

## Austria solar energy research and development

The documentation and market research in the field of technologies for the use of renewable energy sources creates a basis for the planning and decision making in politics, economy, research and development. The aim of this market study "Innovative energy technologies in Austria - market development 2020" is to lay a foundation in the following fields: biomass, photovoltaics, solar thermal collectors, heat pumps and wind power.

Methods used are: questionnaires handed out to manufacturers, trading firms and installation companies as well as questionnaires for funding providers at the national and local governments. Furthermore information is gathered with a survey of literature, the evaluation of available statistics and internet research. The obtained data is displayed in time series to provide the starting point for deeper analysis and strategical considerations.

First the market development is illustrated by production numbers or installed capacities and then the energy gain is calculated taking into account the life cycle of the machinery. The necessary support energy for the main and auxiliary machinery is discussed and savings in gross and net of greenhouse gas emissions are calculated. The graphically displayed turnovers and the job creating effects eventually show the impact of the various technologies in Austria. Results are shown in alphabetical order of technologies.

The influencing factors of the market diffusion of the renewables were widespread in 2020. The consequences of the Corona crisis remained widely manageable in 2020 - as was generally the case in the building sector and classical factors as the price of fossil energy, the existing energy-political framework and the competition among the technologies for the use of renewable energy dominated the events. Against this background an increase of the domestic market in the areas biomass boilers, photovoltaics and heat pumps could be recorded while clear declines had to be registered in the areas biomass stoves, solar thermics and wind power.

Fuels from solid biomass contributed to a CO<sub>2</sub> reduction of about 9.2 million tons in 2020. The whole sector of solid biofuels made a total turnover of 1.580 billion Euros thus creating 18,376 jobs.

The success of bioenergy highly depends on the availability of suitable biomasses in sufficient volumes and at competitive prices. The availability of biomass feedstock is currently very good. In addition to the traditional use of biomass in the heating sector, the importance of bioenergy as part of a sustainable energy system in combination with other renewables is increasing: biomass fuels are weather-independent energy suppliers. In this context the co-production of electricity and/or material products such as biochar is of great interest in order to ensure the most efficient use of resources.

This trend also continued in the following years due to low oil prices and warm weather. In 2019 and 2020 the sale figures increased again. In 2020, the sales of pellet boilers (<100 kW) increased by 21.9 %, those of

wood log/pellets combi by 45.2 %. The sales of small-scale (<100 kW) wood chip boilers increased by 6.9 % and the sales of wood log boilers by 10.9 %.

For the first time after the early phase of innovators and stand-alone systems the Austrian photovoltaic market in 2003 experienced an upsurge as the green electricity bill (Energiewirtschaftsgesetz) was passed before collapsing again due to the 15 MWpeak capping of feed-in tariffs in 2004. After the absolute highest market diffusion of photovoltaic systems in Austria in 2013 due to an extra funding process, the PV market stabilized from 2014 to 2018. After an increase in 2019 to 247 MWpeak, also in 2020 a substantial increase was generated: As shown in Figure 9, PV plants with a total capacity of 340.84 MWpeak were installed in 2020, which represents a significant increase of 38 %.

Hence, in 2020 the total amount of installed PV capacity in Austria was 2,043 MWpeak. This represents an increase of 20 %. As a consequence, the sum of produced electricity by PV plants in operation amounted to at least 2,043 GWh in 2020 and lead to a reduction in CO<sub>2</sub> emissions by 888,063 tons.

The Austrian photovoltaic industry is covering the production of PV modules and inverters as well as other PV components and devices. Furthermore, there is a high density of planning and installation companies for PV systems as well as specialized institutions and universities, which play an important role in international photovoltaic research & development (R&D). Within those economic sectors 2,755 persons are employed full-time, which raises solar technology to an overall substantial market. The average system price of a grid-connected 5 kWpeak photovoltaic system in Austria has decreased slightly compared to 2019 (1,568 EUR/kWpeak excl. VAT) to 1,506 EUR/kWpeak excl. VAT in 2020.

Especially the development of building integrated photovoltaic systems is of high importance for Austria. High added value seems to be achievable in this market branch. The integration does not only concern architectural aspects, but also systemic aspects of the optimal use of the locally generated electricity.

As early as the 1980s, the use of thermal solar energy experienced a first boom in the area of water heating and the heating of swimming pools. At the beginning of the 1990ies it was possible to develop a considerable market in the field of solar combi systems for hot water and space heating. In the period between the year 2002 and 2009 the solar thermal market grew significantly and reached the peak in 2009 due to rising oil prices but also due to new applications in the multifamily house sector, the tourism sector as well as new applications in solar assisted district heating and industrial process heat.

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