



Report 2022

# Austria

*Photo: sedmak / Getty Images-Canva.*

**Authors** *Martin Jaksch-Fliegenschnee and Patrik Wonisch, Austrian Windenergy Association;  
Andreas Krenn, Energiewerkstatt, Austria.*

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

The year 2022 marked a slightly increasing expansion of wind power. Austrian wind power increased by 315 MW. Many of the projects are still part of a queue caused by inadequate support scheme conditions in recent years and lengthy approvals. Since winter 2022 the new support scheme EAG (Erneuerbaren-Ausbau-Gesetz) is in place. The first wind power plant subsidized by this scheme will be

erected earliest next year.

In 2022, Austria installed 87 turbines compared to 7 turbines in 2020. By the end of 2022, 3,3560 MW were installed as well as 27 turbines with 49 MW were decommissioned. As a result, comparing installed and decommissioned turbines in Austria gained a slight net increase of existing wind power plants. [1]. The estimated

**Table 1. Key National Statistics 2022: Austria**

Total (net) installed wind power capacity	3.560 GW
Total offshore capacity	0 GW
New wind power capacity installed	315 MW
Decommissioned capacity (in 2022)	27 turbines; 49 MW
Total electrical energy output from wind	8,2 TWh
Wind-generated electricity as percent of national electricity demand	11,1%
Average national capacity factor	26,3%
Target	100% renewable electricity in 2030
National wind energy R&D budget	

feasible potential until 2030 is at 7,500 MW with 22.5 TWh p.a. [2].

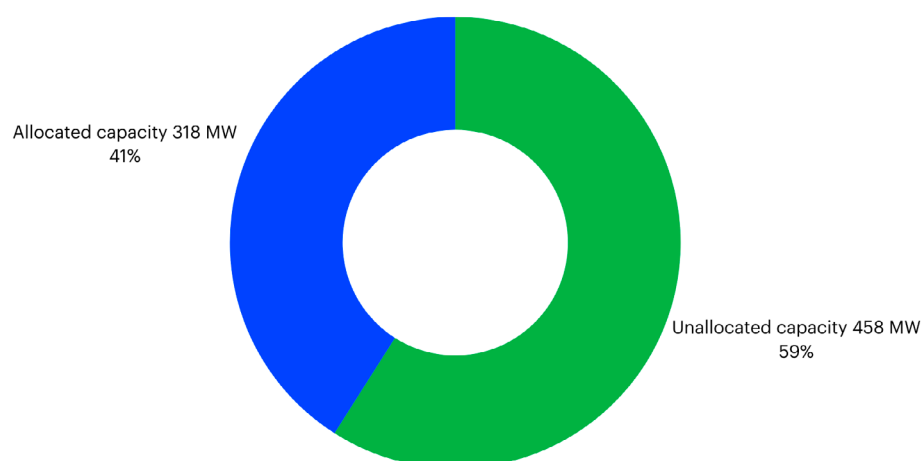
## Market Development

### National Targets and Policies Supporting Development

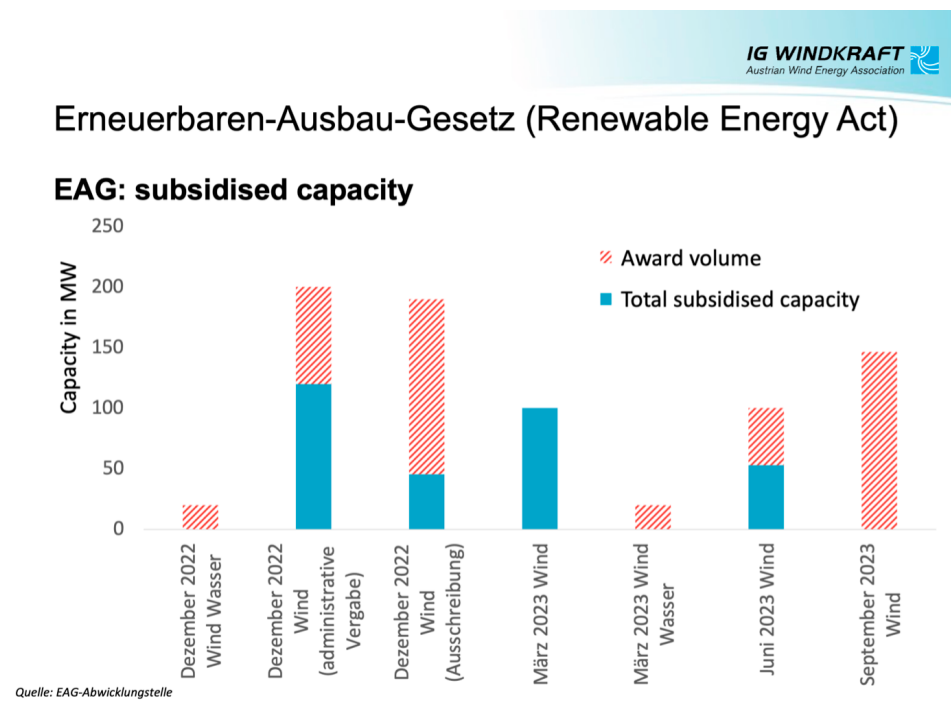
The Austrian scheme to support the production of renewable energy (EAG), approved by the European Commission in 2022, should provide the framework for reaching Austria's goal of 100% renewable electricity in 2030. Currently (2021 last available figure) Austria provides around

76% of its electricity production by renewable energy. Furthermore, the ambition is to make Austria climate-neutral by 2040. As a step forward there are concrete targets implemented, such as additional 10 TWh of wind power, 11 TWh PV or 5 TWh of hydro power **by 2030. By contrast the year 2020 marked a further decline in the expansion of wind power and 2021** caused just a moderate expansion of wind power of 298 MW and a little bit more in 2022 with 315 MW. One of the reasons is the long development and notification of the new support scheme (EAG). Since the

end of 2022 the EAG is fully implemented. Unfortunately, the big desolations of the electricity market and the prolonged troubles with the supply chain caused a suboptimal functionality of the subsidy system, which must be corrected soon. At the moment only 1/3 of the tender volumes are awarded. 450 MW of wind power are fully approved and waiting for subsidy conditions that make the installation possible.



**Figure 1:** Allocated Wind Energy Capacity of the Austrian Renewable Energy Act [3].



**Figure 2:** Result of the tender rounds of the Austrian Renewable Energy Act [3].

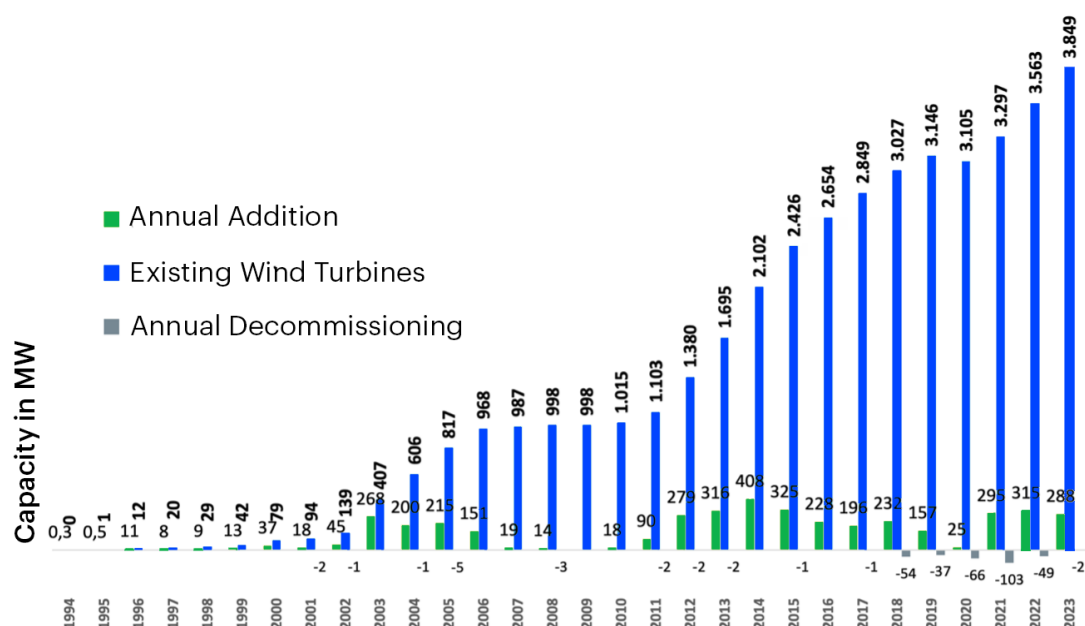
Furthermore, the legislation for the environmental impact assessment has been revised. So the approvals of projects will be faster in future. As a result, a more ambitious expansion in 2022 and the years following is needed. The biggest barrier at the moment are the missing wind power zones in all federal states in Austria. Further wind power zones have to be enacted, more staff in the permitting authorities have to be employed

and the as well the federal states must speed up the approval process for wind turbines.

#### Progress and Operational Details

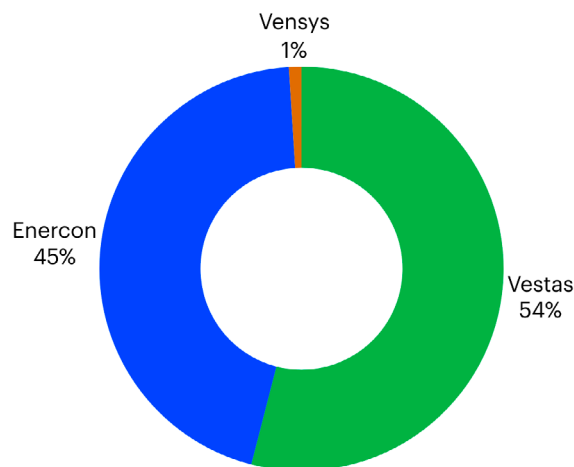
In 2022 a steady increasing expansion of wind power was reached and will be expected for the upcoming years of 2030. The prerequisite

for this is the improvement of the framework conditions. The goal of the current Austrian government envisages an annual expansion of 400 MW of wind power, although this goal has to lift to at least 500 MW of wind power per year. In total Austria's wind power production was able to generate around 8,2 billion kWh and 11% of the national electricity consumption. [1]



**Figure 3:** Overview of installed capacity in Austria with 2023 forecast.

A forecast for 2023 assumes an additional installed wind power capacity at the same level as 2022. This means that the development of Wind power is not in line with the national goals. The first turbines that are subsidized by the new Austrian Renewable Act will be earliest erected in 2023.



**Figure 4:** Market share - wind turbine manufacturers (2022). Source: IG Windkraft.

Regarding market development, the Austrian market was dominated by Vestas, which was responsible for 54% of the added capacity. The second biggest wind power manufacturer was Enercon with a share of 45%. The overall market share is divided among mature players like Enercon with 55,7%, Vestas with 29,8%, GE 5,1%, and the remaining stock of Senvion with 7,8%.

The scientific study "Stromzukunft Österreich 2030" quantifies the total investment costs as 1,350 to 1,570 EUR/kW (1,516 to 1,763 USD/kW) and the O&M costs as 36 to 40 EUR/kW (40 to 45 USD/kW) per year. [4] The big desolations of the electricity market and the prolonged troubles with the supply chain are not priced in these figures. It's obvious that these impacts have changed the whole prize situation.

### Matters Affecting Growth and Work to Remove Barriers

In the past the Austrian parliament adopted a new legislation for electricity from renewable energy sources in 2011: the Green Electricity Act 2012, which offered the existing FiT system, a stable legal framework through 2020. However, the lack of a sufficient support scheme budget for

renewable energy projects, especially for 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 power turbines with a capacity of 1.185 MW to be installed within the next four years. As a result, we had a moderate wind power expansion in 2021 and an increasing one in 2022 of 315 MW. However, for the upcoming next ten years, a well performing new Renewable Energy Law is needed to provide necessary funding for new projects. The actual support scheme (EAG), notified by the European Commission in 2022, has been in place since the End of 2022. A few main key elements for wind power is besides additional 10 TWh of new wind power until 2030 the upcoming capacities will be assigned by an auctioning system. Furthermore a paradigm shift has taken place as market premiums have displaced the FiT - system and an adapted support scheme framework for the development of projects with poorer wind conditions, to use the full wind power potential in Austria.

However many elements of the

draft of the new renewable support scheme mechanism (EAG) sound promising, it has to be pointed out that the big desolations of the electricity market and the prolonged troubles with the supply chain require a fast adaptation of the new subsidy system. Otherwise, the installation of wind turbines in Austria will come to an abrupt stop in the near future.

Furthermore, the success of the energy transition especially regarding wind power, needs stronger and more ambition, especially from the federal governments level. Many crucial elements of a fast expansion of renewable energy projects especially wind power are located under the jurisdiction of the federal government. What is more, important regulations and processes differ from one federal state to another, causing an increased complexity for wind energy project developers. Besides that the current climate and renewable energy plans of the several federal governments are partly outdated or lack the necessary ambition to make Austria climate-neutral by 2040.

Another crucial thing is the development and further expansion of the grid capacity. For example, currently, direct international competition with



other states of net grid costs for renewable energy is causing discrimination for 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 planning and the construction of a wind turbine in Austria is between 3 and 8 years, although longer periods may also occur. Complex and long environmental impact assessment (EIA) procedures slow down infrastructure expansion and prevent investments. Another crucial element was the increasing lack of necessary eligible spaces for wind power in the federal states. As a consequence, nearly all Austrian federal states need to determine additional areas for wind power to lift existing potentials.

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

## RD&D Activities

Wind Power really began in Austria, when Josef Friedländer was the first inventor in the world to present a wind turbine for generating electricity at the International Electricity Exhibition in Vienna’s Prater in 1883. He even used a battery to store the produced electricity. To this day, the pioneering spirit and innovative strength of Austrian wind companies

are instrumental in all areas of the wind industry.

Energiewerkstatt, for example, is researching innovative wind LiDAR measurement systems in International Energy Agency programmes. The crane and transport company Prangl played a major role in developing blade mover technology to facilitate the transport of rotor blades for mountain and forest sites. Hexcel Composites from Neumarkt is regarded as a leading manufacturer of ultra-light, glass and carbon fibre-reinforced epoxy resin composites - a base material for huge rotor blades. The Upper Austrian high-tech company Miba has done a great deal of development work in the advancement of its engine bearings that entire sectors of the wind energy industry are now switching to them. And the rotor sensors from Ventus are celebrated worldwide as a game changer in condition monitoring.

## National RD&D Priorities and Budget

Many research projects are also supported by public funds. In the last twelve years, according to surveys by the Austrian Energy Agency, the average amount of wind research funding from the public sector was 1.15 million euros per year; in the last two years the funding average has doubled (2.3 million euros). As the corporate structure in this area is characterised particularly strongly by the supplier industry for wind turbine components for wind turbines, R&D expenditure here tends to be underestimated. Many material and component developments are not categorised as energy research, although they are then used - in some cases predominantly categorised as energy research - in wind power plants (materials for blades, generators, etc.) Austrian wind companies’ innovations have had an influence on the wind industry both in their own country, and worldwide. They contribute to improving the efficiency and reliability of wind turbines and

enable the implementation of the global energy transition.

## National Research Initiatives and Results

Based on the topographic and climatic conditions, the following R&D topics are currently prioritized. In 2022, research projects regarding wind energy in cold climates and projects regarding the utilization of Wind Lidars at challenging locations were still pursued. Those projects addressed not only site-specific technical challenges but also the requirements during the approval procedure. The topic of ‘cold climate’ is still up to date in the field of ice protection systems. The focus is on improving ice protection systems through machine learning. Another area is the improvement of forecasting tools. These are of great importance for the integration of wind energy into the electricity system.

## Collaborative Research

Austria has been involved in the Wind TCP (Technology Collaboration Programme) of the IEA since 2009. Austria is currently involved in 4 TPC tasks.

Task 41 (Integration of decentralised wind turbines into an overall energy system): The aim here is to create a framework for decentralised small and medium-sized wind power plants are to be created in order to establish them competitively. One focus is the revision of the IEC standard for wind turbines.

Task 51 (Forecasts for the weather-controlled energy system): Here, possibilities for improving the accuracy and applicability of forecasting models and their models and their benefits for stakeholders in the wind industry, the energy sector and the energy system are being analysed.

Task 52 (Widespread application of wind LiDAR): Work on the widespread introduction of wind LiDAR systems.

The Energiewerkstatt is contributing to this with a study (see info box) and plays a coordinating role in and plays a coordinating role in the creation of guidelines for the use of LiDAR.

Task 54 (Wind energy in cold climate zones): The task investigates solutions for the operation of wind turbines under icing conditions and publishes and publishes recommendations in the form of reports and guidelines. Latest topic: Development of standards for standards for rotor blade heaters.

## Impact of Wind Energy

### Environmental Impact

Wind power is supposed to play a dominant role in Austria's current and future climate and energy strategy, providing additional potential to achieve the demanded climate goals. Therefore around 4,1 million tons of CO<sub>2</sub> could be saved in 2022. Austria has also very strict rules on the natural impact during the permitting procedures, which fulfill the European requirements of environmental

protection. During the last year, a significant number of studies on birds and wildlife around wind power plants are published and show the functioning of their coexistence. As a result of those strict rules as well as the growth of knowledge, most populations of big birds have been growing within the last years.

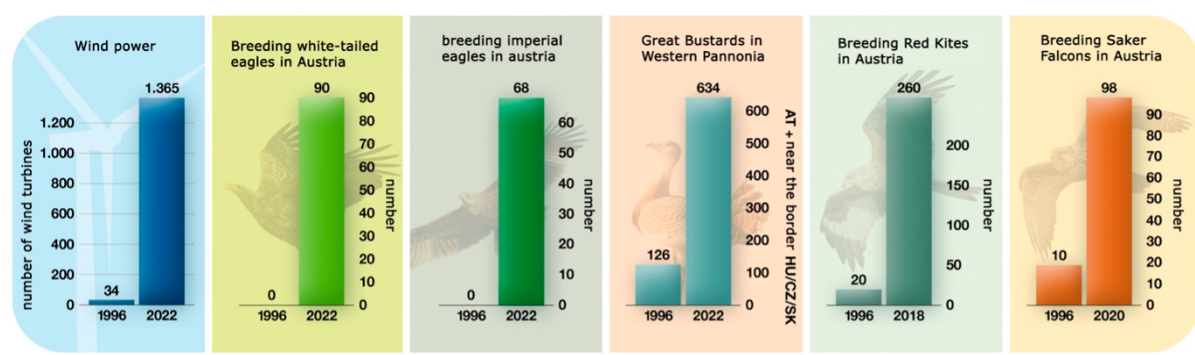


Figure 5: Wind Turbines and Bird of Prey Development. Source: IG Windkraft.

However, a lot of excessive and redundant legal prerequisites hinder an efficient expansion of renewable energy sources and its positive effects. Especially discussions on landscape impacts by wind power through different administrative processes delay the permission of wind power projects significantly and hinder the forthcoming of renewable energy. Therefore is highly important to take positive impacts of wind power into consideration and balance them with possible negative ones. Furthermore, permission processes have to speed up significantly as the average process last up to 10 years and therefore constitute a high barrier for wind power.

### Economic Benefits and Industry Development

The Austrian wind power industry

consists of over 180 companies with around 5.950 employees, including wind turbine operators, planning offices, and component suppliers for international wind turbine manufacturers. In 2022, the annual turnover of existing wind park operators was overall 1,6 billion EUR (1,7 billion USD), which is an increase of about 115% compared to 2021 due to the much higher electricity price in 2022 [6]. Cooperatives and private companies own 60% of Austria's existing wind turbines, while the other 40% are owned by utilities. One wind turbine (5 MW) caused 3,2 million EUR (3,4 million USD) of domestic added value, furthermore through the 20 years of lifetime it generates more than 5,2 million EUR (5,5 million USD) added value as well as 2 permanent jobs. In 2022 the establishment of 315 MW created an investment volume of 460 million EUR (488 million USD).

Local Austrian companies are successful in both the land-based and offshore sectors, and Austrian crane companies, planning offices, and software designers work intensively abroad. Austrian wind energy companies of 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 neighbouring countries in Central and Eastern Europe, and some independent companies have also 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 550 million EUR (584 million USD).

Austrian component suppliers serve as hidden champions in several fields in the international wind turbine market too. 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 centres in Austria, e.g. SKF GmbH.

In the field of innovation, Start-ups are a sustainable 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 of wind turbines. Promising developments were also made by a recently founded startup - Speedpox, researching in new processes for the production of fiber composites for wind turbine blades.

## Next steps

Since the end of 2022 the new support scheme mechanism (EAG) is in place, providing funding and a framework for the upcoming next ten years. Nevertheless, due to the big desolations of the electricity market and the prolonged troubles with the supply chain caused a suboptimal functionality of the subsidy system, so that it has already been changed. Several additional policies need to be revised such as Austria's climate protection law, a new market design for renewables or measures on federal state level like spatial planning to achieve Austria's ambitious climate laws and the EU's "Fit for 55%" program.

## References

[1] IG Windkraft (2022) Windkraftausbau 2022 und Vorschau 2023.

Download from:

[https://www.igwindkraft.at/media.php?filename=download%3D%2F2023.01.11%2F1673456390551631.pdf&rn=2023\\_Pra%CC%88sentation%20Jahresanfangs-PK.pdf](https://www.igwindkraft.at/media.php?filename=download%3D%2F2023.01.11%2F1673456390551631.pdf&rn=2023_Pra%CC%88sentation%20Jahresanfangs-PK.pdf)

[2] S. Moidl, H. Winkelmeier (2018) Neubewertung Windkraftpotential 2030.

Download from:

[https://www.igwindkraft.at/?mdoc\\_id=1038243](https://www.igwindkraft.at/?mdoc_id=1038243)

[3] IG Windkraft (2023).

[https://www.igwindkraft.at/?mdoc\\_id=1052003](https://www.igwindkraft.at/?mdoc_id=1052003)

[4] TU Wien - Energy Economics Group (2017) Stromzukunft Österreich 2030.

Download from:

<https://www.igwindkraft.at/mmedia/download/2017.07.10/1499698755049626.pdf>

[5] M. Jaksch-Fliegenschnee (2022) Meinungsumfrage Windkraft 2022.

Download from:

[https://www.igwindkraft.at/?mdoc\\_id=1047387](https://www.igwindkraft.at/?mdoc_id=1047387)

[6] E-Control (2022).

<https://www.e-control.at/referenz-marktpreis1>