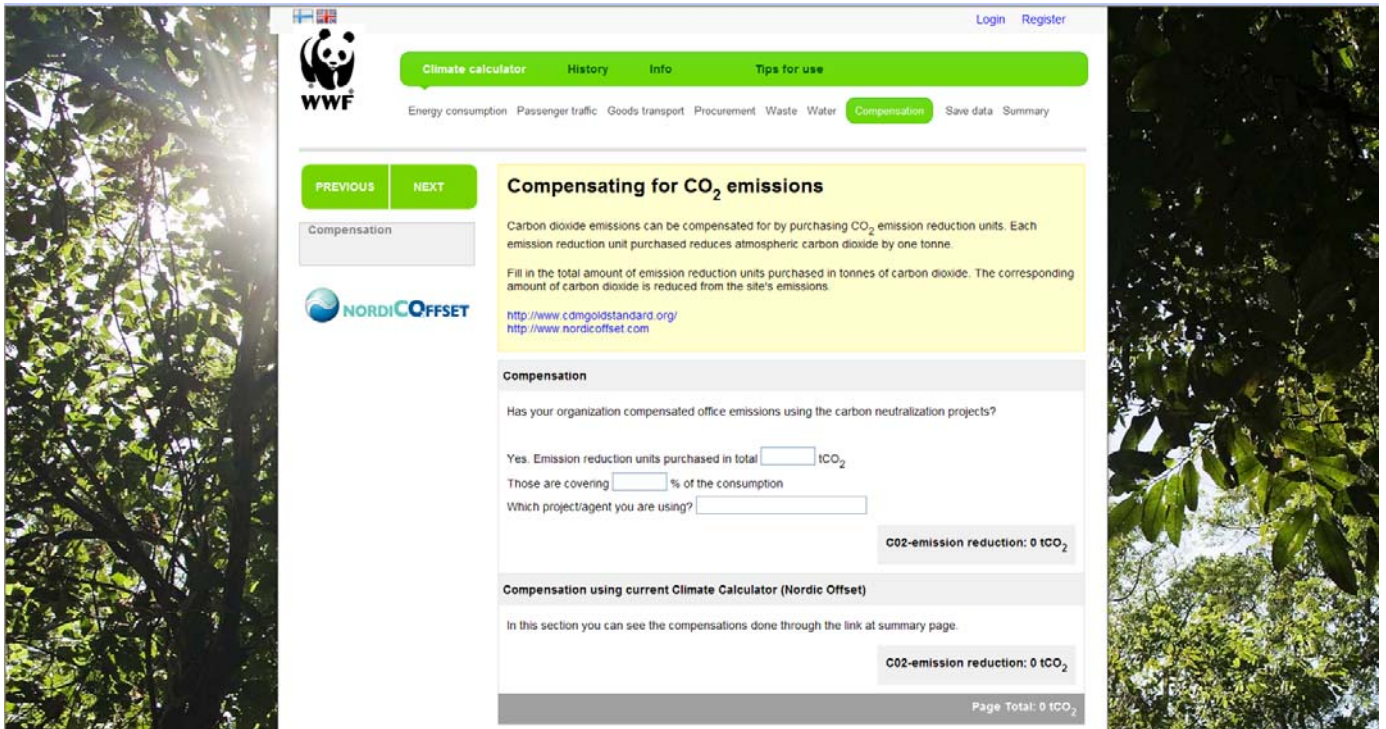


Picture 1. An example page of the Climate Calculator.

### 3. The function of the Climate Calculator

The consumption data can be entered to the Climate Calculator in a year or quarter or month level. When the data is entered to the Climate Calculator, the CO<sub>2</sub>-equivalent emissions of the consumption are calculated online. The data can also be saved and monitored by making a user account.

In the Climate Calculator, it is possible to compensate the greenhouse gas emissions by buying CO<sub>2</sub> emission reduction units. With each emission reduction unit, it is possible to offset one tonne of atmospheric carbon dioxide emissions. The service is offered by the Nordic Offset.



Picture 2. The compensation of the greenhouse gas emissions in the Climate Calculator.

In the Climate Calculator, the emissions created by the user are presented in a summary table. The summary shows the total amount of carbon dioxide emissions created and how the emissions correspond to the average emissions of litres of petrol or the energy consumed of detached houses. The summary shows also how many trees have to be planted in order to absorb the emissions.

Carbon dioxide emissions total: 0 tCO<sub>2</sub>  
 CO<sub>2</sub> emissions correspond to the average emissions from 0 litres of petrol (info) or 0 detached houses (info). In order to absorb this amount of emissions, 0 trees would have to be planted (info).  
 If you would like to compensate your CO<sub>2</sub> emissions, it is possible using this link.

Page	tCO <sub>2</sub>	Water, m <sup>3</sup>	Costs, €
Electricity consumption	0	0	0
Heating consumption	0	0	0
Road traffic	0	0	0
Rail traffic	0	0	0
Local public transportation	0	0	0
Air traffic	0	0	0
Water traffic	0	0	0
Traffic between home and workplace	0	0	0
Road transport	0	0	0
Rail transport	0	0	0
Air transport	0	0	0
Water transport	0	0	0
Transport of letters	0	0	0
Paper consumption	0	0	0
Office appliances	0	0	0
Furniture	0	0	0
Waste	0	0	0
Compensation	0	0	0
Water consumption	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>

Picture 3. The summary table of the Climate Calculator.

#### 4. Emission coefficients and default values

The emission factors and default values used in the Climate Calculator's emission calculations are primarily based on statistical mean values and expert assessments.

The emission factors used in the Climate Calculator are primarily for the emissions created by the consumption of the real estate and service sectors and private persons. The emission factors are not suitable to use for CO<sub>2</sub> emission estimates of energy-intensive industries or energy generating industries. The emission factors used in the Climate Calculator are intended for the estimation of consumption-based rather than production-based emissions.

The factors used in the calculations are updated on average once per year. Before the Calculator is taken into use in another country, the national emission coefficients have to be defined.

Table 3. A List of the Climate Calculators factors. The example country is Finland.

#### ENERGY CONSUMPTION : ELECTRICITY CONSUMPTION

- The mean value of electricity purchasing in Finland
- Marginal based CO<sub>2</sub> emission coefficient for electricity
- Heating electricity
- Green electricity (renewable energy sources)
- Mean heat coefficient of ground source heat pumps
- Mean heat coefficient of air source heat pumps

#### ENERGY CONSUMPTION: HEATING CONSUMPTION (except electric heating, which is under electricity consumption)

- Light heating oil
- Natural gas
- Wood-based fuels (renewable energy sources)
- Light heating oil, heat value
- Natural gas, heat value
- Pellets, heat value
- Wood chips, heat value
- District heating CO<sub>2</sub> emission coefficients by municipality of production
- Mean value of district heating networks, total of aggregate production and separate production
- District heating, aggregate production approximately
- District heating, separate production approximately

Specific heating consumption of office buildings based on sector and building volume:

- Private sector, all
- Priv. sector, under 10,000 m<sup>3</sup>
- Priv. sect., 10,000 - 20,000 m<sup>3</sup>
- Priv. sect., 20,000 - 30,000 m<sup>3</sup>
- Priv. sect., 30,000 - 60,000 m<sup>3</sup>
- Priv. sect., over 60,000 m<sup>3</sup>
- Public sector, all
- Pub. sect., less than 10,000 m<sup>3</sup>
- Pub. sect., 10,000 - 20,000 m<sup>3</sup>
- Pub. sect., 20,000 - 30,000 m<sup>3</sup>
- Pub. sect., 30,000 - 60,000 m<sup>3</sup>
- Pub. sect., over 60,000 m<sup>3</sup>

Specific heating consumption of various building types:

- Apartment buildings, dormitories
- Row houses
- Detached houses
- Department stores and malls
- Hotels, restaurants, hospitals and institutions
- Schools
- Kindergartens, nursery schools
- Museums etc.
- Theatres and music halls
- Exhibition halls
- Swimming halls, baths, spas
- Sport halls, stadiums
- Industry buildings, small industry halls
- Laundries
- Warehouses

## **PASSENGER TRAFFIC**

CO<sub>2</sub> emission coefficients of fuels:

- Petrol and diesel

CO<sub>2</sub> emission coefficients in road and rail transport:

- Petrol-powered private cars, diesel-powered private cars, all private cars (mean value), taxi (diesel-powered, mean value), bus (long distance), bus (commuter), train (long distance), hybrid car, underground, tram, commuter train (Finland, mean value)

Default values in road and rail transport:

- Mean travel distance of shopping or running errands in Finland
- Mean cost per kilometre by taxi
- Mean energy consumption of an electric car
- Mean energy consumption of charging the battery of an electric car
- Mean distance travelled by long distance train in Finland
- Share of bus transport
- Share of tram transport
- Share of commuter train transport
- Share of underground transport
- Mean distance travelled by residents of the Helsinki metropolitan region when using public transport within the region for work-related travel

Mean prices of bus travel:

- 0-6 km, 7-9 km, 10-12 km, 13-16 km, 17-25 km, 26-30 km, 31-60 km, 61-160 km, over 161 km

CO<sub>2</sub> emission coefficients in air transport (coefficient is GHG based, Global Warming Potential value is 1,9)

- Short-haul flight, less than 400 km = 180 g CO<sub>2</sub>/person km
- Medium-haul flight, 400-1600 km = 130 g CO<sub>2</sub>/person km x 1,9 = 247 gCO<sub>2</sub>/person km
- Long-haul flight, over 1600 km = 110 g CO<sub>2</sub>/person km x 1,9 = 209 gCO<sub>2</sub>/person km

CO<sub>2</sub> emission coefficients in personal waterway transport:

- Passenger ship, Finland, mean value
- Passenger car ferry
- Waterway transport distances by route

#### **GOODS TRANSPORT**

CO<sub>2</sub> emission coefficients of goods transport:

- Delivery van
- Small lorry, 6 t, delivery, 50% load
- Large lorry, 15 t, delivery
- Semi-trailer combination, driving on highway, 70% load
- Full trailer combinations, driving on highway, 70% load
- Dustcart 14 t, typical collection route
- Waste transport
- Transport of letters
- Mean price of mailing a letter in Finland
- Electric train transport, mean value
- Diesel train transport, mean value
- Train transport, mean value
- Jet turbine transport, domestic M82
- Air transport in Europe, mean value
- Intercontinental air transport, mean value
- Car and cargo ferry, Finland, mean value
- Container and tank ship, Finland, mean value

#### **PROCUREMENT: PAPER**

Equivalent CO<sub>2</sub> emission coefficients and default values for paper:

- Printing paper, copy paper, paper made of recycled fibre pulp, weight of a paper ream

#### **PROCUREMENT: OFFICE APPLIANCES**

Equivalent CO<sub>2</sub> emission coefficients and default values for office appliances:

- Mobile phone, laptop, desktop computer, LCD monitor, MFP (Multifunction Printer), printer, photocopier, fax

#### **PROCUREMENT: FURNITURE**

Equivalent CO<sub>2</sub> emission coefficients and default values for furniture:

- Desk, chair, storage furniture, screen

#### **WASTE**

Equivalent CO<sub>2</sub> emission coefficients and default values for waste:

- Bio waste, recycled paper, cardboard, recycled carton, energy waste, mixed waste to landfill, mixed waste to incineration plant

#### **COMPENSATION**

- The amount of carbon dioxide absorbed by a tree in compensating of the emissions

### **5. Greenhouse gas emission factors for various types of waste**

The Finnish Environment Institute has estimated the greenhouse gas emission factors for various types of waste. Detailed description of these factors can be found here

<http://www.hsy.fi/julia2030/en/project/waste/Pages/default.aspx>