



Report 2021

Austria

Photo: Klaus Rockenbauer

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Austria has set ambitious renewable energy and climate protection targets, reaching 100% electricity generation from renewables by 2030.

THE YEAR 2021 marked a moderate expansion of wind power. Austrian wind power increased by 298 MW. Many projects are part of a queue caused by inadequate support scheme conditions in recent years and lengthy approval procedures.

In 2021, Austria installed 69 turbines compared to 7 turbines in 2020. By the end of 2021, there was more than 3,300 MW installed capacity, while 57 turbines with 103 MW were decom-

missioned. As a result, comparing established and decommissioned turbines in Austria, there was a slight net increase in existing wind power plants. [1] The estimated feasible potential until 2030 is at 7,500 MW with 22.5 TWh p.a. [2]

Table 1. Key National Statistics 2019: Austria

Total (net) installed wind power capacity*	3.300 GW
Total offshore capacity	0 GW
New wind power capacity installed	298 MW
Decommissioned capacity (in 2018)	103 MW
Total electrical energy output from wind	7,6 TWh
Wind-generated electricity as percent of national electricity demand	11%
Average national capacity factor***	26,2%
Target	100% renewable electricity in 2030
National wind energy R&D budget	

*Installed wind power capacity: Calculated using nameplate power ratings of the installed wind turbines

Highlight(s)

- A steady increase in wind power was reached and expected for the upcoming years until 2030 to reach the 10 TWh/a target
- Austria support scheme moving from FIT to auctions.

Market Development

National Targets and Policies Supporting Development

The new Austrian scheme to support the production of renewable energy (EAG), approved by the European Commission in 2022, is meant to provide the framework for reaching Austria's goal of 100% renewable electricity in 2030. Currently, Austria generates around 70% of its electricity production from renewable sources. Furthermore, the ambition is to make Austria climate neutral by 2040. As a step forward, concrete targets are implemented, such as an additional energy generation of 10 TWh from wind power, 11 TWh from PV, and 5 TWh from hydropower until 2030. In contrast, the year 2020 marked a further

decline in the expansion of wind power, and 2021 resulted in just a moderate increase of wind power by 298 MW. One of the reasons is the long development and notification of the new support scheme (EAG) as well as lengthy approval procedures of projects. As a result, a more ambitious expansion in 2022 and the following years is needed, as well as further dedicated wind power zones in Austria.

Progress and Operational Details

In 2021, a steady increase in the expansion of wind power was reached and is expected for the upcoming years until 2030. The Austrian government targets an annual growth of 400 MW of wind power. In total, Austria's wind power production generated around 7,6 billion kWh, corresponding to 11% of the national electricity consumption. [1]

The forecast for 2022 assumes a significant increase of additionally installed wind power capacity of 457 MW. One of the reasons for this is the backlog of older projects that have already been approved before 2019 and provided with a feed-in-tariff (FiT) due to a reform of the Austrian Renewable Energy act. These projects can now be completed. [3] Another reason are projects which have been delayed over the last years due to the Corona-pandemic and its effects on the global supply chains of wind turbine manufacturers.

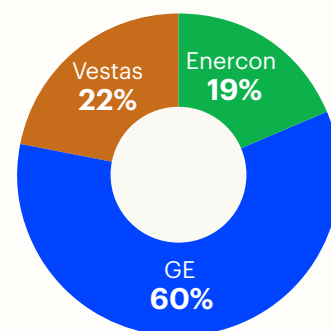


Figure 2. market share - wind turbine manufacturers (2021) (source: IG Windkraft)

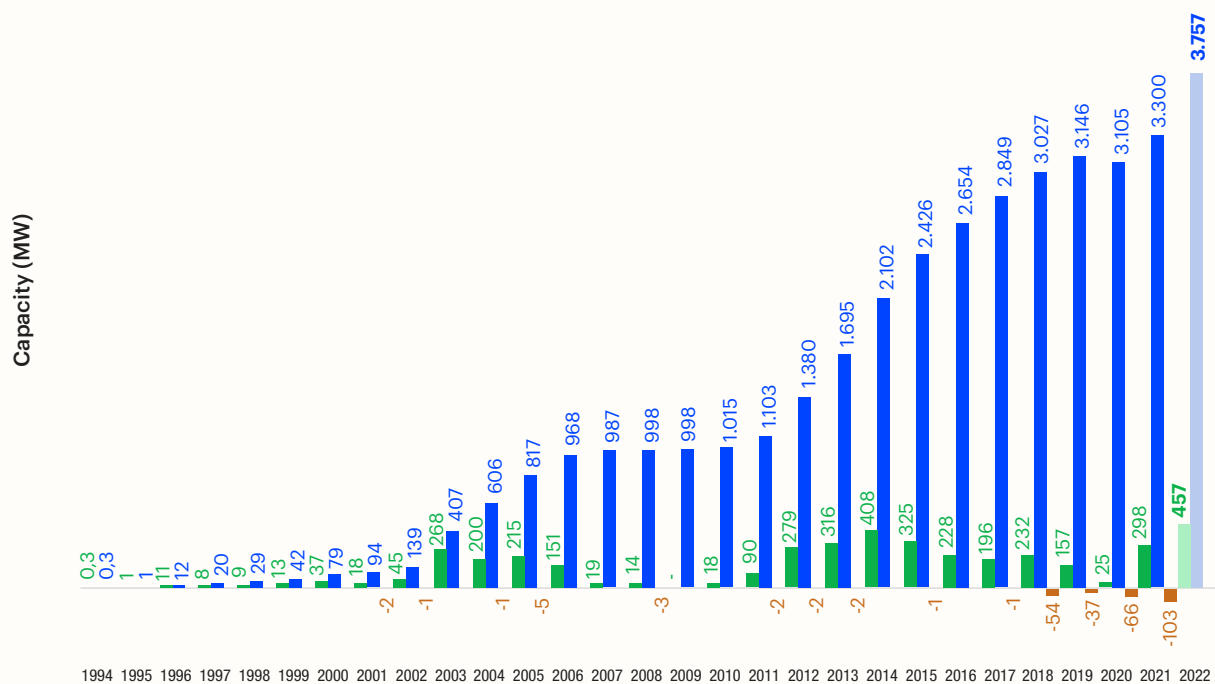


Figure 1. Overview of installed capacity in Austria with 2022 forecast

Regarding market development, GE dominated the Austrian market and is responsible for 60% of the added capacity. GE was able to realize several more significant projects in the south-east of Austria. The overall market share is divided among mature players like Enercon with 56,5%, Vestas with 27,3%, GE with 5,8%, and the remaining stock of Senvion with 8,4%.

The scientific study “Stromzukunft Österreich 2030” quantifies the total investment costs at 1,350 to 1,570 EUR/kW (1,516 to 1,763 USD/kW) and the O&M costs at 36 to 40 EUR/kW (40 to 45 USD/kW) per year. [4]

Matters Affecting Growth and Work to Remove Barriers

In 2011, the Austrian parliament adopted new legislation for electricity from renewable energy sources: the Green Electricity Act 2012, which offered the existing FiT system and a stable legal framework through 2020. However, the lack of sufficient support scheme budget for renewable energy projects, especially wind power, created a backlog of permitted projects with a capacity of over 800 MW, waiting for a FiT since 2016. Thanks to the amendment to the

Green Electricity Act of September 2019, the backlog could be reduced, resulting in around 320 fully approved wind turbines with a capacity of 1.185 MW to be installed within the next four years. As a result, there was a moderate wind power expansion in 2021 of 298 MW, and there will be an increasing one in 2022.

However, a well-performing new Renewable Energy Law is needed for the next ten years to provide the necessary funding for new projects. The future support scheme (EAG), notified by the European Commission, is within the process of national implementation. A key element for wind power, besides the additional 10 TWh of electricity generation until 2030, is that an auctioning system will assign the upcoming capacities. Furthermore, a paradigm shift will occur, as market premiums will displace the FiT-system. An adapted support scheme framework for developing projects with suboptimal wind conditions will be introduced to use Austria’s total wind power potential.

However, although many elements of the draft of the new renewable support scheme mechanism (EAG)

sound promising, it needs to be stressed that the success of the energy transition, especially regarding wind power, needs stronger and more ambitious initiatives on the state government level. Many crucial elements of a fast expansion of renewable energy projects, especially wind power, are located under the jurisdiction of the federal state governments. Furthermore, important regulations and procedures differ from one state to the other, causing an increased complexity for wind energy project developers. In addition, the federal state governments’ current climate and renewable energy plans are partly outdated and/or lack the necessary ambition to make Austria climate neutral by 2040.

Another crucial aspect is the development and further expansion of the grid capacity. For example, a direct international competition with other countries for net grid costs for renewable energy is currently causing discrimination against domestic renewable electricity producers exceeding the capacity of 5 MW. The reason is the so-called “G-component” of around € 1.3 per MWh, which has to be paid by the operators

of renewable energy plants with a capacity > 5 MW for grid connection. Furthermore, "G-components" differ from one federal state to another, causing discriminatory market conditions. The upcoming new support scheme mechanism (EAG) provides an overall regulation with "flat rates" depending on the project's capacity, decreasing the "G-component" for developers. However, there are still further operative details to be clarified. Additionally, the current average time between the start of the planning and construction of a wind turbine in Austria ranges from 3 to 8 years and even more extended periods occur sporadically. Complex and long environmental impact assessment (EIA) procedures slow infrastructure expansion and prevent investments. Another crucial element is the increasing lack of eligible spaces for wind power in the federal states. Therefore, nearly all Austrian federal states need to determine additional areas for wind power to raise existing potentials.

On the other hand, movements like "Fridays for Future" and other civil engagements confirm wind power's high public acceptance rate. Latest surveys show that over 80% of the Austrian population supports a further wind power expansion - a continuing trend since 2011. [5]

R,D&D Activities

National R,D&D Priorities and Budget

Based on the topographic and climatic conditions, the following two R,D&D topics are currently prioritized in Austria: In 2020, research projects regarding wind energy in cold climates and projects regarding the utilization of Wind Lidars at challenging locations were pursued. Those projects addressed not only site-specific technical challenges but also the requirements during the approval procedure.

National Research Initiatives and Results

In 2021, a new research project relat-

ed to the topic of 'Cold climate' was initiated. This project aims to improve the performance of ice protection systems through machine learning. Physical models of blade heating systems and their control strategies, as well as operational data of systems in the field and meteorological forecasts, will be used to create and educate algorithms that shall enable optimized operation and yield of wind turbines under icing conditions.

Test Facilities and Demonstration Projects

The winter of 2021 to 2022 was the second and last field test period for the N.Ice research project related to wind energy utilization in cold climates. In this project, an ultra-short pulse laser generates nanostructures in the sub- μm range on technical surfaces (like rotor blades) to avoid or prevent the adhesion of ice or at least reduce the lifespan of ice shells. Individual samples were used in field tests on a small wind turbine and were exposed together with reference samples. The laser-processed samples were monitored continuously together with unprocessed reference samples, and the ice formation on the sample surface was registered quantitatively. This enables statements about the degree of ice formation and the duration of icing.

Collaborative Research

Based on the focus areas mentioned above, Austria is participating in IEA Task 41, Task 52, and Task 54. In Task 52, the Austrian focus is on utilizing Lidar devices in complex terrain; in Task 54, the Austrian partner is leading a subtask that deals with the risk of ice fall and ice throw. Because of the international cooperation and the produced deliverables in the Tasks, the impact of the national research projects could be improved and gain value for the national authorities.

Impact of Wind Energy

Environmental Impact

Wind power is supposed to dominate Austria's current and future climate and energy strategy, providing the

additional potential to achieve the demanded climate goals. Therefore, around 3,3 million tons of CO₂ could be saved in 2021.

Austria has a rigorous legal regime on environmental impacts during the permitting procedures, which fulfill the European environmental protection requirements. Especially rules on the protection of birds and bats as well as landscape protection are focus of various discussions. During the last year, a significant number of studies on birds and wildlife around wind power plants were published examining the functioning of their coexistence. Even though the number of wind power plants has risen to 1.300, most populations of big birds have been growing significantly within the last few years. However, many excessive and redundant legal prerequisites hinder an efficient expansion of renewable energy sources and their positive effects.

On the one hand, wind power is often seen as an excellent risk for birds and is therefore prohibited near breeding or living habitats. As space is limited, the (re)settlement of big birds can cause limitations to (already existing) projects. On the other hand, in particular, discussions on landscape impacts of wind power as part of different administrative procedures delay the permission of wind power projects significantly and hinder the forthcoming of renewable energy. Therefore, it is essential to take the positive impacts of wind power into consideration and balance them with possible negative ones. Furthermore, approval procedures have to speed up significantly, as the average process lasts up to 10 years and thus constitutes a high barrier for the expansion of wind power.

Economic Benefits and Industry Development

The Austrian wind power industry consists of over 180 companies with around 5.000 employees, including wind turbine operators, planning offices, and component suppliers for international wind turbine manufacturers. In 2021, the annual turnover

of the existing wind park operators was overall 745 million EUR (848 million USD), which is an increase of about 46% compared to 2020 due to the much higher electricity price in 2021. [6] Cooperatives and private companies own 60% of Austria's existing wind turbines, while utility companies own the other 40%. A single wind turbine produces 1,4 million EUR (1,7 million USD) of domestic added value; furthermore, through the 20 years of its lifetime, it generates more than 3 million EUR (3,4 million USD) added value as well as two permanent jobs. In 2021, the establishment of 298 MW created an investment volume of 435 million EUR (495 million USD).

Local Austrian companies are successful in land-based and offshore sectors, and Austrian crane companies, planning offices, and software designers work intensively abroad. Austrian wind energy companies in the supply chain are industry leaders, e.g., in the fields of electricity conduction, wind power generators, wind turbine generator design, and high-tech materials. Several wind power operators have successfully implemented projects and are operating on an international level. Austrian operators are very active with neighboring countries in Central and Eastern Europe, and some independent companies have started businesses outside Europe. There are no major wind turbine manufacturers in Austria, though there are manufacturers of small- and micro-sized wind turbines. According to a study conducted by the Austrian Wind Energy Association, one-third of the Austrian wind energy supply chain industry obtains an export volume of estimated over 400 million EUR (455 million USD).

Austrian component suppliers are hidden champions in several international wind turbine market fields. Bachmann Electronic GmbH is a leading manufacturer of turbine control systems. Hexcel Composites GmbH develops and produces materials for blades. Elin EBG Motoren GmbH supplies generators for the

global market. There are also several global players with competence centers in Austria, e.g., SKF GmbH.

In the field of innovation, start-ups have become a significant part of the wind energy industry. For example, start-up companies like Eologix implemented an innovative ice detection system on rotor blades, or Aero-Enterprise, offering drone inspection services for wind turbines. Promising developments have also been made by the recently founded startup Speedpox, which is researching in new processes for the production of fiber composites for wind turbine blades.

Next Term

In 2022, the new support scheme mechanism (EAG) will come into effect, providing funding and a framework for the upcoming ten years. Several additional policies need to be revised, such as Austria's climate protection law, a new market design for renewables, and measures on the federal state level like spatial planning, in order to achieve Austria's ambitious climate laws and the EU's "Fit for 55%" program.

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