



IEA Bioenergy
Technology Collaboration Programme

Implementation of bioenergy in Austria - 2021 update

Country Reports

IEA Bioenergy: 10 2021



This report was prepared from the 2021 IEA World Energy Balances and Renewables Information, combined with data and information provided by the IEA Bioenergy Executive Committee and Task members¹. Reference is also made to Eurostat data as well as data from national statistics. All individual country reports were reviewed by the national delegates to the IEA Bioenergy Executive Committee, who have approved the content. General background on the approach and definitions can be found in the central introductory report for all country reports.

Edited by: Luc Pelkmans, Technical Coordinator IEA Bioenergy

Contributions: Dina Bacovsky, Elisa Carlon (BEST – Bioenergy and Sustainable Technologies)

HIGHLIGHTS

- Renewables make up 30% of Austria's *total energy supply* in 2019. The renewable energy share in *final energy consumption* is 35%². Around 55% of renewable energy is from biomass.
- The main application of bioenergy is in renewable heat, both in direct heating (residential, services and industry) and in district heating. 50% of district heating is produced from biomass, and additions in district heating in the past decade were mostly through biomass-based heat and CHP plants.
- Electricity production in Austria is dominated by hydropower, with a modest role for bioenergy (mostly through CHP plants). The role of wind and solar power is growing.
- The use of fossil fuels (particularly diesel) is still growing. The role of biofuels in transport was relatively stable around 5% (by energy) in the past decade, with a general use of B7 as diesel fuel (*containing up to 7% biodiesel by volume*) and E5 as gasoline fuel (*containing up to 5% bioethanol by volume*).

¹ While data for 2020 are starting to become available at national level, it was decided to consider trends up to 2019 for good comparability and benchmarking between the different IEA Bioenergy member countries. Care should also be taken when using 2020 data for analysing trends as these data are distorted by the COVID19 Pandemic.

² The difference between the share of renewables in supply and consumption relates to unused heat from power plants (which is counted in energy supply, but not in final consumption).

COUNTRY PROFILE

Population and land use

Austria is a largely mountainous country in central Europe and is member of the European Union. It has a total land area of 82.5 thousand km² and a population of 9 million people. This represents a population density of 109 persons per km².

Around half of the land area is forest land (*of which 23% protected*). 30% is agricultural land, evenly split between arable land and permanent meadows/pastures.

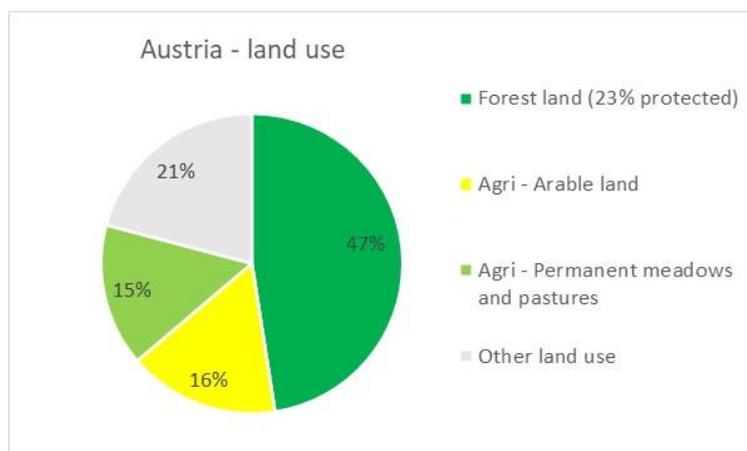


Figure 1: Land use in Austria (2018 figures - Source: FAOstat)

Final energy consumption

Overall final energy consumption in Austria (*also including non-energy use of oil, natural gas, and coal in industry*) equates 3.1 tonnes of oil equivalent (toe) per capita, which is somewhat above the average of IEA Bioenergy member countries. Industry, transport, and residential/services each represent around one third. Particularly transport energy per capita is fairly high compared to other countries.

Table 1: Distribution of the final consumption of energy carriers by sector in Austria (2019 figures - Source: IEA (2021) World Energy Balances and Renewables Information)

Final consumption energy carriers	Toe/capita (2019)	% of total	Median* (toe/capita)
Industry (energy use)	0.83	27%	0.67
Industry (non-energy use)	0.23	7%	0.21
Transport	1.00	32%	0.69
Residential	0.73	23%	0.57
Commercial & public services	0.28	9%	0.34
other	0.06	2%	
Total	3.11		2.34

* Median of the 25 member countries of IEA Bioenergy³

³ Comparative figures of the different IEA Bioenergy member countries are discussed in the central Countries' Report.

NATIONAL POLICY FRAMEWORK IN AUSTRIA

TARGETS AND STRATEGIES

Austria is moving towards a transformation to a highly efficient and climate-neutral energy, mobility, and economic system along the entire energy value production chain (generation, transport, conversion, consumption), including all associated products and services.

The draft of the Austrian national energy and climate plan (NECP) for the period from 2021 to 2030 was submitted to the European Commission by the Federal Ministry for Sustainability and Tourism (BMNT) at the end of 2018. This is based on #mission2030, Austria's integrated climate and energy strategy. The plan includes the following objectives by 2030:

- Reduction of greenhouse gas emissions by 36% compared with 2005 levels in sectors that are not covered by the EU emissions trading system.
- Increase the share of renewable energy in gross final energy consumption to 46–50%.
- Coverage of 100% of domestic electricity consumption from renewable sources (national, net balance, with exceptions for control and balancing energy for grid stabilisation and internal electricity generation from fossil fuels in tangible goods production).
- Improvement of primary energy intensity, defined as primary energy use per GDP unit, by 25–30% compared with 2015.

For the heating and cooling sectors, further in-depth work must be undertaken, in particular the development of a 'heating strategy' in collaboration with the provinces.

In the transport sector, the existing measures, which will be continued until 2030, will be further developed. In the case of biofuels, the most important measures are the blending of around 7% biodiesel with diesel fuel and around 5% bioethanol with petrol. In addition, a certain proportion of 100% biodiesel is still used for captive fleets. Almost all rail in Austria is electrified, hence further contributing to the share of renewable energy in the transport sector.

Austria is committed to becoming climate neutral by no later than 2050, without using nuclear power. This means that the unavoidable greenhouse gas emissions (for example from agriculture and production processes) will be compensated by carbon storage in natural or technical sinks. This is the guiding principle of the long-term climate strategy 2050.

Table 2: renewable energy and climate targets in Austria.

Sector	Share of renewables in gross final consumption per sector*	GHG reduction target compared to base year 2005
Overall target	46-50 % by 2030	36% by 2030 in non-ETS sectors*, 100% by 2050
Heating and cooling	Not available (Strategy under development)	100% by 2050
Electricity	national net annual balance of 100% by 2030	100% by 2050
Transport	minimum 14% by 2030	100% by 2050

** 2030 targets mentioned in the 2018 NECP are likely to be reviewed in the frame of the European Fit for 55 package of 2021.*

A description of renewable energy and climate policies and measures in Austria is available at the IEA's Policies and Measures Database: <https://www.iea.org/policies?country=Austria>

Specific policies related to renewable electricity, renewable heat and transport biofuels will be highlighted in the chapters about the role of bioenergy in different sectors.

THE CONTRIBUTION OF BIOENERGY IN NATIONAL ENERGY SUPPLY

TOTAL ENERGY SUPPLY

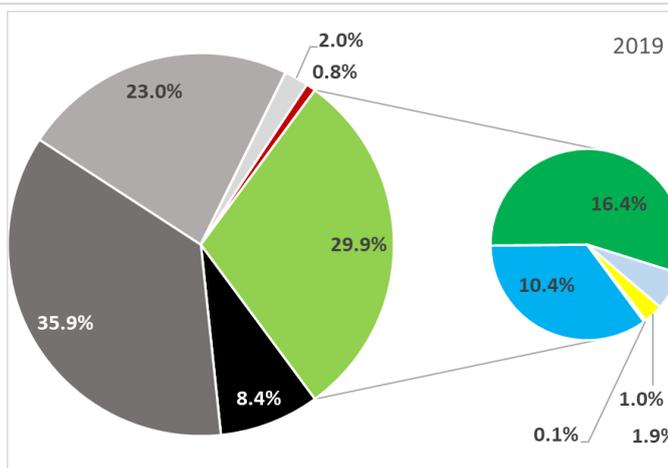
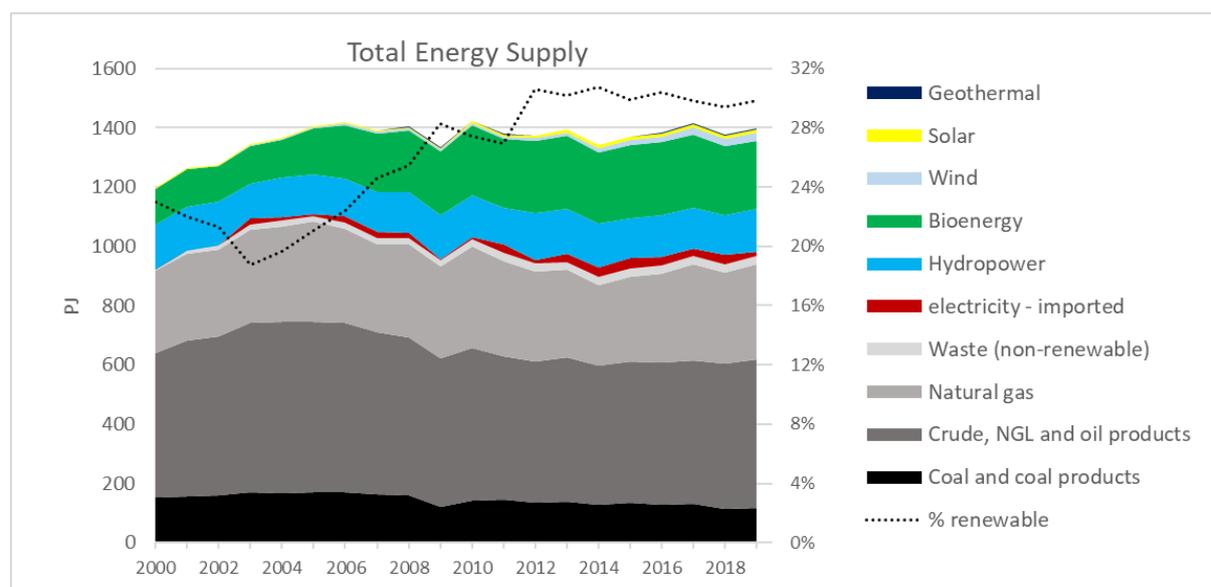


Figure 2: Total energy supply⁴ and the contribution of different energy sources in Austria, with distribution in 2019 (Source: IEA (2021) World Energy Balances and Renewables Information)

The total energy supply (TES) of Austria in 2019 amounted to 1,398 petajoule (PJ) with fossil fuels (oil, gas, coal) still contributing two thirds. Oil products account for a third of the energy supply (502 PJ); natural gas (321 PJ) and coal products (117 PJ) together also representing a third. Renewable

⁴ Total energy supply refers to the use of resources. In terms of the role in the energy system this distribution overestimates the role of resources producing electricity with a high share of unused waste heat (like nuclear plants).

energy sources represent another third (417 PJ) of total energy supply, of which 55% is through bioenergy. 11 PJ of electricity is imported, which represents 0.8% of Austrian TES.

Compared to 2010, the share of coal has gone down slightly from 10% to 8.5% of TES, while oil was stable around 35%. The share of natural gas decreased from 24% in 2010 to 20% in 2014 but has recovered again to 23% in 2019. Renewable energy increased steadily between 2004 to 2012 from 20% to 30% of TES but has stabilized around 30% since 2012.

The total supply of renewable energy sources in 2019 is still dominated by biomass (230 PJ) and hydropower (147 PJ). Shares of wind energy (27 PJ) and solar energy (14 PJ) are still much smaller, although their shares are growing. The overall share of bioenergy in total energy supply decreased slightly from 250 to 230 PJ in the past years. Wind and solar energy combined increased from 15PJ to 41 PJ since 2011, now representing almost 3% of TES in Austria.

As shown in Figure 3, solid biofuels represent the major part (>80%) of bioenergy in Austria. They include fuel wood, wood chips, wood pellets, bark, and sawmill by-products. Wood chips and sawmill by-products are primarily used for energy production in forest-based industries, as well as in cogeneration and district heating plants. Pellets are mainly used in domestic heating systems. Waste lye, sludge and bark are used to produce electricity and process heat in the pulp and paper industry. The figure below shows the three main sectors where solid biofuels are being used.

The other bioenergy types are biodiesel (8%), biogas (4%), renewable MSW (3%) and bioethanol (1%).

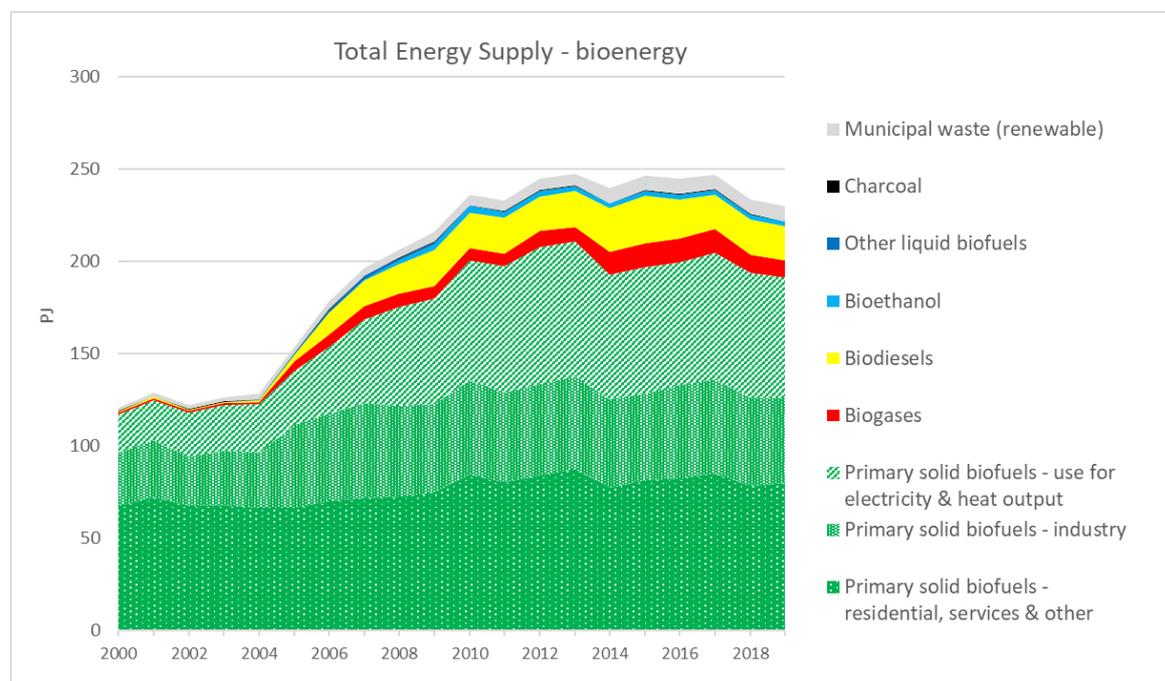


Figure 3: Development of total energy supply from bioenergy in Austria 2000 - 2019 (Source: IEA (2021) World Energy Balances and Renewables Information)

Evolution of the bioenergy carriers:

- Between 2004 and 2010 there was an important growth in solid biofuels from 120 PJ to 200 PJ, triggered by the Green Electricity Act, with main growth in cogeneration and district heating

plants. After 2010 the use of solid biofuels stabilized around 200 PJ. Some of the fluctuations are related to differences between cold and mild winters. There seems to be a slight decrease in the past 2 years, caused by the phase-out of green electricity feed-in tariffs in these years.

- Biodiesels includes biodiesel (FAME) and HVO. FAME supply increased from 1PJ in 2005 to 19 PJ in 2010. The sum of FAME and HVO shows a peak of 26 PJ in 2015, caused by imports of HVO. Biodiesels supply levels dropped back to 19 PJ in recent years.
- Bioethanol levels also increased up to 2010, albeit at a lower level of 3 PJ. Levels have also slightly decreased in past years to around 2.5 PJ, linked to a reducing consumption of gasoline.
- Biogas had a steady increase up to 13 PJ in 2017, but a decline to 9 PJ was recorded in the past years.
- Renewable municipal waste increased steadily from 2 PJ in 2000 to 8 PJ in 2014 and has stabilized around this level since.

Table 3 displays the 2019 total bioenergy supply values on a per capita basis. Compared to the other 24 member countries of IEA Bioenergy (expressed per capita), Austria ranks high for solid biofuels, at the higher end for biogas and liquid biofuels, and in the middle for renewable MSW.

Table 3: Total energy supply per capita in 2019 for different bioenergy carriers

	Supply per capita	Median IEA Bioenergy members
Bioenergy	25.5 GJ/cap	10.6
Solid biofuels	21.3 GJ/cap	7.0
Renewable MSW	0.9 GJ/cap	0.8
Biogas	1.0 GJ/cap	0.7
Liquid biofuels	2.3 GJ/cap	1.5

Source: IEA (2021) World Energy Balances and Renewables Information

Table 4 indicates the amounts of the different bioenergy carriers compared to some relevant reference points, namely the amount of forest in the country (for solid biomass), the amount of generated MSW (for renewable MSW used for energy), the amount of natural gas consumed in the country (for biogas) and the amount of fossil oil products consumed (for liquid biofuels).

Table 4: Comparison of the supply of different bioenergy carriers in 2019 to specific reference points

Compared to reference points			Median*
Bioenergy	16.4 %	of total energy supply	7.2 %
Solid biofuels	63.4 GJ/ha_forest	compared to the domestic hectares of forest land (excl. protected)	21.3 GJ/ha_forest
Renewable MSW	1.63 GJ/ton_MSW	compared to the total generated MSW in the country	1.4 GJ/ton_MSW
Biogas	0.028 GJ/GJ_NG	compared to natural gas supply	0.023 GJ/GJ_NG
Liquid biofuels	0.042 GJ/GJ_oil	compared to oil products supply	0.028 GJ/GJ_oil

Source: energy data from IEA (2021) *World Energy Balances and Renewables Information*; forest figures from FAOStat; waste figures from World Bank

* Median of the 25 member countries of IEA Bioenergy⁵

Specific comments in relation to the reference points:

- The amount of solid biofuels compared to the domestic forest area is relatively high (~3.3 tons_{dry mass} of wood per hectare⁶). That is partly related to the relatively high forest increment in Austria, partly also to significant imports of wood from neighbouring countries (e.g., Czech Republic) by wood processing industries, which use their residues for energy production.
- The use of renewable MSW for energy production is fairly modest compared to some other European countries. In Austria biogenic waste is collected separately and either composted or used for biogas production. Thus, the remaining MSW has rather low organic content.

⁵ Comparative figures of the different IEA Bioenergy member countries are discussed in the central Countries' Report.

⁶ Counted with a typical calorific value of wood (dry mass) of 19 GJ/ton_{dry mass}

ROLE OF BIOENERGY IN DIFFERENT SECTORS

OVERVIEW

The overall share of renewables in **final energy consumption** among electricity, transportation and heat sectors is 35%, with bioenergy making up 18% of the energy share (Table 5). Mind that these figures are slightly higher than the shares in total energy supply (where unused waste heat, e.g., in power production, is also included).

Table 5: Role of bioenergy and renewable energy in electricity, transport energy and fuel/heat consumption as well as final energy consumption in 2019

Sector	Share of bioenergy	Share of renewable energy	Overall consumption
Electricity ⁷	6.4%	73.5% (54.7% hydro)	74.0 TWh (266 PPJ)
Transport energy (final consumption)	5.5%	8.0%	377 PJ
Overall fuel and heat consumption ⁸	Direct biomass: 25.4% Biobased heat: 8.1%	35.1%	507 PJ
TOTAL FINAL ENERGY CONSUMPTION	18.2%	34.6%	1138 PJ

Source: IEA (2021) World Energy Balances and Renewables Information

The following paragraphs will consider the evolutions in the different sectors.

ELECTRICITY

The Austrian power production is already largely renewable, with a dominating role of hydropower which provides between 50 and 60% of electricity consumption. Fossil energy represents only 20% of the electricity mix. The share of coal steadily decreased from 10% in 2010 to less than 5% in 2019, and coal power was completely phased out in 2020 (coal remains to be used in steel production as a reducing agent). On the other hand, the role of natural gas is picking up again in the past 5 years (from 5.3 TWh in 2014 to 11.6 TWh in 2019). Part of the natural gas is used to stabilize the grid at times of high electricity production from renewables (also from neighbour countries).

⁷ Renewable electricity production compared to final consumption. Potential renewable shares of imported electricity are not included.

⁸ This includes final consumption of fuels and heat in industry, the residential sector, commercial and public services and agriculture/forestry. Transport fuels are excluded. Energy used for transformation and for own use of energy producing industries is also excluded.

Electric heating (direct or through heat pumps) is not included in these figures as this is not separately reported.

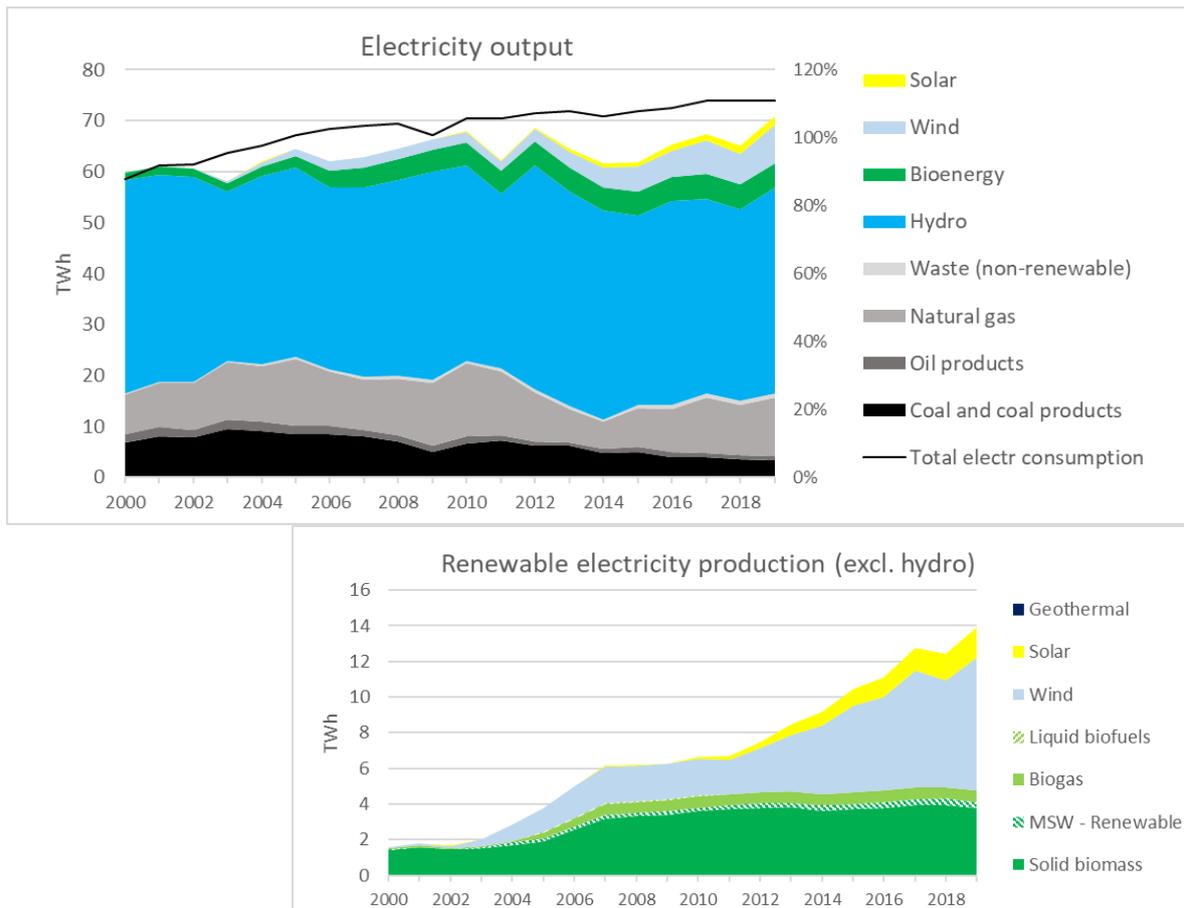


Figure 4: Evolution of the electricity mix in Austria 2000 - 2019 (Source: IEA (2021) World Energy Balances and Renewables Information)

Biomass-based electricity production (mostly from CHP installations) was stimulated by the Green Electricity Act of 2002. It has been relatively stable since 2010, around 6.5% of overall electricity consumption. Supportive feed-in tariffs have stimulated investments in biomass-based electricity production, but development stalled when these tariffs ended after 10-13 years. In 2021, new legislation was finally published that again provides support to renewable installations. Wind energy saw a strong and consistent growth, increasing from 3% in 2010 to 10% in 2019. Solar energy is also growing but is still at relatively modest levels (2.3% of electricity consumption in 2019).

Net electricity imports (difference between consumption and production in the figure) have been up to 14% of electricity consumption in 2015 but have gone down to 4% in 2019.

Policy framework

The main relevant policy instruments behind these evolutions are:

- Green Electricity Act BGBl. I Nr. 149/2002
- Federal Act Providing New Rules for the Organisation of the Electricity Sector (Electricity Act 2010 – ElWOG 2010)
- Federal Act on Supporting Electricity Produced from Renewable Energy Sources (Green Electricity Act 2012)

- Federal law on the expansion of energy from renewable sources - Bundesgesetz über den Ausbau von Energie aus erneuerbaren Quellen (Erneuerbaren-Ausbau-Gesetz – EAG), StF: BGBl. I Nr. 150/2021

HEAT/FUEL

Figure 5 shows the role of different fuels/energy carriers for providing heat in different sectors (industry, residential sector, commercial and public services and other). It also includes heat sold to customers, e.g., through district heating. Fuel use by energy producing industries for transformation and for own use is excluded. Mind that electric heating (direct or through heat pumps) is not included in these figures as this is not separately reported in the IEA database.

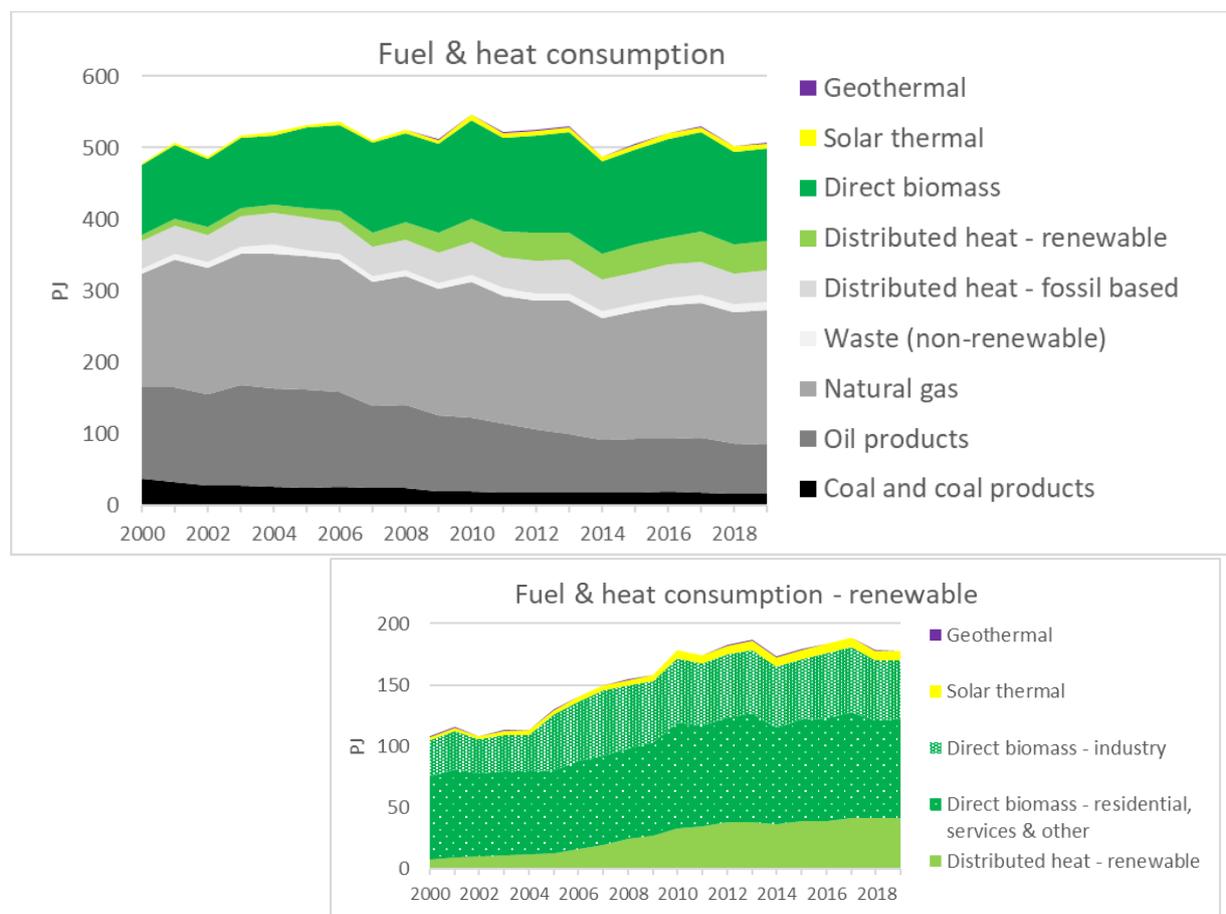


Figure 5: Evolution of fuel and heat consumption in Austria 2000 - 2019 (Source: IEA (2021) World Energy Balances and Renewables Information)

The provision of heat is still mostly based on fossil fuels, mainly natural gas and heating oil. The share of oil products is decreasing, while natural gas is fairly stable. Austria has a dense natural gas grid, making it a very convenient provider of heat and hot water for domestic use especially in urban areas. Direct use of biomass represents around 25%. In the residential sector biomass represents about one third of fuel/heat consumption.

Heat sales – e.g., through district heating - are also important in Austria. Heat output generated and sold by CHP plants and heat plants represents around 17% of fuel/heat provided, of which around half is produced from biomass.

The following figure shows that distribution of heat almost doubled from 2000 to 2010, and the additions were mostly produced by biomass-based heat and CHP plants. The situation stabilized in the past decade, with a slight increase of the role of biomass.

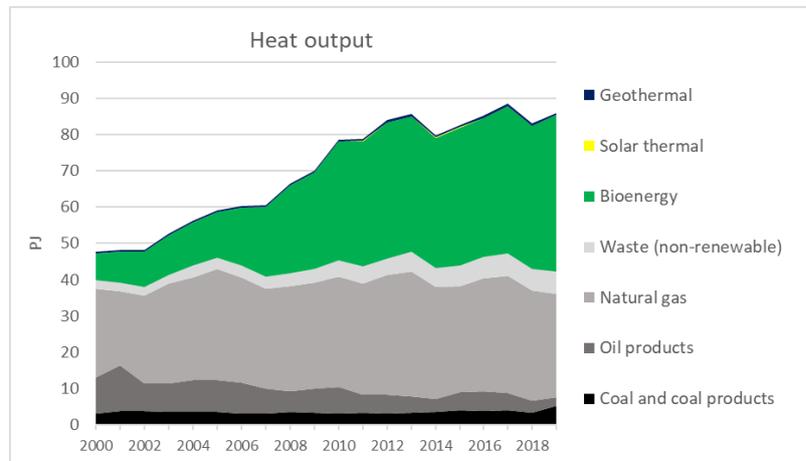


Figure 6: Evolution of fuels for heat output in Austria 2000 - 2019 (Source: IEA (2021) World Energy Balances and Renewables Information)

Policy framework

The main relevant policy instruments (with relevance for biomass-based heat) behind these evolutions are:

- Green Electricity Act BGBl. I Nr. 149/2002: while mainly focus on renewable electricity, it provided indirect stimulus through the support of combined heat and power projects.
- Federal law on the expansion of energy from renewable sources - Bundesgesetz über den Ausbau von Energie aus erneuerbaren Quellen (Erneuerbaren-Ausbau-Gesetz - EAG), StF: BGBl. I Nr. 150/2021
- Regional subsidies for biomass heating have been granted over the last decade and are still available. See for example the funding opportunities in the regions of Upper and Lower Austria:
 - Funding of individual biomass plants within the framework of state funding - Förderung von Biomasseeinzelanlagen im Rahmen der Landesförderung
 - Biomass local heating promotion in Lower Austria - Biomasse-Nahwärme-Förderung in Niederösterreich

TRANSPORT

Figure 7 shows an overview of the energy used in transport in Austria, split up by different fuels/energy carriers.

Diesel is the dominant fuel at 70% of transport fuels in 2019, and its consumption is in fact still increasing. Gasoline now represents less than 20%. There is also some natural gas use in transport (3% of transport energy consumption).

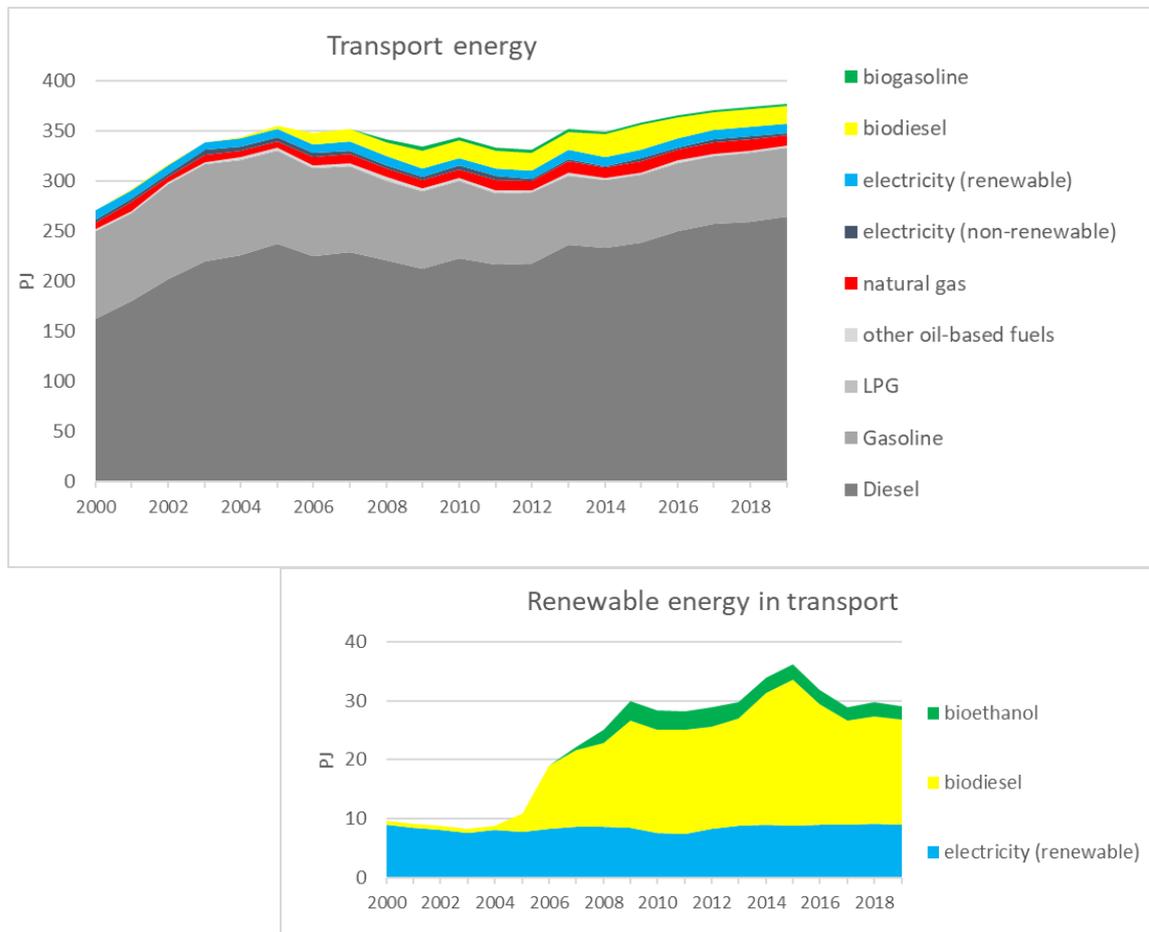


Figure 7: Evolution of transport fuels in Austria 2000 - 2019 (Source: IEA (2021) World Energy Balances and Renewables Information)

Between 2005 and 2009 there was a strong increase of biofuels in Austria, but levels have rather stabilized after that around 5-6% of overall transport energy consumption. Biodiesel is the main biofuel, which is consistent with the dominance of diesel fuel. There was a temporary increase in biodiesel (and HVO in 2014-2016, but this dropped back to previous levels (18 PJ). On average biodiesel (mostly FAME but also some HVO) represents 6.3% by energy of diesel consumption, which is consistent with a widespread use of B7 and some HVO.

Bioethanol use also increased up to 2010, albeit at a lower level of 3 PJ. Levels have also slightly decreased in past years to around 2.5 PJ, linked to a reducing consumption of gasoline. On average bioethanol represents 3.3% by energy of gasoline (which is consistent with a widespread use of E5).

Electricity (which is 3/4 renewable) represents a relevant and stable share of 3.1% of total transport energy use in Austria. This is mostly in rail (which is largely electrified in Austria) - the use of electricity in road vehicles is still marginal in 2019 (0.014% of total transport energy use).

Policy framework

The main relevant policy instruments behind these evolutions are:

- EU Renewable Energy Directive (RED) 2009/28/EC
- EU Fuel Quality Directive (FQD) 2009/30/EC
- Fuel Ordinance – Änderung der Kraftstoffverordnung 2012 (i.d.F. BGBl. II Nr. 259/2014)
- Sustainability Ordinance – Nachhaltigkeitsverordnung BMF (BGBl. II Nr. 157/2014)
- Ordinance on Agricultural Feedstocks for Biofuels - Landwirtschaftliche Ausgangsstoffe für Biokraftstoffe und flüssige Biobrennstoffe (i.d.F. BGBl. II 250/210)
- Mineral Oil Tax Law - Mineralölsteuergesetz 1995 (BGBl. I Nr. 630/1994, geändert durch das Bundesgesetz BGBl. I Nr. 151/2009) in der Fassung BGBl. I Nr. 118/2015
- Ethanol Blending Order - ethanolgemischverordnung (BGBl. II Nr. 378/2005) and its revision Bioethanolgemischverordnung (BGBl. II Nr. 260/2007)

COMPARISON WITH RENEWABLE ENERGY TARGETS

According to Eurostat⁹, the following renewable energy shares in *gross final energy consumption* were reached.

Table 6: Share of renewables in different sectors in Austria, according to Eurostat, and compared to the 2020 target

	2005	2010	2015	2019	2020 target
Overall share	23.7%	30.2%	32.8%	33.6%	34.2%
In heating & cooling	22.0%	29.0%	32.4%	33.8%	32.6%
In electricity	61.9%	65.7%	70.3%	75.1%	70.6%
In transport	4.8%	10.7%	11.4%	9.8%	11.4%

⁹ http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_ind_335a&lang=en

Most sectors were already quite close to reaching 2020 renewable energy targets in 2010. Major steps were taken between 2005 and 2010 but advances after 2010 - particularly in the last 5 years - have been more modest.

Mind that some of these figures can differ from the IEA derived data because of different accounting rules. Particularly in transport the Eurostat shares are higher, which is due to the multiple counting of advanced biofuels and renewable electricity towards the transport target. The heating & cooling figure in Eurostat also includes heat pumps.

RESEARCH FOCUS RELATED TO BIOENERGY

The research focus for bioenergy in the upcoming years is defined in the calls for projects of the Austrian Climate and Energy Fund.

ENERGY RESEARCH (ENERGIEFORSCHUNG)

The energy research program aims at developing technological competencies to strengthen Austria as an innovation location for clean energy technologies and to improve export opportunities. A budget of € 13.5 million in funding has been available for the 2020 call. The call focusses on research and development of innovative materials, technologies, systems and concepts. The main research topics are:

- Energy systems and networks
- Energy efficiency in industry
- Storage and conversion technologies
- Digitization as a cross-sectional technology

The “**Sub-topic 2.3 -Cross-sectional technologies for CO₂ reduction in industry**” includes the following guidelines for projects with focus on bioenergy:

- CO₂ capture directly from the atmosphere by means of technical systems or by permanently binding the carbon contained in biomass.
- Optimization of the decentralized generation of electricity, heat and cold: new systems, generators and thermoelectrics concepts, innovative adsorption and absorption processes and media, load and fuel flexibility (e.g., use of special gases, biomass combustion).
- New approaches to the use of secondary raw materials and fuels from industry (e.g., slag, process gas, old plastics) as well as trade and commerce (e.g., dismantling waste, fats, shredder light fraction), biowaste (green cuttings, crop waste, liquid manure) and biogenic residues;

The “**Sub-topic 3.1 - Storage and conversion technologies**” includes funding opportunities for optimized production, storage and cost-efficient conversion (power-to-hydrogen, gas, fuel / liquids and chemicals) of CO₂-neutral chemical energy carriers.

FUNDING PROGRAMS FOR SHOWCASE REGIONS

The Austrian initiative for showcase regions aims at advancing the deployment of renewables (including bioenergy) at a regional level. In showcase regions, bioenergy is integrated with other renewables in order to achieve up to 100% renewable supply, using local resources.

Showcase region energy (Vorzeigeregion Energie)

In the initiative “Vorzeigeregion”, innovative energy technologies from Austria are used to develop and demonstrate solutions for intelligent, safe and affordable energy and transport systems of the future. The focus is on an efficient interplay of generation, consumption, system management and storage in an overall system optimized for all market participants with regional supply of up to 100% renewable energies. The initiative is intended to ensure that value creation in the field of innovative energy technologies is secured and expanded in Austria. The call 2021 has a budget of 23 million Euro and will run for around eight years, with a focus on the following 3 objectives:

- **Objective 1:** Development and exemplary application of domestic energy and energy-relevant transport technologies for extensive practical testing of intelligent system solutions in real operation. The showcase region should show that an energy supply based on up to 100% renewable energies with innovations from Austria is feasible as well as economically and ecologically beneficial.
- **Objective 2:** Strengthening and expanding Austria as a lead market for innovative energy and energy-related transport technologies and services
- **Objective 3:** Involvement and active participation of users in the showcase region to arouse curiosity, get to know innovative technologies and create trust and acceptance.

Climate and energy showcase regions (Klima- und Energie-Modellregionen)

The program supports Austrian regions in making optimal use of their local renewable energy resources, exploiting the potential for energy saving and doing business sustainably. Showcase regions demonstrate that an active climate protection and a contribution to the energy transition are possible on a regional level. The cooperation between municipalities is promoted to optimize the use of natural resources and energy-saving potentials. A key success factor is the ability to drive process and structural change through the close proximity between decision-makers and citizens. This has resulted in over 5,400 successful projects to date. The objectives of the call 2021 are:

- **Creation of new model regions:** Creation of an implementation concept, installation of the model region management and implementation of at least 10 concrete measures in 2 years
- **Continuation of existing model regions:** Implementation of at least 10 concrete measures within 3 years
- **Lead projects**
- **Investment projects** in the following areas: photovoltaic systems on public properties, wood heating systems in public buildings, solar thermal systems on public properties, charging points for e-vehicles, renovations of public buildings, large-scale solar systems, thermal storage for heat.

RECENT MAJOR BIOENERGY DEVELOPMENTS

CO-PROCESSING UNIT AT THE OMV REFINERY, VIENNA

In December 2020, OMV the international oil, gas and petrochemicals company headquartered in Vienna committed to invest EUR 200 million to build a pilot plant at its refinery that will produce second-generation biofuels from 2023. The new unit, located at the Schwechat Refinery, will be constructed by Chemieanlagenbau Chemnitz (CAC). Biogenic input materials will be processed together in combination with fossil, oil-based raw material in a hydrogenation facility to produce high quality bio-based fuels with characteristics identical to fossil fuels. Input materials will include pre-treated vegetable oils, such as rapeseed, sunflower, or soy oil as well as waste products such as used cooking oil and advanced feedstocks, such as algae oil. The produced biodiesel shall be suitable for any type of vehicle.

This process will lead to an annual reduction in OMV's carbon footprint of up to 360,000 metric tonnes of CO₂ and contribute to the target of having at least 60% of the product portfolio consisting of natural gas and low/zero-carbon products by 2025.

ADVANCED BIOETHANOL PRODUCTION AT THE AUSTROCCEL PULP MILL, SALZBURG

The AustroCel Hallein pulp mill, located near Salzburg, has been retrofitted to implement the fermentation of liquor for the production of advanced bioethanol. AustroCel processes spruce wood to dissolving pulp for cellulose applications, with a capacity of 160,000 t/a. The retrofit adds a fermentation step for the spent sulphite liquor. During the pulping process, sugar is produced, which is distilled and subsequently fermented to advanced bioethanol. The planned annual production is 30 million litres of advanced bioethanol, which will be sold to OMV, in order to substitute about 1% of the Austrian petrol consumption.

The retrofit started in mid-2019 and the advanced bioethanol production plant is already operating. A first train load of with 1.3 million litres of advanced bioethanol was delivered in early 2021 to the OMV refinery in Schwechat. The plant had an investment volume of about 40 million euros. The overall objective is to obtain a viable, sustainable, and marketable production of advanced bioethanol. The retrofit has been assessed in the BIOFIT project, funded by Horizon 2020.

NEW GASIFIER TO CONVERT WASTE MATERIALS INTO FUELS, VIENNA

A new pilot plant in Vienna will demonstrate the conversion of waste materials into eco-friendly and carbon-neutral fuels. At the site of a waste incineration plant, a 1 MW pilot gasifier is being constructed to research and demonstrate the use of waste materials at a scale that allows full integration into the waste incineration processes. The gasifier is the key technology for a series of downstream options to upcycle the resulting syngas.

The plant is the first of its kind in the world designed to research the entire process chain, from waste materials through syngas production and synthesis of the fuel, through to fleet trials by Vienna's public transport operator Wiener Linien. The project findings will pave the way for industrial-scale application of this technology by Vienna's energy utility, Wien Energie. The various upcycling pathways to create CO₂-neutral green diesel and kerosene, mixed alcohols, synthetic

The construction of the plant began in September 2020 and the start-up is planned in the fourth quarter of 2021. BEST-Bioenergy and Sustainable Technologies is responsible of the planning and operation of the plant, while the construction is carried out by SMS Group.

LINKS TO SOURCES OF INFORMATION

- Long-Term Strategy 2050 - Austria:
https://unfccc.int/sites/default/files/resource/LTS1_Austria.pdf
- Integrated National Energy and Climate Plan for Austria 2021-2030:
https://ec.europa.eu/energy/sites/ener/files/documents/at_final_necp_main_en.pdf
- Federal law on the expansion of energy from renewable sources (in German):
<https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=20011619>
- Upper Austria - Funding of individual biomass plants within the framework of state funding (in German): <https://www.land-oberoesterreich.gv.at/97453.htm>
- Biomass local heating promotion in Lower Austria (in German):
https://www.no.e.gv.at/noe/Energie/Foerd_Biomasse.html
- Guidelines Energy research - Annual program 2020 (in German):
https://www.ffg.at/sites/default/files/allgemeine_downloads/thematische%20programme/Energie/201221_Leitfaden_Energieforschung_2020.pdf
- Climate and Energy Fund - tenders (in German):
<https://www.klimafonds.gv.at/ausschreibungen/>
- Climate and energy model regions (in German): <https://www.klimafonds.gv.at/call/klima-und-energie-modellregionen-2021/>
- Showcase region for energy 2021 (in German):
<https://www.klimafonds.gv.at/call/vorzeigeregion-energie-2021/>
- OMV press release (Dec 2020): OMV invests around EUR 200 mln in biofuel production at Schwechat Refinery: <https://www.omv.com/en/news/201215-omv-invests-around-eur-200-mn-in-biofuel-production-at-schwechat-refinery>
- OMV website - Sustainable fuels & chemicals: <https://www.omv.com/en/sustainability/climate-protection/sustainable-fuels-and-chemicals>
- BIOFIT Case Study: Fermentation of liquor at the AustroCel Hallein pulp mill in Austria for the production of advanced bioethanol: <https://www.biofit-h2020.eu/austrocel-hallein-austria-pulp-and-paper/>
- Waste2Value project: https://www.best-research.eu/en/competence_areas/all_projects/view/611 & <https://smartcity.wien.gv.at/en/waste2value/>