CO_2 Factor

Factor for calculating the amount of CO_2 avoided in power generation

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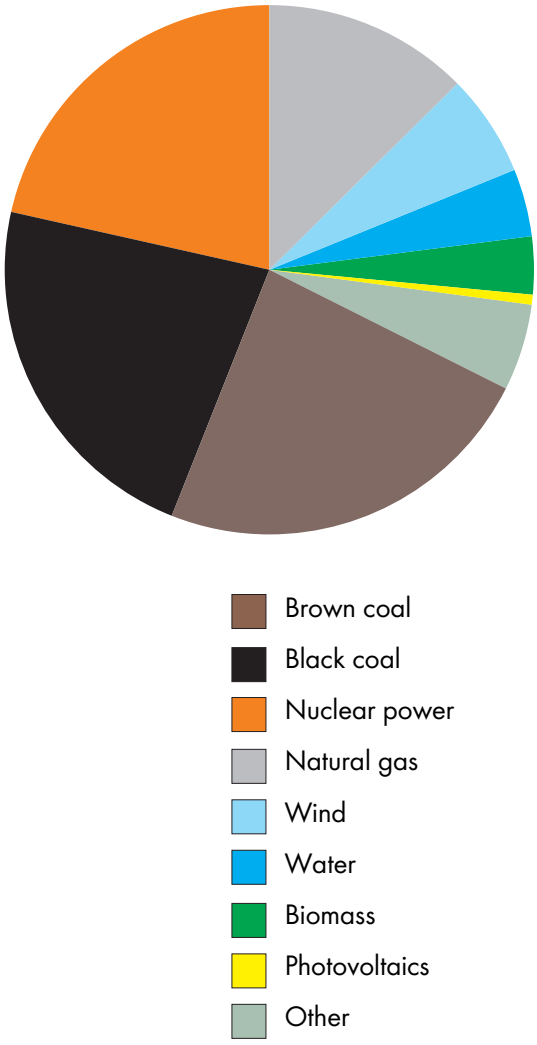
This document contains background information on the CO_2 factor. Some products from SMA Solar Technology can calculate how much carbon dioxide (CO_2) you avoid by environmentally friendly power generation with your PV system. For this calculation, the CO_2 factor for the region must be stated.

1 What is the Fuel Mix?

The combination of different energy sources for the power supply of a country is called the fuel mix. One advantage is that there is no dependency on one particular source of energy. Otherwise, one would be at the mercy of this source`s price and often the politically specified availability.

The quality of electricity is always the same. However, every provider generates electricity in a different way. In order to ensure that aspects of environmental protection can be taken into account, all energy supply companies are obliged to publish information on their fuel mix.

Example of the different energy sources of a fuel mix



2 CO_2 Avoidance and Fuel Mix

The avoidance of CO_2 is a measure for the contribution to climate protection and thus reduces the greenhouse effect. CO_2 is emitted during the generation of electrical power as a result of burning fossil fuels (e.g. coal). Electricity which is generated using renewable energy (sun, wind, water, biomass, geothermal energy) does not produce (additional) CO_2.

The higher a country's portion of renewable energy sources in the fuel mix, the lower the CO_2-emissions. If for example you feed power into the public grid via your PV system, you make a contribution to reducing the CO_2 emissions of your country. The amount of CO2 avoided as a result of using a PV system, for example, depends on the fuel used (gas, heating oil, coal) and respectively the conventional energy used (electricity, district heating) by a country.

2.1 How do I determine the CO_2 factor?

The CO_2 factor (unit: kg/kWh) indicates how much CO_2 is produced for every one kilowatt hour of electricity generated in the country. Depending on the technology used and the efficiency, the CO_2 factor can vary between the different energy supply companies in the region. You can find out the level of the CO_2 factor of the electricity supplied to you by contacting your energy supply company.

2.2 Sample calculation of CO_2 avoidance

Formula for calculating CO_2 avoidance:

Generated electricity in kWh **x** factor for CO_2 avoidance in kg/kWh **=** avoided CO_2 in kg

A region has, for example, a CO_2 factor of 0.6 kg/kWh. In this region there is a 3 kWp PV system which generates, for example, 2400 kWh electricity per year. The electricity generated in this way spares the earth a CO_2 emission of 2400 kWh x 0.6 kg/kWh = 1440 kg CO_2.

How much CO_2 does a car emit?

How far can I drive in my car until it has emitted the amount of CO_2 into the air which I have saved with my PV system in a year?

Example calculation:

A car has a CO_2 emission of 150 g/km, for example.

1440 kg CO_2 = 1440000 g CO_2

1440000 g / 150 g/km = 9600 km

You could drive 9600 km in this car until the amount of CO_2 saved has been emitted into environment. This is approximately the distance from Germany to Tibet per year. See the vehicle registration document for the amount of CO_2 that your car emits.