

Country Reports

IEA Bioenergy: 09 2018

This report was prepared from the 2018 OECD/IEA World Energy Balances, combined with data and information provided by the IEA Bioenergy Executive Committee and Task members. Reference is also made to Eurostat data as well as data from national statistics (Statistik Austria). 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 report¹ for all country reports.

Edited by: Luc Pelkmans, Technical Coordinator IEA Bioenergy

Contributors: Manfred Woergetter, Dina Bacovsky, Bioenergy2020+ GmbH; Fabian Schipfer, TU Wien

NATIONAL POLICY FRAMEWORK IN AUSTRIA

Austria has committed itself to a target of 34% share of renewable energy in gross final energy consumption in 2020, with a split in sectors as displayed in the table below.

Table 1: Austria's 2020 renewable energy targets.

Sector	Share in gross final consumption per sector
Overall target	34.2 %
Heating and cooling	32.6 %
Electricity	70.6 %
Transport	11.4 %

Source: National Renewable Energy Action Plan of Austria (2010)²

A comprehensive legislative and administrative framework regulating and facilitating sustainable development of renewable energies has been established. This framework is supported by various financial, fiscal, research and promotional measures and incentives.

The Green Electricity Act sets the following targets of new installations until 2020: Hydro 1,000 MW; Wind 2,000 MW; PV 1,200 MW; Biomass and Biogas 200 MW. A feed-in tariff scheme under the Green Electricity Act supports the pay-off of the investments.

The fuel ordinance amendment 2012 sets a quota for biofuels and defines tax exemptions. By 2020, 8.45% (with regard to energy content) of the diesel and petrol provided to the transport sector have to

¹ Available at <https://www.ieabioenergy.com/iea-publications/country-reports/2018-country-reports/>

² <https://ec.europa.eu/energy/en/topics/renewable-energy/national-action-plans>

be substituted by energy from renewable resources.

On May 28, 2018 the Austrian Climate and Energy Strategy³ was decided by the Federal Government. The strategy aims to reduce GHG emissions by 36% by 2030, and to decarbonize energy provision by 2050. This shall be reached by increasing the share of renewable energy by 2030 to 45-50% from the current level of 33.5%, with a subtarget of fully renewable electricity production by 2030; and increasing the energy efficiency by 30% by 2030 as compared to 2015, with a 1,200 PJ limit of total primary energy demand in 2030. Concrete measures are currently being elaborated. Some additional background information on the strategy can be found in the chapter "Recent major bioenergy developments".

A detailed description of all current fiscal and non-fiscal supports for bioenergy development is available at: <http://www.iea.org/policiesandmeasures/renewableenergy/?country=Austria> .

TOTAL PRIMARY ENERGY SUPPLY (TPES) AND THE CONTRIBUTION OF BIOENERGY

The total primary energy supply of Austria in 2016 amounted to 1,395 petajoule (PJ)⁴ with fossil fuels (oil, gas, coal) still contributing most. Oil products account for a third of the energy supply (489 PJ), coal products (124 PJ) and natural gas (301 PJ) are contributing another third. Renewable energy sources have a share of 30% or 420 PJ – 17.6% bioenergy and 12.6% other renewable energy sources. 26 PJ of electricity is imported, which represents 1.8% of Austrian TPES.

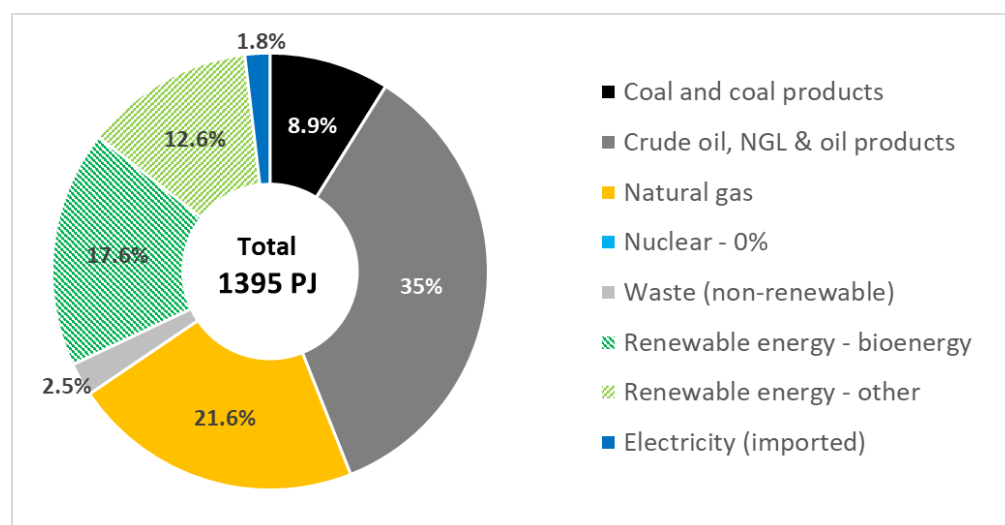


Figure 1: Total primary energy supply in Austria in 2016 (Source: World Energy Balances © OECD/IEA 2018)

Compared to 5 years earlier (2011) the share of coal has gone down from 10.6% to 8.9%, and the share of natural gas from 23.3% to 21.6%. In the same period the share of renewable energy increased from 26.2% to 30.2%. The share of other energy carriers remained relatively stable.

³ <https://mission2030.info/wp-content/uploads/2018/06/Klima-Energiestrategie.pdf>

⁴ Note: There are some (limited) differences between the OECD / IEA data and national Austrian data. According to national statistics, gross domestic energy consumption in 2016 was 1,435 PJ. Total Primary Renewable Energy is reported with 404 PJ. https://www.bmnt.gv.at/umwelt/energiewende/erneuerbare_energie/erneuerbare-energie-in-zahlen-2017.html

The total primary energy supply of renewable energy sources in 2016 comprises somewhat over 400 PJ. 60% is energy from biomass (245 PJ); a third is hydropower (143 PJ), complemented with smaller shares of wind energy (19 PJ), solar energy (12 PJ) and geothermal energy (1 PJ).

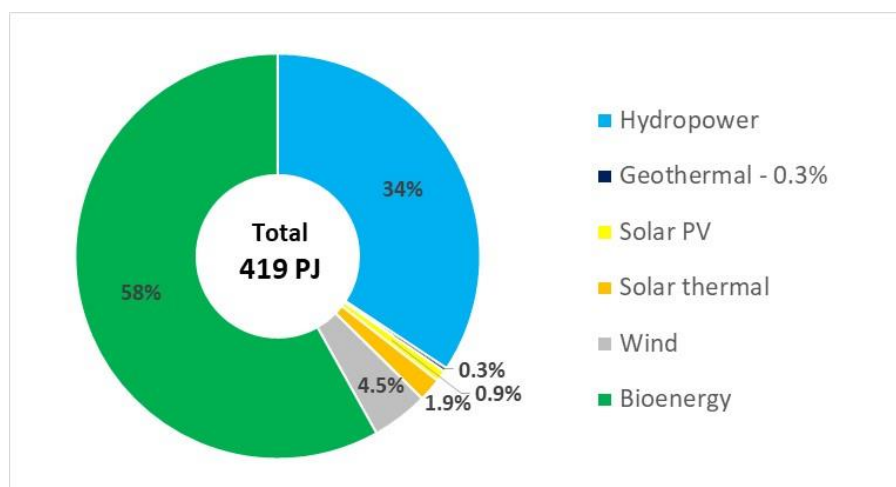


Figure 2: Total primary energy supply of Renewable Energy Sources in Austria in 2016 (Source: World Energy Balances © OECD/IEA 2018)

The major part (80%) of bioenergy consumed in Austria is composed of solid biofuels, which represents 201 PJ. Around 66 PJ of solid biomass is used in the residential sector. Solid biofuels include fuel wood, wood chips, 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 for the production of electricity and process heat in the pulp and paper industry. The other bioenergy types are biodiesel (21 PJ), biogas (13 PJ), renewable MSW (7 PJ) and biogasoline (2 PJ).

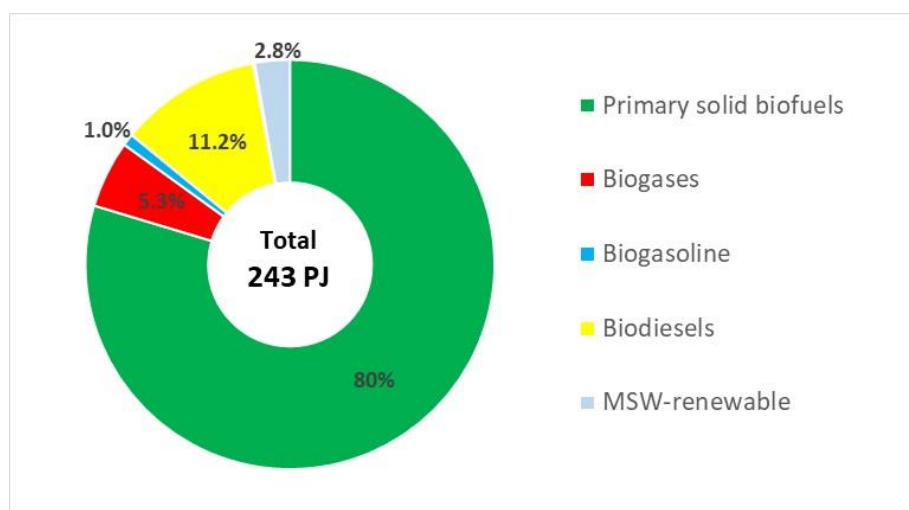


Figure 3: Total primary energy supply from bioenergy in Austria in 2016 (Source: World Energy Balances © OECD/IEA 2018)

The supply of bioenergy in Austria almost doubled from 2000 to 2010, with the sharpest rise between 2005 and 2010, when the use of solid biomass increased and liquid biofuels were established on the

market. Since 2010 the share of bioenergy has increased modestly from 16% of TPES in 2010 to 17.5% in 2016, with relatively stable use of solid biomass and some increase in liquid biofuels and biogas (particularly between 2013 and 2014).

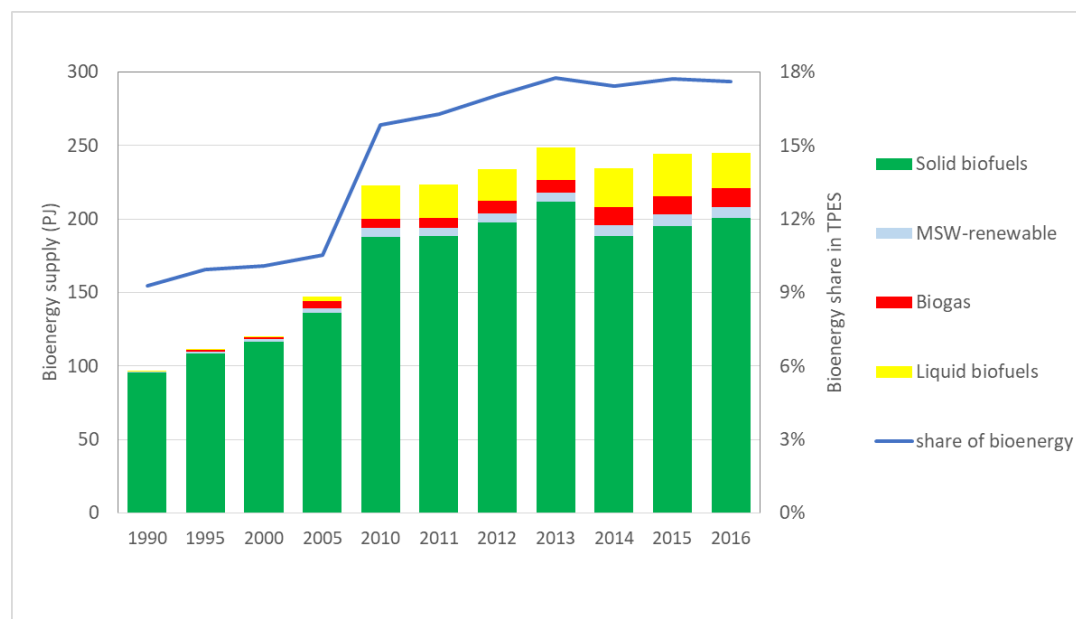


Figure 4: Development of total primary energy supply from bioenergy in Austria 1990 – 2016 (Source: World Energy Balances © OECD/IEA 2018)

Table 2 expresses the 2016 TPES figures per capita, considering Austria’s population of 8.74 million people. Compared to the other 22 member countries of IEA Bioenergy (expressed per capita), Austria ranks in the top 5 for solid biofuels, biogas and liquid biofuels, and halfway for renewable MSW.

Table 2: Total primary energy supply per capita in 2016

	GJ/capita
Total energy	159.6
Bioenergy	28.1
Solid biofuels	23.0
Renewable MSW	0.8
Biogas	1.5
Liquid biofuels	2.7

Source: World Energy Balances © OECD/IEA 2018

Role of bioenergy in different sectors

Austria has a very high share of renewable electricity, reaching 78% of total electricity production. Most is hydropower (61% of total electricity production), the rest of renewable electricity is divided between bioenergy (7.1%) and other renewable energy sources (9.7%).

The share of biofuels for transport amounts more than 6%, which is higher than European average. Mind that there is also a considerable share of renewable electricity in the Austrian transport system, predominantly through rail.

Overall, the direct share of biomass for heating in the different sectors is around 27%. Mind that heat output generated and sold by CHP plants and heat plants represents around 15% of fuel/heat provided, of which on average 45% is produced from biomass. In the residential sector biomass represents about one third of fuel/heat consumption.

Table 3: Role of bioenergy and renewable energy in electricity production, transport energy consumption and fuel/heat consumption in 2016

Sector	Share of bioenergy	Share of renewable energy	Overall production/ consumption
Electricity production	7.1%	78% (61% hydro)	65.3 TWh (235 PJ)
Transport energy (final consumption)	6.2%	8.7%	358 PJ
Overall fuel and heat consumption⁵	Direct biomass: 27.0% Biobased heat: 6.5%	35.1%	515 PJ

Source: World Energy Balances © OECD/IEA 2018

According to Eurostat⁶, the following renewable energy shares in *gross final energy consumption* were reached in Austria in 2016:

- Overall share: 33.5 %
- In heating and cooling: 33.3 %
- In electricity: 72.6 %
- In transport: 10.6 %

Most sectors have reached or are very close to the renewable energy targets for 2020 (see Table 1). Mind that some of these figures can differ from the IEA derived data because of different accounting rules, e.g. multiple counting of advanced biofuels and renewable electricity in transport.

⁵ 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.

⁶ http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_ind_335a&lang=en

The role of bioenergy trade

Austria was a net importer of biomass for energy since 2006, reaching a maximum of 23 PJ net imports in 2013 (about 9% of primary bioenergy supply). Since 2013 net-imports decreased to 11 PJ in 2016 mainly due to a doubling of "other liquid biofuels" exports. While the categories "biodiesel" and "bioethanol" indicate biogenic quantities which are blended with fossil transport fuels, "other liquid biofuels" denote the sum of pure liquid biofuels prior blending⁷. Despite the rapid increase in pure liquid biofuels exports, wood pellets still represent the most important bioenergy export. Pellet trade is mainly directed towards Italy but also in the form of bidirectional trade streams to and from Germany.

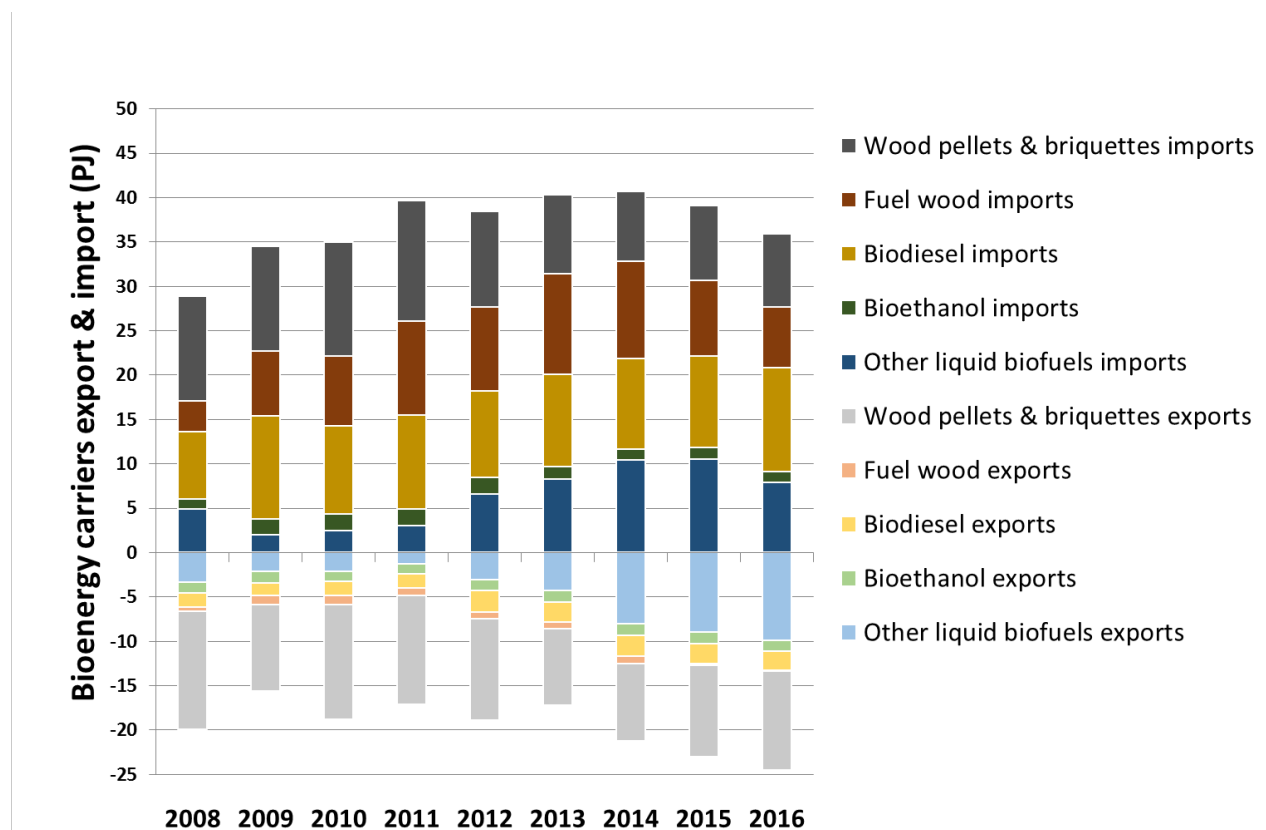


Figure 5: Bioenergy trade to and from Austria in 2008 – 2016. Source: own illustration based on the Energy Balance 2018 © Statistik Austria

The wood processing as well as the pulp, paper and print industry are key drivers of the Austrian economy. This leads to about 12% of domestic primary bioenergy supply being based on black liquor combustion. Thus, indirect bioenergy imports in the form of wood imports for material purposes with a fraction being energetically used play another important role. Sawn wood, panel board and paper products on the other hand are exported in significant amounts partly ending up in waste incineration plants outside of Austria at the end of their lifetime.

⁷ Personal communication: Dr. Bittermann, Statistik Austria, 18.02.2015

RESEARCH FOCUS RELATED TO BIOENERGY

The successful development of Austrian bioenergy technologies is based on a long-lasting, internationally oriented R&D policy. Beside others the government supports Austrian 's participation in IEA Bioenergy since the first days of the Agreement.

In 2010 the Federal Ministry for Transport, Innovation and Technology (BMVIT) initiated an Austrian Energy Research Strategy which was revised in 2017.⁸ In 2012 the role of bioenergy for renewable heating and cooling has been highlighted in a roadmap.⁹ In 2013, bioeconomy became part of the work program of the Austrian Government. In January 2018 the government presented a bioeconomy research strategy.¹⁰

Bioenergy research is concentrated in several research organisations and universities. The Austrian "Competence Centre for Excellent Technologies" program supports collaborative research between universities and companies. As part of this program, Bioenergy2020+ Ltd provides R&D on bioenergy technologies. Universities working on bioenergy and biobased industries include the Technical Universities of Vienna and Graz, the University of Natural Resources and Life Sciences in Vienna and the Johannes Kepler University Linz. Two large publicly-owned research institutes (Joanneum Research, Austrian Institute of Technology) as well as the Competence Centre for Wood Composites & Chemistry (Wood K plus) are linking basic research with industry needs. The International Institute for Applied Systems Analysis (IIASA), a non-governmental research organization, carries out system analysis on – among others - biobased systems.

Austria's industry is involved in R&D through large industrial companies — including Siemens, Andritz and GE Jenbacher — that are engaged in researching power plant and process engineering, power stations and control centres. Last but not least a range of small and medium sized enterprises are strongly engaged in the development and production of bioenergy technologies. In the biorefinery sector companies like Lenzing, Mondi, Heinzl, Sappi, and Agrana are exploring and implementing integrated valorisation pathways.

RECENT MAJOR BIOENERGY DEVELOPMENTS

Austria's average temperature has risen by 2°C, which is above the global average of 0.9°C. This leads to increasing economic impact.¹¹ Therefore climate change should be systematically taken into account in all planning processes.¹²

In 2016 four Federal Ministries published a policy support document "Green book for an integrated energy and climate strategy". A set of questions started the public debate, which includes target setting for 2030 and visioning till 2050.¹³ In January 2018 the Council of Ministers decided to draw up the **climate and energy strategy** as kick-off for a long-term process. On May 28, 2018 the strategy was decided by the Austrian Federal Government¹⁴.

In detail the strategy includes:

- Principles for a climate-friendly economy: sustainable, safe, competitive and affordable.
- Energy in complex systems: sector coupling, decarbonisation without nuclear power, low-

⁸ https://nachhaltigwirtschaften.at/resources/e2050_pdf/E-Forschung_Kurzfassung_englisch_v2.pdf

⁹ <https://nachhaltigwirtschaften.at/de/publikationen/fti-roadmap-bioheating-and-cooling.php>

¹⁰ https://nachhaltigwirtschaften.at/resources/nw_pdf/biooekonomie-fti-strategie-ag2-2018.pdf

¹¹ <http://hw.oeaw.ac.at/7699-2>

¹² <http://archiv.bundeskanzleramt.at/DocView.axd?CobId=66868>.

¹³ <https://www.konsultation-energie-klima.at/assets/Uploads/Grunbuch-integrierte-Energiestrategie.pdf>

¹⁴ <https://mission2030.info/>

emission mobility, growth and jobs, research and innovation, reduced bureaucracy, cost-effective implementation by using market forces, financing.

- A package of measures: developing infrastructure, creating economic and legal framework, mobilizing investments, cost-effective subsidy systems, supporting research and innovation, activating awareness and education, sustainable technologies, climate-friendly urban and rural areas.
- Flagship projects: efficient freight logistics, public transport, e-mobility, thermal insulation of buildings, renewable heat, 100,000-roof photovoltaic program, renewable hydrogen and biomethane, green finance, energy research initiatives.

The implementation of the strategy needs a monitoring of the progress, an evaluation of the effectiveness and a follow-up of the multi-stakeholder dialog.

The Government is committed to a competitive and multifunctional agriculture and forestry. The (existing) government program provides for the implementation of a National Bioeconomy Action Plan which includes research and promotion as core elements. Opportunities for advanced biofuels in heavy transport and aviation have been identified. Bio-heat is of particular interest, work on a "Heat Strategy" is planned.

Austrian companies and research community are front runners in many bioenergy technologies and work on low emission biomass combustion for heat and electricity production, fermentation and gasification technologies for the production of "green gas" (biomethane), renewable hydrogen production technologies, sector coupling (power-to-gas, power-to-liquid, power-to-heat and wind-to-hydrogen), process engineering, system analysis, regulation and control systems for integrating variable energy sources, and digital and smart energy systems.

In January 2018 four Austrian Federal Ministries (Transport, Innovation and Technology/ Education, Science and Research/ Digital and Economic Affairs/ Sustainability and Tourism) presented a working document on the role of the bioeconomy and the respective fields of research in tackling climate change.¹⁵ The **National Bioeconomy Strategy** will move towards circular economy, innovation, efficiency measures, high-quality jobs, regional development and innovative companies.

Bioeconomy is a flagship project of the Austrian Climate and Energy Strategy, and aims to boost growth for bio-based products, energy, processes and services and will strengthen the competitiveness of the national economy. Research and innovation is seen as the basis for a structural change from fossil energy to a sustainable economy; ecological and social interests must be taken into account.

The contribution of the bioeconomy to the climate goals should come from bioenergy, efficiency measures, circular economy, and raw materials from agriculture and forestry as well as from services. The largest potential is seen in wood, agriculture also offers additional usage cascades. Waste and residues are another important feedstock.

Innovations should generate ecological, economic and social benefits. The Sustainable Development Goals (SDGs) are also drivers for a change, but clearly show its limitations.

At the 3rd Mission Innovation Ministerial Summit in Malmö on May 23, 2018 Austria has been accepted as member of Mission Innovation. Of particular interest to Austria are storage systems and batteries, smart buildings and smart cities, smart grids and industrial applications.¹⁶

¹⁵ https://nachhaltigwirtschaften.at/resources/nw_pdf/biooekonomie-fti-strategie-ag2-2018.pdf

¹⁶ <https://nachhaltigwirtschaften.at/de/news/2018/20180619-oe-mission-innovation.php>

LINKS TO SOURCES OF INFORMATION

Relevant Federal Ministries:

Ministry for Sustainability and Tourism <https://www.bmnt.gv.at/>,
<https://www.bmnt.gv.at/english/ministry.html>

Ministry for Digital and Economic Affairs <https://www.en.bmdw.gv.at/Seiten/default.aspx>,
[https://www.en.bmdw.gv.at/ExternalTrade/Climate and Environmental policy/Seiten/default.aspx](https://www.en.bmdw.gv.at/ExternalTrade/Climate_and_Environmental_policy/Seiten/default.aspx)

Ministry for Transport, Innovation and Technology: <http://www.bmvit.gv.at/>,
<https://www.bmvit.gv.at/en/index.html>,
https://www.bmvit.gv.at/en/service/publications/downloads/downloads_ftb/ftb_2015_en.pdf

Funding organizations:

Austrian Research Promotion Agency (FFG) <https://www.ffg.at/en>;
<https://www.ffg.at/produktionderzukunft>

Austrian Climate and Energy Fund: <https://www.klimafonds.gv.at/home-en-US>,
<https://www.klimafonds.gv.at/assets/Uploads/Expertenbeirat/Climate-and-Energy-FundFunction-and-effect20140610.pdf>

Relevant documents:

Austrian energy research strategy:
www.bmvit.gv.at/innovation/downloads/energieforschungsstrategie.pdf

Research agenda for bioheating and cooling:
www.nachhaltigwirtschaften.at/nw_pdf/1254_fti_roadmap_bioheating_and_cooling.pdf

Research agenda biobased industry: www.nachhaltigwirtschaften.at/results.html/id7113,
www.fabrikderzukunft.at/results.html/id7793

Austrian energy strategy: www.energiestrategie.at

Climate and energy strategy of the Austrian Government (draft): https://mission2030.info/wp-content/uploads/2018/04/mission2030_Klima-und-Energiestrategie.pdf

Sustainable development, networking and statistics:

Sustainable development: www.nachhaltigwirtschaften.at/

IEA Technologieprogramme: <https://nachhaltigwirtschaften.at/de/iea/technologieprogramme/>

IEA Bioenergy in Austria: www.nachhaltigwirtschaften.at/iea/results.html/id1970

Biobased Future: www.nachhaltigwirtschaften.at/results.html/id6874

Network Biofuels: www.network-biofuels.at/

Statistics Austria:
www.statistik.at/web_de/statistiken/energie_umwelt_innovation_mobilitaet/energie_und_umwelt/index.html

Relevant stakeholders in academia:

Technische Universität Wien: https://www.tuwien.ac.at/en/about_us/:

- Institute of Chemical, Environmental and Bioscience Engineering: <https://www.vt.tuwien.ac.at/home/EN/>;
- Energy Economics Group: <http://www.eeg.tuwien.ac.at/>

Vienna University of Natural Resources and Life Sciences: www.boku.ac.at;

- Department of Agrobiotechnology: <http://www.ifa-tulln.boku.ac.at/en/>

Graz University of Technology: www.tugraz.at

- Institute of Chemical Engineering and Environmental Technology: <https://www.tugraz.at/en/institutes/ceet/home/>;
- Institute of thermal engineering: <https://www.tugraz.at/en/institutes/iwt/research/overview/>

University of Innsbruck:

Waste and Resource Management:

https://www.uibk.ac.at/umwelttechnik/research/soil_pollution.html.en;

Department of Microbiology: <https://www.uibk.ac.at/microbiology/index.html.en>

University of Applied Sciences Upper Austria: <https://www.fh-ooe.at/en/>

University Linz: <http://www.energieinstitut-linz.at/>

Bioenergy 2020+: www.bioenergy2020.eu

Joanneum Research: www.joanneum.at

Austrian Institute of Technology: www.ait.ac.at

WOOD K-plus: <http://www.wood-kplus.at/en>

AAE Intec: <https://www.aee-intec.at/index.php?lang=en>

AEA – Austrian Energy Agency: <https://en.energyagency.at/>

GET – Güssing Energy Technologies: <http://get.ac.at/>