Renewable Energy: Solar Energy – Power from the Sun

Factsheet 05

Facts and Figures

Solar Energy – Using the Power of the Sun

The Earth functions like a power plant: As the largest source of energy, the sun delivers an amount of energy of about 1.5 – 1018 kWh to the Earth's surface per year. This amount of energy corresponds to more than 10,000 times the world energy demand of mankind in 2010 (1.4×1014 kWh/year).

The sun is the basis that planet Earth itself functions like a power plant: solar energy is the driving force for wind energy, it provides for the worldwide air currents (wind), for water energy, it ensures the continuity of the water cycle, and for energy from biomass, the sun ensures the growth of plants and thus enables the life of humans and animals.

How does Solar Energy work?

Direct forms of solar energy use

1. **Solar Thermal Energy**: solar collectors generate heat (solar thermal or photothermal), e.g. installed on roofs to produce hot water
2. **Photovoltaics:** solar cells generate direct electric curren), e.g. installed on roofs or as large-scale solar farms
3. **Solar Thermal Power Plants**: generate electricity using heat and steam to drive turbines
4. **Updraft Power Plants**: generate hot air in a greenhouse, which rises through a chimney and generates electricity

Solar energy is the cleanest and easiest form of alternative power supply to implement – it is precisely these advantages that make it indispensable for the energy transition.

Using Solar Energy on a Small Scale

Solar energy can also be used on a small scale and offers people in developing countries opportunities to significantly improve their living conditions: solar cookers or solar ovens heat food or sterilise medical material, simple solar lights provide light, solar pumps enable access to water.

Professions & Competence Profiles

Solar energy is relevant for many professions in the field of engineering, project management, plant construction, crafts and also in the commercial sector. e.g.:

- Installers, solar technicians/roofers/ electricians for the installation and maintenance of photovoltaic systems,
- Engineers, power plant technicians for planning, operation and maintenance of solar power plants
- Commercial managers

The production of solar cells has been largely outsourced from Europe and takes place in Asia (China). Of course, (skilled) workers are also needed in production worldwide.

Solar Energy – is it really Clean?

Harmful substances such as lead and cadmium are used in the production of solar cells for photovoltaics. In addition, there are transport costs, etc. As a current (March 2023) study by the Fraunhofer Institute shows, it is definitely worthwhile from an energy perspective to rely on solar energy. The Energy Payback Time (EPBT), the time it takes for a PV system to produce as much energy as was invested through its production and operation, is 1.3 years when using commercially available monocrystalline Si modules in Germany. As the Fraunhofer Institute's survey confirms, the use of photovoltaics in Germany saved 34.9 million tonnes of greenhouse gas emissions (net) in 2020.

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3 Country Check on Solar Energy

Spain

The share of solar energy in the energy mix in Spain was 11.9 % in 2022, putting solar energy in 4th place after natural gas, wind energy and nuclear power. The total share of renewable energy in 2022 was 45 %. Spain is the fastest growing PV market in Europe and is also ahead in innovation.

In 2020, Núñez de Balboa, Europe's largest ground-mounted photovoltaic plant to date, went into operation. The Spanish energy company Iberdrola wants to supply 250,000 people per year with renewable energy. 215,000 tonnes of CO_2 are to be avoided.

Greece

The share of solar energy in the energy mix of Greece was 14.3 % in 2022, putting solar energy in 4th place after natural gas, wind energy and lignite. The overall share of renewable energies was 38 % in 2022.

The expansion of solar energy is picking up speed in Greece, which is ideally suited with 300 days of sunshine. In 2021 alone, according to the European solar association Solarpower Europe, new PV plants with a capacity of 1,600 MW were newly built in Greece. In 2022, Europe's largest solar park with bifacial panels was opened after a year and a half of construction. The 204-megawatt plant in Kozani, Greece, is expected to provide enough electricity for 75,000 households.

Slovakia

The use of renewable energy (RE) is developing in Slovakia. In 2020, primary energy consumption by energy source shows a share of 8.4% for RE in total, while the share of RES in heat production is 17.8% in total. Demand is growing, so a new rebate system was introduced in 2022, through which the Slovak Energy Agency promotes the expansion of RE. 30 million euros are available for solar thermal systems, PV systems up to 10 kW, heat pumps and biomass systems; 50 % of the costs for acquisition and installation are covered.

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