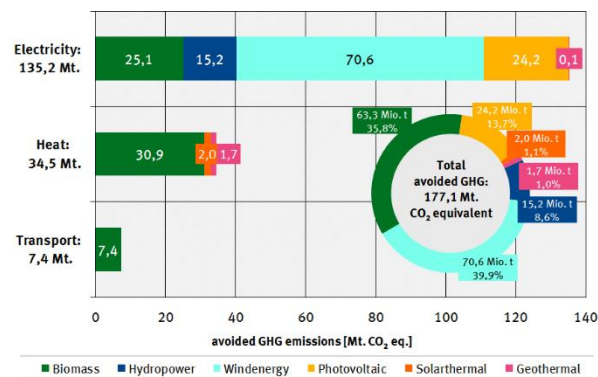


Latest Results

Calculations for 2017 show that the expansion of RES contributes substantially to achieving national climate goals in Germany. In all energy sectors (i.e. electricity, heat and transport) fossil fuels are increasingly replaced by renewable energies thereby permanently avoiding energy related emissions of greenhouse gases (GHG) and air pollutants. In 2017 renewable energies accounted for approximately 13.1% of total final energy consumption. They showed strong growth rates especially in the electricity sector where their share climbed to 36.0% of total (gross) electricity production.

Avoided greenhouse gas emissions through the use of renewable energy sources in Germany (2017)



Calculation show that RES deployment resulted in a net-avoidance of GHG emissions of about 177.1 Mt. CO₂-eq. in 2017. Out of the 135.2 Mt. CO₂-eq. avoided within the electricity sector, a significant share (115 Mt. CO₂-eq.) was directly related to renewables supported through the Renewable Energy law (EEG). The use of renewables in the heat and transport sector accounted for 34.5 Mt. and 7.4 Mt. CO₂-eq. respectively. Besides GHGs, the emission balance also looks into other emissions related to the use of renewable energy sources including acid forming substances and particulate matter. Detailed results for these emissions are available in the full publication.

Publications

The result of our work is made available through the yearly updated UBA publication: “Emission Balance of Renewable Energy Sources“ (in German only). Besides detailed results for all investigated renewable energy sources the publication contains a comprehensive methodology chapter.

Furthermore, most important results are available through the brochure “Renewable Energy in Figures” published by BMWi (available in German and English).

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As at: November 2017



Emission Balance of Renewable Energy Sources in 2017

German Environment Agency

Umwelt
Bundesamt

Background

Since 2007, the Federal Environment Agency (UBA) has been compiling a regularly updated emission balance of renewable energy sources (RES) in Germany.

The work is undertaken on behalf of the Ministry for Economic Affairs and Energy (BMWi) within the framework of the working group on renewable energy statistics (AGEE-Stat). The analysis is based on the Directive 2009/28/EC of the European Parliament and of the European Council of 23 April 2009 (RED), which includes guidelines on the continuous monitoring of avoided GHG emissions through the use of renewable.

To fulfil these requirements UBA developed a detailed methodology which is underpinned by up-to-date research from a range of leading research institutions.

Methodology

The emission balance aims to provide comprehensive results on the overall net-emissions avoided through the use of renewables. The work takes into account all emissions produced during the use of different RES. It includes all steps of the production and generation chain such as manufacturing, construction or maintenance of technical hardware (e.g. PV panels or wind turbines) or the cultivation, harvesting and transport of biomass.

In a consecutive step, these life cycle emissions are compared with the avoided emissions of the substituted fossil fuels. The related calculations are carried out using technology specific substitution factors and result in overall net-emission balances for all investigated renewable energy sources.

Which types of emissions are investigated?

The emission balance includes all three relevant renewable energy sectors: electricity production (including solar PV, on- and off-shore wind power, hydropower, geothermal power and electricity generation from a number of biogenic resources), heat production (from different types of biomass in households and industry, biogas, waste, solar thermal and geothermal sources), as well as transport (based on different biofuels). The balance includes GHG-emissions (CO₂, CH₄ and N₂O), acid former (SO₂, NO_x) and ground-level ozone substances (CO, NMVOC), as well as particulate matter (PM).



Some key aspects of the methodology

- ▶ The calculation is not limited to GHG emissions but also includes some of the most important air pollutants in line with EU-Directive 2001/81/EC.
- ▶ Specific and regularly updated substitution factors for renewable power generation are used to derive emissions balances in the power sector.
- ▶ An analysis of substitution interlinkages and effects within the heat sector is applied, considering different consumption pattern (e.g. household, service, industry and agriculture)
- ▶ The calculation of emissions from biofuels is based on emissions, published by the Federal Office for Agriculture and Food in its annual Evaluation and Progress Report on the Biofuel/Biomass Electricity Sustainability Ordinance

