Federal Ministry
Republic of Austria
Sustainability and Tourism

Draft Integrated National Energy and Climate Plan for Austria

2021-2030

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Part 1

SECTION A: NATIONAL PLAN

1. OVERVIEW AND PLAN DEVELOPMENT PROCESS

1.1. Summary

i. Political, economic, environmental and social context

Austria is a federal republic built on the economic principles of the social market economy. Balancing the interests of employers and employees plays an essential role in political discourse, although the 'social partnership' has undergone changes in recent years. The standard of living is very high, even by European standards, and the long-term average unemployment rate is relatively low. Social benefits and the progressive taxation of wages and income have an equalising effect on society. Since 1990, population growth in Austria has accelerated significantly, in particular due to immigration from EU Member States and third countries. This growth is concentrated primarily in the conurbations, while some of the surrounding rural areas are exhibiting downward population trends.

The environmental situation in Austria can be described as positive in terms of essential parameters such as water quality, air quality (with the exception of certain regions) and the use of renewable energy resources. Furthermore, by European standards a very high percentage of agricultural land is farmed in an ecological or environmentally appropriate way, and there are very high levels of sustainable forest use. There are, however, areas for improvement, such as the development of transport, in particular in conurbations and along transit routes, and the accompanying immission levels. This problem area is being addressed, including on a long-term basis, through the continuous development of rail infrastructure. Currently, Austria already has the highest share of rail transport within the European Union. As regards taxation of energy products, Austria is towards the lower end of the middle range of EU Member States.[1] In the case of petroleum products, tax rates are consistently lower than in neighbouring countries, which means that a significant proportion of the diesel fuel sold in Austria is used abroad (fuel exported in fuel tanks).

In several regions, land use is also a critical issue. Alongside population trends and economic prosperity, the primary reason for this is the lack of adequate planning tools at local and regional level.

In connection with the economic, environmental and social context of the plan, the UN's Sustainable Development Goals (SDGs) are also of paramount importance. These goals are to be implemented in

[1] An overview of the taxation of energy products, including electricity, is provided in the following publication from the European Commission (as at 1 January 2018): https://ec.europa.eu/taxation_customs/sites/taxation/files/resources/documents/taxation/excise_duties/energy_products/rates/excise_duties-part_ii_energy_products_en.pdf

Austria through mainstreaming in all policy areas, thus ensuring sustainable economic, environmental and social development. As a result, the economic, environmental and social dimensions are taken into equal consideration both in the National Energy and Climate Plan and in the Federal Government's integrated Climate and Energy Strategy.

ii. Strategy on the five dimensions of the Energy Union

In May 2018 the Austrian Federal Government adopted its Climate and Energy Strategy (#mission2030). The Strategy aims to meet the Sustainable Development Goals in the areas of greenhouse gas reduction, renewable energy and energy efficiency by 2030, in line with the objectives of the European Union. Security of supply, competitiveness, affordability and research and development complete the aims of the Strategy, making it largely consistent with the five dimensions of the Energy Union. The Strategy not only forms the basis for Austria's National Energy and Climate Plan (NECP) in accordance with the Regulation of the European Parliament and of the Council on the governance of the Energy Union and climate action, but also provides the medium- and long-term framework for transforming the energy system in line with the goals of the Paris Agreement on climate change. Long-term decarbonisation must be used in the best possible way in terms of the eco-social market economy, as well as from an economic, environmental and social standpoint. Accordingly, the implementation of these long-term objectives does not denote a loss of prosperity, but must be shaped in such a way as to result in a highly successful economic, environmental and social model of a resource-efficient economy. For this to happen, all relevant provisions must be taken in the vision for 2030 and stranded costs and lock-in effects must be avoided.

iii. Summary table showing the main objectives, together with policies and measures

Table 1: Main objectives and action areas of the NECP

Objective (2030) ***Sector***	***Measure***	***Instruments***	***(Other) dimensions affected***
Main objectives and measures affecting the decarbonisation dimension			
Reduction of GHG emissions (non-ETS) by 36 % compared to 2005			
Transport *GHG sector contribution:* *-7.2 million t CO_2 equivalent compared to 2016 (total contribution)*	*Strengthen and develop public transport, including electrification and mobility management proposals*	*Public procurement* *Infrastructure development* *Funding*	*Decarbonisation* *Energy efficiency*
	Mobility management for business, cities, municipalities, regions and tourism	*Infrastructure* *Raising awareness* *Funding*	*Decarbonisation* *Energy efficiency*
	Increase walking and cycling	*Infrastructure development* *Raising awareness* *Funding*	*Decarbonisation* *Energy efficiency*
	Goods transport: shift from road to rail	*Funding*	*Decarbonisation* *Energy efficiency*

Objective (2030) ***Sector***	***Measure***	***Instruments***	***(Other) objectives affected***
	E-mobility in private transport	*Funding for infrastructure and vehicle purchase* *Regulatory precedence* *R&D*	*Decarbonisation* *Energy efficiency* *Security of supply*
Buildings *GHG sector contribution:* *-3 million t CO_2 equivalent compared to 2016 (total contribution)*	*Meet the heating and cooling needs of newly constructed buildings, as far as possible without using fossil fuels, and in any event excluding fossil oil*	*Regulatory policy (national law and EU law)*	*Decarbonisation* *Energy efficiency* *Security of supply*
Agriculture	*Avoid methane and nitrous oxide emissions in agriculture, in particular through:* - *manure management* - *conservation and development of humus (through management methods and maintenance of arable land)* - *maintenance of permanent grassland* - *adjustments in livestock farming*	*funding for climate-related practices and measures* *regulatory policy* *raising awareness*	*decarbonisation.*
Forestry	*Maintain the carbon pool and continuously increase timber growth and timber harvesting in accordance with the basic principles of sustainable forest management*		

Objective (2030) *Sector*	*Measure*	*Instruments*	*(Other) objectives affected*
Waste management	*Avoid methane and CO_2 emissions in waste management, in particular through:* *Prevention of waste* *aerobic and anaerobic treatment of biogenic waste* *reduction in single-use plastic items* *increase in the proportion of municipal waste recycled*	*regulatory policy (national law and EU law)* *raising awareness*	*decarbonisation.*
Fluorinated gases	*Prevent F-gas emissions, in particular through:* *implementation of EU law* *reduction in the cooling needs of buildings (see also the building measures concerning thermal renovation and standards for new buildings)* *qualification in the area of cooling and air conditioning*	*regulatory policy (national law and EU law)* *raising awareness* *funding*	*decarbonisation.*
Land management	*Improve land use planning and energy spatial planning*	*Planning* *Regulatory policy*	*Decarbonisation* *Energy efficiency*

Objective (2030) ***Sector***	***Measure***	***Instruments***	***(Other) objectives affected***
Increase the share of renewable energy in gross final consumption of energy to 45-50 %, and source 100 % of electricity consumption from renewables (national balance)	***Expansion of renewable energy*** *Expand electricity generation from renewable energy sources under the Renewable Energy Expansion Act (*Erneuerbaren-Ausbau-Gesetz*)* *Create a '100 000 rooftops solar panel and small-scale storage programme'* *Abolish the tax on self-produced electricity* *Basic conditions for feeding biogas and 'renewable' hydrogen into the existing natural gas infrastructure* *Preferential tax treatment for renewable gases* *Develop a hydrogen strategy* *Support sector-specific investments in the future of the hydrocarbon industry (mining royalties)*	*Funding, market-based invitations to tender* *Regulatory law* *Market incentives*	*Decarbonisation* *Security of supply* *Market integration*
	Mitigate temporary surpluses and shortfalls through the use of appropriate flexibility technologies together with sector coupling (with particular focus on new legislative projects for electrolysis installations)		

Objective (2030) ***Sector***	***Measure***	***Instruments***	***(Other) objectives affected***
Transport	*Increase the share of renewable energy in transport in 2030 to at least 14 % by using biofuels and increasing the share of e-mobility*	*Regulatory law* *Financial incentives / funding*	*Decarbonisation* *Security of supply*
Buildings	*Phase out the use of fossil fuels by replacing them with renewable energy sources for heating, hot water and cooling*	*Funding, regulatory law*	*Decarbonisation* *Security of supply*
	Phase-out of oil heaters in the long-term (by 2050 at the latest) — milestone by 2030	*Funding, regulatory law*	*Decarbonisation* *Security of supply*
Agriculture and forestry	*Expand agricultural and forestry bioenergy production*	*Market incentives*	
Main objectives and measures affecting the energy efficiency dimension			
Improve primary energy intensity by 25-30 % compared to 2015			
Buildings	*Carry out thermal energy renovation of building stock and improve efficiency of heating systems* *Provincial business advisory programmes*	*Funding (investment, consultations)* *Consultations*	*Energy efficiency* *Decarbonisation*

Objective (2030) *Sector*	*Measure*	*Instruments*	*(Other) objectives affected*
	Increase the share of efficient renewable energy sources and district heating/cooling systems for heating, hot water and cooling	*Funding, regulatory law*	*Energy efficiency* *Decarbonisation*
Transport	*Implement public transport measures, walking/cycling, goods transport, e-mobility (see decarbonisation above)*	*See above*	*Energy efficiency* *Decarbonisation*
Industry	*Provincial business advisory programmes* *Implement energy efficiency measures and use renewable energy sources in industrial manufacturing processes* *Heat recovery Thermal renovation of existing commercial buildings* *Large businesses are obliged to carry out an energy audit or to implement an energy management system SMEs are encouraged, by way of funding, to implement an energy management system*	*Funding*	*Energy efficiency* *Decarbonisation*

Objective (2030) *Sector*	*Measure*	*Instruments*	*(Other) objectives affected*
Horizontal	*Implementation of the EU's Energy Efficiency Directive*	*Regulatory law (in conjunction with accompanying market incentives)* *Public procurement* *Energy management for businesses* *Raising awareness*	*Energy efficiency* *Decarbonisation*
Main objectives and measures affecting the security of supply dimension			
	Invest in electricity and gas grid infrastructure *Invest in storage, grant remuneration to storage for system capacity* *Maintain efficient existing installations* *Accelerate demand-side management*	*Regulatory law* *Market incentives*	*Security of supply* *Market integration*

Objective (2030) *Sector*	*Measure*	*Instruments*	*(Other) objectives affected*
Main objectives and measures affecting the internal energy market dimension			
	Accelerate and simplifying licensing procedures, relax power line regulations *Develop Austrian grid infrastructure plan* *Accelerate market integration and energy system flexibility* *Adapt the grid tariff structure*	*Regulatory law* *Market incentives* *Reduction in bureaucracy*	*Internal energy market* *Security of supply*
Main objectives and measures affecting the research/innovation/competitiveness dimension			
Horizontal	*Implement the Austrian Energy Research and Innovation Strategy* *European cooperation on the SET Plan* *Transnational and global cooperation — 'Mission Innovation' membership*	*R&D*	*Innovation* *Competitiveness* *Decarbonisation* *Energy efficiency* *Security of supply*

1.2. Current policy and administrative structures

i. Energy system at national and EU level — political context of the plan

European context

Within its 2030 climate and energy policy framework, the EU has three main objectives:

- reduce greenhouse gas emissions by at least 40 % (compared to 1990 levels);
- increase the share of renewable energy sources in the EU to 32 % by 2030;
- increase energy efficiency in the EU by at least 32.5 %.

On the basis of the European Council's conclusions of October 2014, the European Commission put forward several legislative proposals — including the Directive on the revision of the emissions trading system,[2] the Regulation on binding annual greenhouse gas emission reductions by Member States ('effort sharing'),[3] the Directive on renewable energy, the Directive on energy efficiency and the Regulation on the governance of the Energy Union and climate action[4] — all of which have since been adopted by the European Parliament and the Council. Consequently, for the dimensions of decarbonisation (greenhouse gases and renewables) and energy efficiency in particular, a binding legal framework is in place, which is to be systematically implemented over the coming years.

In addition to this National Energy and Climate Plan, the Member States are also required to prepare and submit a long-term strategy in line with the Paris Agreement on climate change by 1 January 2020. The European Commission submitted its draft long-term strategy for the European Union at the end of November 2018 — shortly before the UN Conference of the Parties (COP 24) in Katowice.

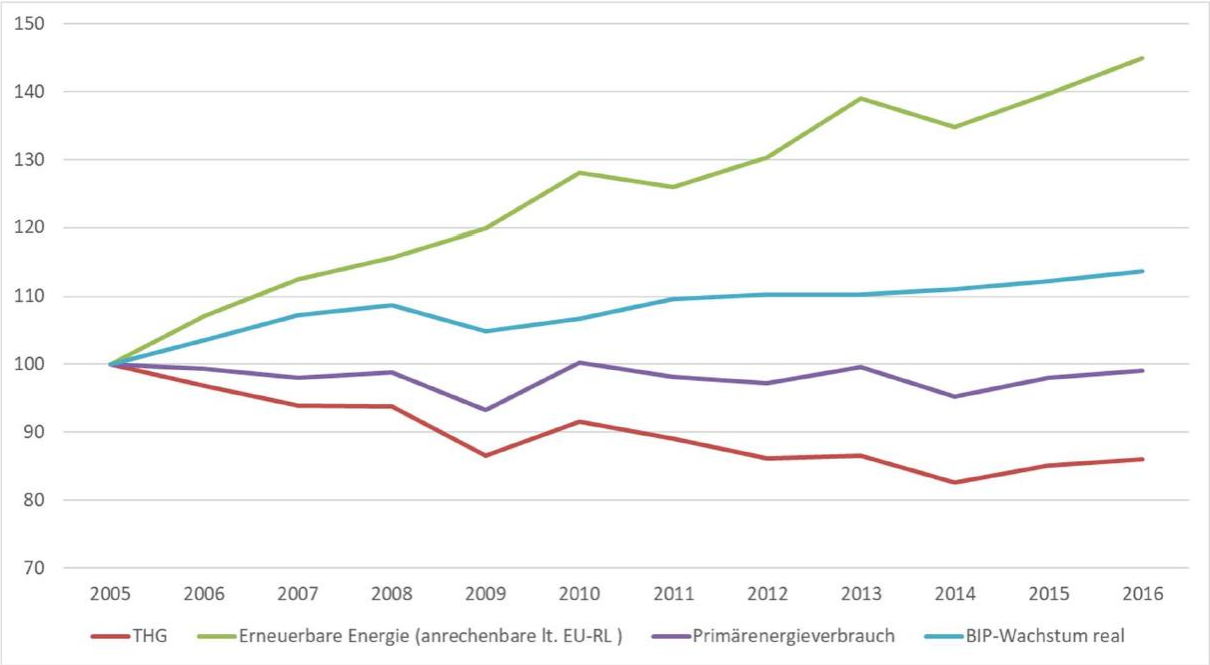
Austrian context

If we look at developments in greenhouse gas emissions, renewable energy and energy efficiency in comparison with economic development since 2005, it is clear that Austria has made significant progress in all three areas over the past decade. The uptake in renewable energy has been most successful, while greenhouse gas emissions have fallen and primary energy consumption has stabilised. For the latter two indicators, there has also been a relative decoupling vis-à-vis GDP throughout the period. However, in

[2] Directive (EU) 2018/410 of the European Parliament and of the Council of 14 March 2018 amending Directive 2003/87/EC to enhance cost-effective emission reductions and low-carbon investments, OJ L 76, 19.3.2018, p. 3.
[3] Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030, OJ L 156, 19.6.2018, p. 26.
[4] At the time of writing, the two Energy Directives and the Governance Regulation have not yet been published in the Official Journal of the European Union.

2015 and 2016, greenhouse gas emissions, primary energy consumption and GDP largely increased in parallel.

Figure 1: Development of greenhouse gas emissions, renewable energy (as defined by EU Directive), primary energy consumption and GDP (in real terms) 2005-2016 (indexed, 2005=100)
Source: Federal Ministry for Sustainability and Tourism, 2018



THG	*GHG emissions*
Erneuerbare Energie (anrechenbare lt. EU-RL)	*Renewable energy (according to EU Directive)*
Primärenergieverbrauch	*Primary energy consumption*
BIP-Wachstum real	*Real GDP growth*

Climate and energy strategy of the Austrian Federal Government

On 28 May 2018 the Federal Government adopted #mission2030, which provides the framework for action in terms of Austrian climate and energy policy up to 2030. This project concerns the long-term transformation of the energy system in order to meet the future challenges of mitigating climate change and fulfil the commitments made under the Paris Agreement and at European level. This means that by 2030, emissions in non-ETS sectors must be reduced by at least 36 % compared to 2005. In order to achieve this, Austria has set ambitious targets for expanding renewable energy and improving energy efficiency. The aim is to increase the share of renewable energy to 45-50 % by 2030, with 100 % of the total electricity consumption being covered by renewables. Primary energy intensity should fall by 25-30 % compared to 2015. To achieve these ambitious targets, #mission2030 provides for a range of measures, and intensive work is already under way to implement them. Twelve 'flagship projects' have been identified as the first key steps to be taken, comprising both short- and long-term measures.

Table 2: Overview of the 12 flagship projects for #mission2030

Flagship project (FP)	***Areas for action***	***Responsibility***	***Timetable***
Mobility			
FP 1: Efficient goods transport logistics	*Support for logistics* *R&D, pilot projects*	*BMVIT*	*2018-2022*
FP 2: Strengthening public rail transport	*Infrastructure development* *Orders*	*BMVIT, ÖBB, provinces*	*2018-2022*
FP 3: E-mobility plan	*Road e-mobility* *Rail e-mobility* *E-mobility management*	*BMVIT, BMNT, provinces, ÖBB*	*2019-2022* *2019-2030* *2019-2022*
Buildings/heating			
FP 4: Thermal renovation of buildings	*Funding instruments* *Legal framework*	*BMNT, BMF, BMVRDJ, provinces*	*2018-2023*
FP 5: Renewable heating	*Funding instruments* *Legal framework*	*BMNT, BMF, provinces*	*Immediately, step-by-step plan*
Renewable energy/electricity			
FP 6: 100 000 rooftops solar panel and small-scale storage programme	*Promotion of investment* *Tax exemption* *Legal framework*	*BMNT, BMF, BMVRDJ, BMDW*	*2019-2023*
FP 7: Renewable hydrogen and biomethane	*Legal framework and preferential tax treatment*	*BMNT, BMF*	*From 2020*
Financing			
FP 8: Green finance	*Market analysis, dialogues with stakeholders, 'Austrian Green Bonds' pilot project, energy transition investment plan*	*BMF, BMNT*	*From 2019*
Research/innovation			
FP 9: Energy research initiative 1: Energiesysteme der Zukunft [Energy systems of the future]	*RTI support programme* *European funding (e.g. SET Plan, EU Framework Programme)*	*BMVIT, BMNT*	*2018-2023*
FP 10: Energy research initiative 2: 'Mission Innovation Austria' programme	*Testing technologies under operating conditions*		*2018-2025*
Horizontal topics			
FP 11: Communication — education and awareness-raising for a sustainable future	*Communications strategy* *School curricula* *Training*	*BMNT, BMVIT, BMBWF, provinces, municipalities*	*2018-2023*
FP 12: Bio-Economy Strategy	*Bio-economy platform* *Federal Government action plan* *Leading bio-economy firms / bio-economy cluster*	*BMNT, BMVIT, BMBWF*	*From 2019*

ii. Current policies and measures in relation to the five dimensions of the Energy Union

Dimension 1: decarbonisation

Greenhouse gas emissions

Decision No 406/2009/EC on the effort of Member States to reduce their greenhouse gas emissions from 2013 to 2020 ('effort sharing') set Austria a target to reduce greenhouse gas emissions in non-ETS sectors by 16 % by 2020 compared to 2005. This target was laid down in the Austrian Climate Protection Act (*Klimaschutzgesetz*) and divided up among the various emitting sectors. In order to ensure that the target trajectory is adhered to, multi-annual action plans were agreed with the provinces. As things stand, these cover the years 2013-2014 and 2015-2018. A regular implementation review and (internal) reporting take place every two years. These measures are currently in the implementation phase.

The main focus of these measures is on expanding the share of renewable energy and improving energy efficiency in the main emitting sectors (in particular transport and buildings), as well as preventing non-CO_2 greenhouse gases in the agricultural sector (reducing methane and nitrous oxide emissions through climate friendly farming practices, above all in relation to manure management, tillage and livestock farming), the waste management sector (reducing methane emissions from landfills) and F-gases. Essential measures are set out in European legislation, such as the Energy Performance of Buildings Directive (EPBD) or the Directive on the promotion of renewable energy.

Transport

In 2016, greenhouse gas emissions from the Austrian transport sector amounted to 22.9 million tonnes of CO_2 equivalent, making it the second largest emitting sector after industry (including ETS). Emissions in the transport sector are exhibiting an upward trend: since 1990, they have increased by 67 %. The causes for this are manifold; as well as the sharp increase in the distances driven in Austria, the export of fuel in fuel tanks has contributed significantly to this development. Greenhouse gas emissions from road goods transport (heavy and light commercial vehicles including fuel export) have increased by 91 % since 1990, while from passenger road transport they have increased by 58 %. In 2016, almost two thirds (64 %) of greenhouse gas emissions from road transport came from passenger transport. In both segments, the increase in distances driven is the largest cause of emissions, followed by fuel exported in the fuel tank.

Measures to reduce greenhouse gas emissions in the transport sector are implemented at different levels. At federal level, the main objectives of the measures are inter-regional infrastructure development, the creation of strategic framework plans, transport-related taxation and financing issues related to financial equalisation between local authorities (allocation of tax revenues to provinces and municipalities). The provinces and municipalities, meanwhile, are primarily responsible for providing an attractive range of local and regional public transport, spatial planning, pedestrian and cycling infrastructure and parking space management or parking ordinances.

The following transport measures have so far been successfully implemented:

- Increasing the share of renewable energy sources in the fuel sector by implementing corresponding EU provisions — in Austria, the biogenic content of diesel, in terms of energy value, is around 6.3 %, while for petrol it is currently around 3.4 %.
- The standard fuel consumption tax, which is chargeable when a car is first placed on the national market (new car purchase or private import) and provides incentives to buy vehicles with low CO_2

emissions.

- Gradually expanding the inter-regional rail infrastructure. Of particular note are the quadrupling of the Western Railway (Vienna to Innsbruck, with significant sections as a high-speed line), the ongoing expansion of the Southern Railway (Vienna — Graz — Klagenfurt) including the Semmering and Koralm tunnel projects, and the construction of the Brenner Base Tunnel, which is essential for the trans-European goods transport between Germany and Italy.
- The ongoing improvements to local and regional public transport services in metropolitan areas.
- Providing mobility management for businesses, cities, municipalities and regions under the climate protection initiative 'klima**aktiv** mobil' in order to support the development and implementation of climate-friendly measures for clean, low-CO_2 mobility at business and municipal level and in the tourism sector.
- Drawing up and implementing the Cycling Masterplan (*Masterplan Radfahren*) and the Walking Masterplan (*Masterplan Gehen*) and supporting the creation of cycling and pedestrian infrastructure, with federal co-financing.
- Implementing concepts relating to energy spatial planning and the revitalisation of town centres (functional diversity) and other spatial planning initiatives.
- Providing significant support for e-mobility through the package of measures introduced by the Federal Ministry for Sustainability and Tourism (Bundesministerium für Nachhaltigkeit und Tourismus, BMNT) (*Umweltförderung im Inland* [Domestic Environmental Support]) and the Federal Ministry for Transport, Innovation and Technology (Bundesministerium für Verkehr, Innovation und Technologie, BMVIT) together with the motor vehicle industry. These measures aim to promote e-mobility using renewable energy by funding the purchase of electric vehicles and the expansion of the recharging infrastructure, by simplifying things from an organisation and fiscal point of view (standard fuel consumption tax, motor vehicle insurance tax, benefits in kind) and by introducing key provincial supporting initiatives promoting e-mobility within their area of impact.
- Implementing the Eurovignette Directive for heavy goods vehicles.

Buildings

Since 2005, greenhouse gas emissions in the buildings sector (residential building and private and public offices) in Austria have decreased by about one third. A variety of effective measures have contributed to this, in particular the switch from oil- and gas-powered heating systems to renewable forms of energy and district heating systems, the thermal renovation of existing buildings built during particularly energy-inefficient construction eras (1950s-1980s) and the gradual increase in construction regulations for new buildings and, increasingly, for renovations.

Over the past 10 years, significant momentum has been created through federal and provincial funding instruments. In an agreement under Article 15a of the Federal Constitution between the Federal Government and the provinces, high energy standards were set for support for housing construction (above all for social housing) which go beyond the standards laid down in construction law. Between 2009

and 2017, a total of around 2.5 million tonnes of CO_2 per year were saved through the use of energy measures in support for housing construction (renovations and new buildings). In addition to provincial support for housing construction, the Federal Government provides funding under the renovation initiative (and paid via the Domestic Environmental Support scheme) not only for private households or building owners for building renovations ('renovation vouchers') but also (together with the provinces) for businesses' commercial premises. Consequently, in the past few years, considerable numbers of building renovations or conversions to renewable heating systems have been carried out. Between 2009 and 2017, support in the form of renovation vouchers led to a total CO_2 reduction of around 700 000 tonnes per year. This combination of instruments strengthens their effects as, to some extent, both instruments can be used.

Adjustments to building legislation have also been made in recent years in response to the requirements laid down the in the EU's Energy Performance of Buildings Directive. The provinces (which are responsible for building regulations) have recently agreed on a new road map for achieving 'net zero energy buildings' when constructing new buildings from 2021. The aim is to ensure that, despite the significant increase in construction as a result of population growth, the rise in specific living space and a growing desire for comfort, greenhouse gas emissions can be kept at a low level. In addition, there are minimum standards in place for building renovations (major renovations). For commercial properties above the low energy standard (new buildings), funding is offered through the Domestic Environmental Support scheme.

Agriculture and forestry

A key instrument for achieving climate-friendly agriculture is the agri-environmental programme '*Österreichisches Programm für umweltgerechte Landwirtschaft* (the Austrian programme for environmentally friendly agriculture), or ÖPUL. This is based on a horizontal approach which aims at providing the widest possible coverage of agricultural environmental services in relation to climate, soil, water and biodiversity. In 2017, almost 93 000 farms participated in the ÖPUL, which represents more than 80 % of the total number of Austrian farms in IACS[5]. In total, therefore, around 80 % of all Austrian agricultural land (excluding alpine pastures), some 1.85 million hectares, were involved in ÖPUL measures. Compared to other EU Member States, Austria therefore has a high participation rate in such voluntary agri-environmental measures.

The key climate protection issues included in the ÖPUL include:

a. limited use of inputs and the creation of broadly closed nutrient cycles (e.g. organic farming);
b. accumulation and retention of organic matter as carbon pools in arable soils;
c. maintenance and location-adjusted management of permanent grassland and wetland habitats;
d. grazing of cattle, sheep and goats.

Point (a)

Because over 30 % of Austria's agricultural land was included in the ÖPUL measures 'Bio'[6] and 'EEB'[7], in

[5] Integrated Administration and Control System.
[6] 'Organic farming'.
[7] 'Restriction of inputs designed to increase yields'.

2017 alone around 740 000 ha[8] refrained from using mineral fertilisers, thereby reducing greenhouse gas emissions. Commitments to reduce fertiliser use are also covered by the ÖPUL measures '*Naturschutz*' [nature conservation] and '*Vorbeugender Grundwasserschutz*' [preventive groundwater protection], combined with fertiliser balancing and training. As improved fertiliser management is, in principle, very dependent on awareness of the problem and the willingness of farmers to change their methods, the current ÖPUL contains increased further training and requirements on carrying out soil testing.

Point (b)

The more diverse crop rotation in organic farming, nitrogen fixation using legumes and the use of organic fertilisers (e.g. solid manure, slurry, compost) all contribute to the development of humus and carbon in agricultural soil. Greening arable land for as long as possible by growing catch crops and fodder also helps to develop humus — in 2017, almost 460 000 ha[9], or around 35 % of Austria's arable land, were covered by ÖPUL greening measures. The accumulation of organic matter is also aided by the reduction in tillage implemented under the ÖPUL measure '*Mulch- und Direktsaat*' [Mulch/direct seeding] (130 000 ha arable land as of 2017).

Point (c)

Due to the high proportion of organic matter, grassland soils are important carbon pools. The conversion of grassland into arable or permanent crop land or into settlements, traffic areas or economic areas results in high humus losses. Meadows and pastures are currently protected both under the first pillar of the CAP (as part of greening) and by various ÖPUL measures. Support for the tailored management of extensive grassland areas, and in particular wetland habitats with particular high levels of soil organic matter, is provided under the ÖPUL nature conservation measure.

Point (d)

The ÖPUL measures '*Tierschutz — Weide*' [Animal welfare — pastures] and '*Alpung und Behirtung*' [Alpine pasturing and herdkeeping] are also relevant to climate protection. Pasture-rearing animals leads to a rapid separation of manure and urine, which reduces greenhouse gas emissions and air pollutants (ammonia). In 2017, 870 000 grazing LUs[10] received ÖPUL support.

In addition to the ÖPUL measures, the Austrian nitrate action programme should also be highlighted in this context, as it contains rules on fertilisers which are compulsory for all farmers.

Austria also has a long-standing expert committee, the 'Fachbeirat für Bodenfruchtbarkeit und Bodenschutz' [Council for Soil Fertility and Soil Protection], which forms part of the BMNT. This committee operates at inter-institutional level (Federal Government, provinces, research institutes, agricultural counsellors, etc.), drawing up recommendations for farmers, above all in relation to fertilisers. These recommendations are used, for example, as a basis for giving advice to farmers, for teaching in

[8] 'Organic farming': 466 511 ha; 'Restriction of inputs designed to increase yields': 271 693 ha.
[9] ÖPUL measure: '*Begrünung — Zwischenfruchtanbau*' [Greening — catch crops]: 270 000 ha (as of 2017); ÖPUL measure: '*Begrünung — System Immergrün*' [Greening — evergreen system]: 188 043 ha (as of 2017).
[10] Livestock units.

agricultural schools or as a basis for the nitrate action programme.

In principle, the provinces have the constitutional regulatory powers in relation to fertilisers and soil protection — with the exception of forest soils and water legislation.

At European level, six priorities have been set for rural development, which are reflected in the funding programmes of each Member State. Priority 5, 'Resource-efficient, climate-resilient economy', and Priority 6, 'Social inclusion and economic development', are important for meeting climate and energy goals as well as to wider climate issues.

In the Austrian Special Directive 'LE-Projektförderungen 2014-2020' [2014-2020 Rural Development Funding Programme], the following climate and energy measures in line with Priorities 5 and 6 are available in the area of agricultural production:

Priority 5, 'Resource-efficient, climate-resilient economy':

- Education
- European innovation partnership (EIP-AGRI)
- Consultation
- Investment in inter-farm irrigation infrastructure
- Investment in infrastructure to develop and diversify agricultural and forestry holdings through the use of energy from renewable raw materials and through energy services
- Photovoltaics in agriculture
- Investment in renewable energy

Priority 6, 'Social inclusion and economic development':

- Education
- European innovation partnership (EIP-AGRI)
- Creation and operation of clusters
- Creation and operation of networks
- Consultation
- Diversification into non-agricultural activities

The education and consultation measures are not quantifiable in terms of CO_2 equivalent, but they are crucial to the implementation of climate and energy-related measures on agricultural holdings. The measure concerning investment in agricultural production under the 2014-2020 rural development programme is also very important, as it allows for expensive construction and mechanical emission reduction measures (such as ground-level slurry application or capping farmyard manure storage) to be carried out.

The forestry sector is of great importance to Austria. Decades of multifunctional forest management have already led to the accumulation of great biomass reserves, and the forests' role as a reservoir has

increased enormously. The continuous growth in sustainable wood and biomass harvests has also resulted in a very high share of renewable energy sources in electricity and heat production, which contributes significantly to the high share of renewable energy sources in Austria. Through the material recovery of wood and the associated substitution effects, the forestry sector makes a significant contribution to climate protection. This holistic management method is also in line with the IPCC's recommendations, which state that in the medium to long term, the concept of sustainable forest management represents the land use sector's most important contribution to climate protection.

In recent years, the increasing occurrence of extreme weather events has shown that climate change is already having an impact. The priority is therefore to introduce medium- to long-term climate change adaptation measures in order to protect and stabilise terrestrial carbon pools and maintain ecosystem performance (conservation of productive arable land, grassland and forest, greater reduction in soil loss, protection against natural hazards, etc.).

Waste management and F-gases

Since 1990, greenhouse gas emissions in the waste management sector have fallen significantly — despite the increase in waste quantities. Successful measures that have led to proven reductions in emissions include, in particular, the prohibition on depositing untreated municipal waste in landfills, the installation of landfill gas collection systems, material recovery measures and large-scale thermal treatment of residual waste in modern waste incineration plants, which also contribute towards energy production (electricity and heat). Based on the planned increase in material recovery of biogenic waste, anaerobic recovery and the resulting energy production will also become more important.

In order to achieve a sustainable reduction in the use of fluorinated gases (F-gases), which are harmful to the climate, statutory requirements are laid down by the 2009 Fluorinated Greenhouse Gas Act (*Fluorierte Treibhausgase-Gesetz 2009*), which is supplemented by EU law (Regulation) and adjusted accordingly.

Horizontal measures: the climate protection initiative *'klima**aktiv***'

The objective of the climate protection initiative 'klima**aktiv**' is to increase market penetration of high-quality, climate-friendly products and services, thereby achieving a reduction in greenhouse gas emissions. Alongside regulatory law and public funding, klima**aktiv** is an instrument in use in the field of voluntary measures and incentives under Austrian climate and energy policy.
Through standards, awareness-raising, information, consultation and further education, klima**aktiv** provides incentives and market stimulus to use renewable energy sources for energy efficiency measures in the field of construction, renovation and mobility ('klima**aktiv** mobil'). klima**aktiv** provides guidance and serves as a quality assurance system for public funding, helping to ensure more efficient use of funding, in particular the Domestic Environmental Support scheme.

As well as providing consultation, training and certification in conjunction with the Domestic Environmental Support scheme for Austria's businesses, cities, municipalities, regions and the tourism sector, klima**aktiv** mobil offers its own funding programme providing financial support for the implementation of measures for clean, low-CO_2 mobility, the focus of which is on mobility management, e-mobility, alternative propulsion methods using renewable energy, cycling and innovative, flexible mobility services. Some 12 000 projects receive support, saving around 0.5 million tonnes of CO_2 per year. Under the klima**aktiv** mobil programme, financial support in the amount of some EUR 108 million, in particular from the EAFRD, the climate and energy fund and the Domestic Environmental Support scheme, has triggered total environmental investments of around EUR 645 million in clean mobility and the provision of 6 000 jobs.

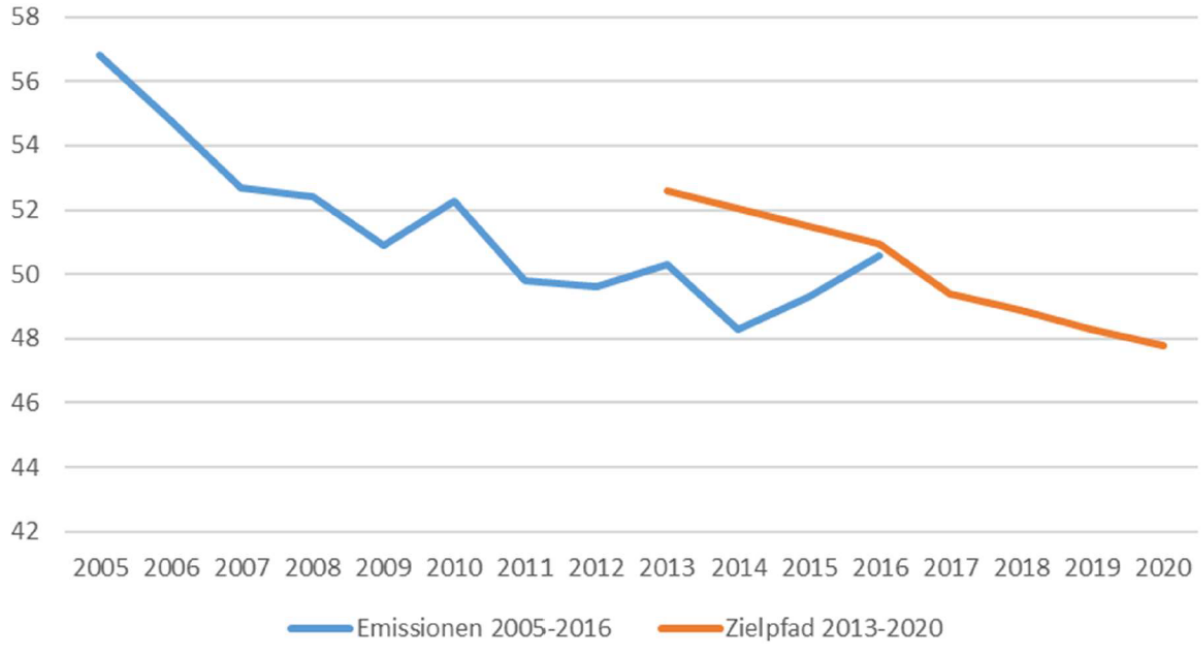
By financing klima**aktiv** through the Domestic Environmental Support scheme, the climate and energy fund and its own budget, the BMNT assumes the role of a key driver and moderator of the societal move towards a sustainable economic and energy system. klima**aktiv** is a multilevel governance instrument, combining administration, economy, science and civil society. Based on this integrated approach, klima**aktiv** provides a communication and cooperation platform which promotes integrated analysis and better networking between the public and the private sectors. klima**aktiv** works together the economic sector and the provinces, cities and municipalities on a number of issues, and has partnerships with a range of companies. It has therefore had a positive location effect on both the demand side and the supply side.

Achieving 2020 targets

Up to the 2016 reporting year, Austria's greenhouse gas emissions in non-ETS sectors were below the target trajectory in accordance with Decision No 406/2009/EC on the effort of Member States to reduce their greenhouse gas emission up to 2020 ('effort sharing') and the Climate Protection Act. If this target trajectory were to be missed in the remainder of the period, additional measures would immediately be negotiated between the Federal Government and the provinces and implemented, in order to ensure that the targets under the Effort Sharing Decision are met. In addition, any costs arising from a breach of target values (purchase of emissions allowances) would be divided between the Federal Government and the provinces at a ratio of 80:20. As the target has been more than met in the years 2013-2016, there are still currently unused emissions allowances, which Austria may still use in the period 2017-2020 to meet its target trajectory ('banking' in accordance with the rules of the Effort Sharing Decision).

Figure 2: Austria's greenhouse gas emissions in millions of tonnes of CO_2 equivalent in non-ETS sectors, 2005-2016, and the target trajectory for 2013-2020 under the Effort Sharing Decision

Non-ETS GHG emissions and 2013-2020 target trajectory



Source: Federal Ministry for Sustainability and Tourism, 2018

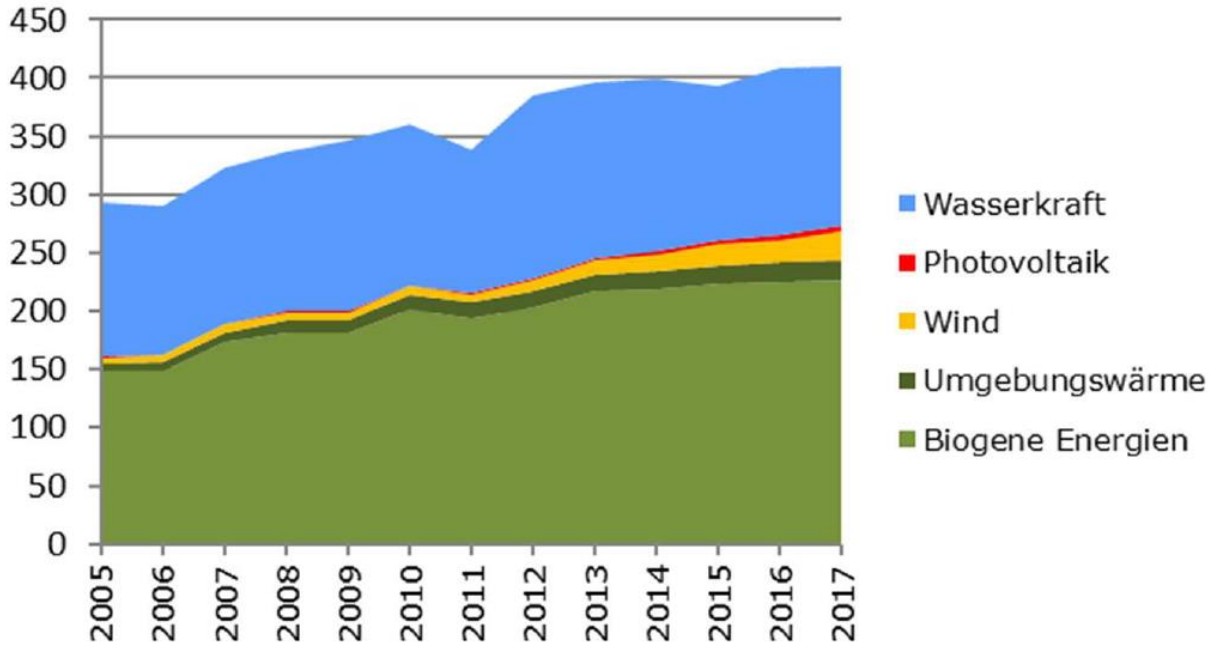
Emissionen 2005-2016	Emissions 2005-2016
Zielpfad 2013-2020	Target trajectory 2013-2020

Renewable energy

In Austria in 2016, the share of renewable energy within the gross final consumption of energy was 33.5 %. With regard to energy use for space heating and air conditioning, the share of renewable energy in 2016 was 33.3 %. The share of renewable energy in gross electricity consumption in 2016 was 72.6 %, while it constituted 10.6 % of energy use in the transport sector.

Due to its topographical location, Austria has at its disposal the two main renewable energy sources: hydroelectric power and biogenic energy. These two renewable energy sources make up the greatest share of domestic primary energy production, with the share of biomass on the increase. Other types of renewable energy, in particular the use of ambient heat (heat pumps, solar heat and geothermal energy) and primary energy production using wind and photovoltaics, are also constantly and visibly increasing.
Figure 3:

Domestic production of renewable energy in PJ

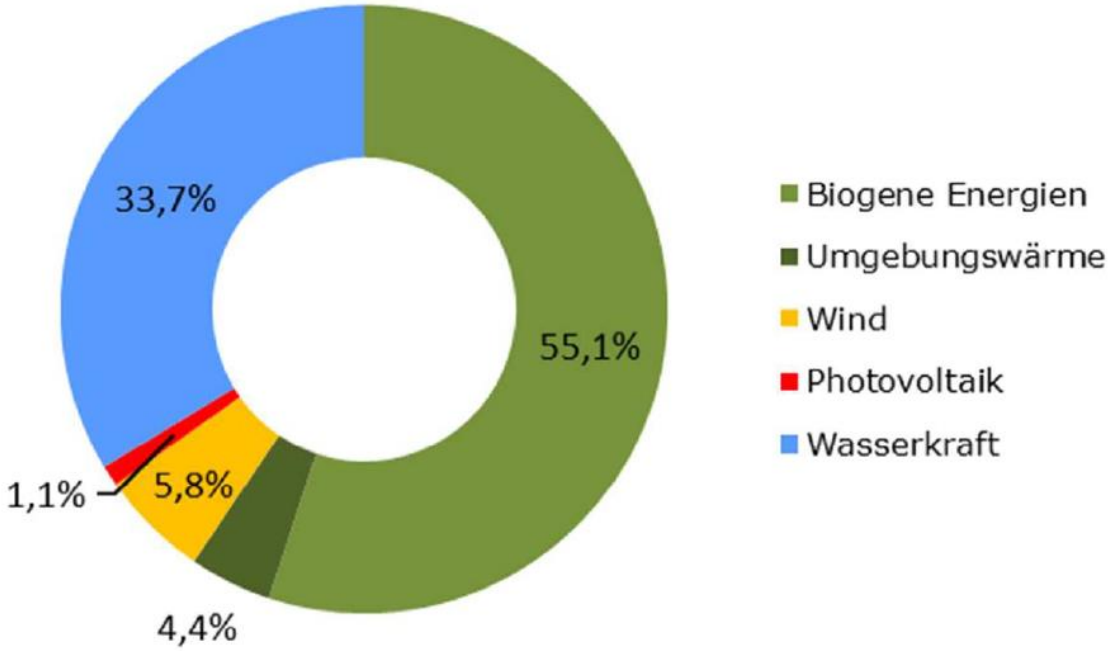


Source: BMNT, Energy in Austria 2018 — figures, data, facts

Wasserkraft	Hydroelectric power
Photovoltaik	Photovoltaics
Wind	Wind
Umgebungswärme	Ambient heat
Biogene Energien	Biogenic energy

Figure 4:

Domestic production of renewable energy 2017



Source: BMNT, Energy in Austria 2018 — figures, data, facts

Biogene Energien	Biogenic energy
Umgebungswärme	Ambient heat
Wind	Wind
Photovoltaik	Photovoltaics
Wasserkraft	Hydroelectric power

In recent years, effective instruments have been used to gradually increase the share of renewable energy. These include in particular the Green Electricity Act (*Ökostromgesetz*), support for renewable energy systems in the heating sector (particularly in buildings) from the Federal Government and the provinces (the Domestic Environmental Support scheme, support for housing construction) and replacing fossil fuels with biofuels in the transport sector. The Green Electricity Act was amended in 2017 with the aim of creating greater flexibility, particular for households, and better integration of existing installations, for example by facilitating the incorporation of storage technologies. This guarantees security of supply in a more decentralised energy system.

Key federal laws concerning renewable energy

Federal Act on Support for Electricity Production from Renewable Sources (2012 Green Electricity Act) — BGBl. I No 75/2011

The 2012 Green Electricity Act provided an ambitious basis for promoting green electricity in Austria, replacing the Green Electricity Act in force since 2003 (as amended BGBl. I No 104/2009). In order to ensure a fairer and more even allocation of the available funding among applicants and boost the expansion of green electricity production, funding amounts have increased significantly and feed-in tariffs have been reduced or applied degressively, where economically reasonable for the installations. In the wind and hydroelectric power sector, applicants currently on the waiting list have been given the opportunity to receive support immediately by accepting a discount — scaled on the basis of time and tariff size — on the feed-in tariff requested. The model also provides a solution for capping the green electricity tax for large consumers, whereby the green electricity support tariff is linked, in percentage terms, to charges for grid use and grid losses, without constituting a scaling of taxes based, for example, on grid level. End consumers located within the same grid level are not differentiated between based on province or network area. A central point of contact and settlement centre for green electricity support under the 2012 Green Electricity Act, OeMAG, was established. Also, in order to relieve the burden on green electricity installation operators, administrative procedures were able to be reduced and simplified, for example by establishing a register of installations or by limiting the requirement to submit an application in respect of decisions of recognition.

Federal Act on support for measures in the areas of water management, the environment, contaminated land remediation, protection of the environment abroad and in relation to the Austrian JI/CDM programme on climate protection (Environmental Support Act (Umweltförderungsgesetz)) — BGBl. No 185/1993

On the basis of the projects supported in the period 2014-2016 (evaluation report), the Domestic Environmental Support scheme for renewable energy sources (with an energy output of 1 160 GWh/a) and energy efficiency measures (with an energy output of around 1 450 GWh/a) are making a vital contribution towards achieving the EU's 2020 targets.
More than a third (around 410 GWh/a, or 36 %) of the energy produced from renewable sources by approved projects was apportioned to local biomass heating. On average, each local heating installation that received support produced 1 430 MWh/a of thermal energy, thus feeding a local heating grid. Further significant amounts of energy were produced by heat distribution projects. The focus of support for heat distribution also includes 10 major projects for feeding waste heat into new or existing local and district heating grids or establishing waste heat distribution grids. At around 109 GWh, these projects make up the majority of renewable energy use in this area of focus.

Support for energy savings is also playing an increasingly significant role. The projects supported in the period 2014-2016 achieved annual energy savings of around 1 450 GWh/a, of which around 860 GWh/a came from general operational energy saving measures and 590 GWh/a from thermal building renovation measures.

In the areas of local biomass heating, biomass CHP, boiler replacement, heat distribution and optimisation of local heating installations, and for some demonstration installations, the provinces were obliged to provide co-funding. In the period 2014-2016, this compulsory provincial support amounted to EUR 29.92 million. Projects in these areas also received EU co-funding.

Ordinance of the Federal Minister for Agriculture and Forestry, Environment and Water Management on fuel quality and the sustainable use of biofuels (2012 Fuel Ordinance) — BGBl. II No 398/2012

The Fuel Ordinance established the obligatory use of renewable energy in road transport at national level, in accordance with the objectives of the EU Directives (Directive 2009/28/EC on the promotion of the use of energy from renewable sources and the Fuel Quality Directive (2009/30/EC)). The cornerstone of the Ordinance is the 'substitution requirement', under which all fossil fuel distributors are required to substitute a certain proportion of the fossil fuel placed on the market with renewable energy. Current targets are to substitute 6.3 % of diesel fuel and 3.4 % of petrol fuel based on energy value. Both targets are mainly achieved through the addition of around 7 % biodiesel to diesel (B7) and 5 % bioethanol to petrol (E5) by volume, which occurs nationwide. In order to avoid as far as possible any negative environmental effects from the biofuels used, the Fuel Ordinance contains detailed requirements and criteria intended to guarantee that the biofuels used are sustainable and have a positive environmental impact.

Achieving 2020 targets

Under EU law, Austria is required to increase the share of renewable energy in its gross final consumption of energy to 34 % by the year 2020. This figure has already almost been reached. In 2016, the share of renewable energy under EU Directive 2009/28/EC was 33.5 %. The largest contributors to the overall production of renewable energy in Austria in 2016 were hydroelectric power, with 36.4 %, and solid biomass, with 29.6 %. Further contributions came from renewable district heating, with 9.8 %, caustic solutions used to produce energy, with 7.3 %, and biofuels, with 5.7 %. The contributions from wind, solar

thermal, environmental heat, biogas, geothermal and photovoltaics totalled 11.2 %.

Dimension 2: energy efficiency

Austria transposed the key elements of Directive 2012/27/EU (the Energy Efficiency Directive) by way of the national Energy Efficiency Act (*Bundes-Energieeffizienzgesetz* (BGBl. I No 72/2014). The contents of the Energy Efficiency Act include:

- Compliance with the requirements of the Energy Efficiency Directive (2012/27/EU).
- Stabilisation of final energy consumption at 1 050 PJ and cumulative final energy savings of 310 PJ by 2020.
- The requirement for large companies to carry out an external energy audit or to implement an energy or environmental management system.

  Section 9 of the Energy Efficiency Act requires large companies to carry out an energy audit. This requirement on companies first entered into force with the Energy Efficiency Act at the start of 2015, and the first audits were to be reported by the end of 2015. A small number of companies did not pass the threshold for classification as a large company until 2016 or 2017. Energy audits are to be carried at least every four years, so the next major submission of energy audit reports is expected at the end of 2019.
- Support programmes to encourage SMEs to implement energy management systems.
- The requirement for energy suppliers to implement energy efficiency measures. The obligations scheme for energy suppliers is laid down in Section 10 of the Energy Efficiency Act. From 1 January 2015, energy suppliers with an annual energy output of at least 25 GWh have been required annually to implement energy efficiency measures with final energy savings of 0.6 % compared to the previous year's output of energy to final energy consumers in Austria, and to report their energy efficiency to the monitoring body.[11]
- The requirement for the Federal Government to implement energy efficiency measures.
- Strategic measures (provincial support for housing construction, energy and environment, the Domestic Environmental Support scheme (see above), etc.) to promote energy efficiency measures.

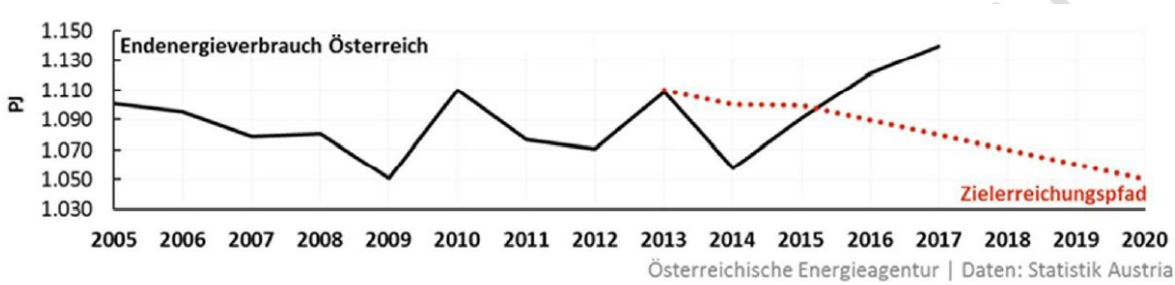
Achieving 2020 targets

Maximum final energy consumption by 2020

[11] The monitoring body for energy efficiency has been established by order of the BMNT. It is a point of contact and information for companies, public bodies and energy service providers subject to the requirements of the Energy Efficiency Act. One of the monitoring body's duties is to analyse the data it receives and develop standardised methods for evaluating energy efficiency measures. It also has various reporting obligations to the general public and the BMNT.

In 2016, Austria's final energy consumption of 1 110 PJ exceeded the 2020 target value of 1 050 PJ. In comparison to 2015, it had risen by some 2.8 %. According to Statistics Austria, the main reasons for this were increased traffic levels and weather conditions. The most recent energy balance sheet for 2017 shows a total final energy consumption of 1.13 PJ, a further increase of 2 % on the previous year. Again, the main reasons for this according to Statistics Austria were increased traffic levels and, to a lesser extent (due to the lower outside temperatures during heating season), weather conditions. Total heating degrees rose by around 1 % compared to the previous year. [12]

Figure 5: Final energy consumption and target trajectory under the Energy Efficiency Act



Source: Austrian Energy Agency, Statistics Austria, 2018

Endenergieverbrauch Österreich	Final energy consumption in Austria
Zielerreichungspfad	Target trajectory
Österreichische Energieagentur	Austrian Energy Agency
Daten: Statistik Austria	Data: Statistics Austria

On the basis of the data available, it now unlikely that the energy efficiency target value of 1 050 PJ in 2020 will be achieved. Progress towards with target value is partly dependent on fairly volatile factors which are difficult to influence, such as weather patterns, population growth and economic growth.

Cumulative energy efficiency target of 310 PJ in the period 2015-2020

Progress towards achieving the target under Section 4(1)(3) of the Energy Efficiency Act presents a different picture. The savings from the measure notifications under the obligations scheme and from strategic measures totalled 168.3 PJ, and contribute towards the savings target of 310 PJ. This suggests that the target of 310 PJ under the Energy Efficiency Act will be achieved by 2020.

Energy efficiency measures notified

The majority of the annual savings came from energy taxes (strategic measures), followed by 'heating systems and hot water' (measures under the obligations scheme).

Household measures accounted for annual savings of 25.4 PJ, comprising 37.3 % of total savings. In low-

[12] http://www.statistik.at/web_de/statistiken/energie_umwelt_innovation_mobilitaet/energie_und_umwelt/energie/energiebilanzen/index.html. July 2017.

income households, the measures taken resulted in annual savings of 0.62 PJ, comprising 0.9 % of total savings.

Table 3: Energy savings from policy instruments in PJ

Measures	**Cumulative savings in TJ**
	2014-2017
Energy efficiency obligation scheme for energy suppliers	64.60
Provincial support for housing construction, energy and environment	28.26
Domestic Environmental Support (Umweltförderung im Inland, UFI)	22.87
Federal support for green electricity	1.8
Energy taxation	39.21
Motorway tolls for HGVs	0.84
Austrian Federal Government's 'renovation initiative'	3.35
klima**aktiv** mobil	0.18
Climate and Energy Fund	7.06
Federal Government property	0.12
Rounded total	**168.29**

Energy audit obligation for companies

Of the 2 015 large companies that registered with the energy efficiency monitoring body as being subject to the requirements of Section 9 of the Energy Efficiency Act, 51 % are classed as manufacturing companies and private-sector service companies. 939 companies have carried out an external energy audit, while 656 companies carried out an in-house energy audit.

Of all energy audits reported, 59 % found potential energy savings of between 1 % and 10 % at the company. The transport sector shows relatively high potential savings on average, ranging between 5 % and 20 %. In energy audits with potential savings of over 20 %, the key focus is on building measures.

For the creation of the energy audits, 880 qualified energy service providers had registered with the energy efficiency monitoring body by mid-November 2018, 564 of which are entered in the public register of external energy service providers.

Energy management in SMEs

In order to encourage SMEs to implement energy management systems, a BMNT support programme was launched with a total of EUR 5 million. Energy advisory programmes, co-financed by the Domestic Environmental Support scheme, are also offered to SMEs in the provinces.

Dimension 3: security of supply

General

Around a third of the energy from primary energy sources comes from Austrian production, a large share of which comes from renewable energy sources. Biogenic fuels and propellants and hydroelectric power are the two main energy sources in terms of domestic production. Photovoltaics, wind power and ambient heat are growing constantly and rapidly. Energy imports account for around two thirds gross inland energy consumption, with oil and gas the main two imports. Although domestic oil and gas output is relatively modest and exhibiting a downward trend, in 2017 they still constituted 6.1 % (oil) and 13.4 % (gas) of gross inland energy consumption.

Security of supply indicators have shown positive developments over the last 10 years in Austria. The net import tangent, which shows the level of dependence on imports, has fallen significantly since 2005, from 72.2 % to 64.5 %. Natural gas storage capacity sits at 8.085 billion cubic metres (bcm), slightly less than the annual natural gas consumption in Austria, while emergency oil reserves, standing at more than a quarter of the average annual consumption, are greater than the obligatory emergency reserves required by the International Energy Agency. As well as security of supply, energy prices are also central Austria's status as a location for business. The trends in gas and electricity prices in recent years show that industry prices in Austria have increased at a slower rate than the EU average. Household gas and electricity prices, while well above industry prices, have shown a negative trend in recent years. Developments in the Austrian Electricity Price Index (ÖSPI) show a reduction in the period 2014-2017 compared to 2005.

Oil and petroleum products

Although the share of oil and petroleum products has fallen from almost 55 % in the first half of the 1970s to around 35.7 % today, they still rank first among the energy sources contributing to Austria's gross inland energy consumption. In 2017, Austria consumed 11.3 million tonnes of petroleum products. The transport sector accounted for around 80 % of this, while 10 % is attributed to private households (heating / hot water). The rest is spread across manufacturing, agriculture and services.

Two companies (OMV Austria Exploration & Production GmbH and Rohöl Aufsuchungs AG) extract oil in Austria, while OMV AG is the only importer of crude oil. Petroleum products are imported by approximately 65 companies and exported by around 20. There is one refinery (Schwechat) and around 15 mixed undertakings. Eighty companies are active in the wholesale supply of petroleum products. Small- and large-scale consumers are supplied by around 20 companies in the fuel and lubricants trade. There are around 2 600 public service stations in Austria. Currently, all oil imports reach Austria and the Schwechat refinery from the Port of Trieste via the Transalpine Pipeline (TAL) and the Adria-Wien Pipeline (AWP). Petroleum products are transported by road, rail, ship and pipeline (the West Product Pipeline (Produktenleitung West, PLW) connects the Schwechat refinery and the Lobau product storage facility with the St Valentin tank farm).

In 2017, 7.2 million tonnes of oil were imported into Austria (around 90 % of the annual demand). Imports came from 13 countries from different regions, with Kazakhstan and Libya ranked first and second. The Schwechat refinery is the only refinery in Austria. Its annual processing capacity is 9.6 million tonnes. Its utilisation rate in recent years has ranged between 90 % and 95 %. Furthermore, in 2017, 1 million tonnes of petroleum products were imported into Austria, compared with product exports of 3.1 million tonnes in 2016.
Obligatory emergency reserves: At the end of 2017, Austria's obligatory emergency reserves totalled 2.76 million tonnes (0.83 million tonnes of crude oil and 1.93 million tonnes of petroleum products). The obligation to hold stocks corresponding to 25 % (90 days) of the previous year's imports is therefore met. The administration has not drawn up a risk assessment for oil, nor does it have a prevention plan.

Natural gas

Austria occupies a key position in the European gas grid and is a major gas transit country. The Baumgarten gas transfer facility in Lower Austria is one of the most important gas hubs in Europe. At 41.14 bcm in 2017, the quantity of natural gas transported through Austria is significantly higher than domestic consumption (8.931 bcm in 2017).

Since the beginning of the decade, natural gas storage capacity in Austria has risen from 4.6 bcm to the current capacity of 8.085 bcm provided by the five natural gas storage companies operating in Austria.

Imports based on long-term contracts, which Austrian importers have concluded with suppliers in Norway and Russia, form a cornerstone of the supply of gas. In 2017, a total of 8.201 bcm of natural gas was imported into Austria.

Due to the ongoing liberalisation of the natural gas market, the purchase of natural gas at short notice has become much more important to the natural gas exchange. The volume of gas traded by the Central European Gas Hub (CEGH) on the spot market has increased significantly in recent years, from 0.09 bcm in 2010 to 5.47 bcm in 2017.

The risk assessment for natural gas and the creation of the preventive action plan and the emergency plan are carried out under the leadership of the BMNT in close cooperation with E-Control, the market area manager and the distribution area manager. The publicly available preventive action plan includes the results of the risk assessment, the results of the calculation of the infrastructure standard and the assessment of compliance with the supply standard and with the requirements placed on natural gas companies. The emergency plan contains crisis levels in line with the EU Security of Gas Supply Regulation (early warning level, alert level and emergency level), a description of the relationships between actors — including information flow (e.g. alert chains), the allocation of tasks and roadmaps in critical supply situations or during a crisis — and energy intervention measures.

Electricity

Risk assessments in the electricity sector currently take place on a voluntary basis. The 'Risk analysis for the electricity sector's information systems, with particular reference to smart meters and data protection', which is publicly available, is the result of voluntary cooperation between the Austrian Federal Chancellery, Ministries relevant to security, representatives from the Austrian energy sector and Energie Control Austria as the competent regulatory authority. Chapter II of the Regulation of the European Parliament and of the Council on risk-preparedness in the electricity sector and repealing Directive 2005/89/EC, which is currently being negotiated under the Austrian Council Presidency, provides for the performance of risk assessments.

With regard to a preventive action plan and an emergency plan, there are currently no EU provisions comparable to those for the gas sector. However, the Network Development Plan, which is to be drawn up by Austrian Power Grid AG every year for a ten-year period, can be considered a key preventive element. Similarly, the 'Energy intervention crisis manual for electricity' (*Energielenkungskrisenhandbuch Strom*) and the 'National grid restoration strategy' (*Konzept des nationalen Netzwiederaufbaus*) can be considered comparable instruments to an emergency plan.

Network code

The legal basis for the network code on electricity emergency and restoration in Regulation (EU) No 714/2009 (conditions for access to the network for cross-border exchanges in electricity). The network code on electricity emergency and restoration provides rules for managing the electricity grid in cases of emergency, total failure (blackout) and restoration.

APCIP — Austrian Programme for Critical Infrastructure Protection

In 2008, the Austrian Programme for Critical Infrastructure Protection (2008 APCIP Master Plan) was adopted, and has since been replaced by the 2014 APCIP Master Plan. APCIP coordination is carried out by the Federal Chancellery and the Federal Ministry of the Interior with the involvement of the relevant federal ministries, provinces, interest groups and strategic companies. The Resolution on a new Austrian Security Strategy (ÖSS) adopted by the National Council in 3 July 2013 tasked the Federal Government with developing a state-level strategy to increase Austria's resilience and protect critical infrastructure. The APCIP represents an essential contribution towards implementing the ÖSS.

In addition to the Federal Government's APCIP, the provinces have their own programmes to protect their regional critical infrastructure, which involve regular exchanges between the Federal Government and the provinces.

Key laws concerning security of supply at federal level

Federal Act on intervention measures for security of energy supply (2012 Energy Intervention Act (Energielenkungsgesetz 2012)) — BGBl. I No 41/2013

The Energy Intervention Act 2012 provides for the creation of a system of measures in Austria to maintain the supply of energy to the population in the event of a crisis and to comply with Austria's obligations under international law to introduce emergency measures. It covers solid and liquid energy sources, electricity and natural gas.

Federal Act on holding minimum stocks of oil and petroleum products (2012 Oil Stockholding Act (Erdölbevorratungsgesetz 2012)) — BGBl. I No 78/2012

The Austrian stockholding system is based on the 2012 Oil Stockholding Act as amended by BGBl. I No 163/2015 and requires importers of oil and/or petroleum products to maintain 25 % (90 days) of their net imports from the previous year as obligatory emergency reserves.

Federal Act on mineral raw materials (Mineral Raw Materials Act (Mineralrohstoffgesetz)) — BGBl. I No 38/1999

The Mineral Raw Materials Act lays down rules for exploring, extracting and processing free-to-mine, state-owned and privately-owned mineral raw materials, for searching for and investigating geological structures to be used to store liquid or gaseous hydrocarbons (i.e. oil and natural gas), for underground container-free storage of hydrocarbons and for processing the stored hydrocarbons, where it is carried out by the storage rights holder in connection with the operation of the storage facility.

Dimension 4: market integration

Electricity

Austria forms part of the western European wholesale electricity market and is closely linked with its neighbouring countries. In 2017, the electricity interconnection level in Austria was 15.3 %, well above the 2020 target of 10 %. The country's central location poses challenges in terms of north-south electricity flows. Austria's electrical grid needs to be able to absorb large and increasing levels of electricity generation from solar and wind power.

There are bottlenecks in the transmission network for Hungary, Czechia, Slovenia, Italy and Switzerland, which are managed partly through implicit auctions as part of the European day-ahead market coupling

(Austria-Italy) and partly through explicit auctions (other congested borders). There are no bottlenecks at the German-Austrian border, and there is no direct grid connection between Austria and Slovakia.

Austria plays an active role in the Central Eastern Europe (CEE) region. This region comprises the countries of Poland, Czechia, Slovakia, Hungary, Slovenia, Germany and Austria.

Austria is also actively involved in the Central Southern Europe (CSE) region. This region comprises Germany, France, Slovenia, Italy, Greece and Austria, plus Switzerland as an observer country. A particularly important step in this region was the implementation of the day-ahead market couplings at (most) Italian borders in 2015.

Through its strong market integration with Germany, Austria has several important links with the Central Western Europe (CWE) region, which comprises Belgium, Germany, France, Luxembourg and the Netherlands. Since 2011, Austria has therefore been active as a full member of the Pentalateral Forum (Benelux, Germany, France, Switzerland and Austria). The aim of this initiative is to provide political support for a process of regional integration towards a European energy market.

Austria is also a member of the CESEC (Central and South-Eastern Europe Connectivity) regional initiative, which aims to speed up the integration of gas and electricity markets in central and south-eastern Europe. It was set up in February 2015 by Austria, Bulgaria, Croatia, Greece, Hungary, Italy, Romania, Slovakia and Slovenia. These countries were later joined by eight Contracting Parties to the Energy Community: Ukraine, Moldova, Serbia, the former Yugoslav Republic of Macedonia, Albania, Bosnia and Herzegovina, Kosovo and Montenegro.

Network Development Plan

The Network Development Plan (NDP) is a legal obligation for transmission system operators. Both Austrian Power Grid AG (APG) and Vorarlberger Übertragungsnetz GmbH (VÜN) draw up their own NDP, which must be approved by the regulator E-Control. The NDP contains a list of investments that have already been agreed and projects to be implemented within the next three years. The NDP also sets out network planning for the next ten years (2019-2028), taking into account developments in energy performance.

The current 2018 network development plans are based on the ENTSO-E's Ten Year Network Development Plan, the 2017 NDP and the 2030 AGP Master Plan, and provide information on the key transmission infrastructure to be developed in the APG network.

Projects of common interest — electricity

Regulation (EU) No 347/2013 provides a framework for identifying, planning and implementing projects of common interest (PCIs). PCIs are essential to the creation of nine priority strategic geographical energy infrastructure corridors in Europe.

The projects are particularly intended to help create a sustainable energy system in order to address challenges such as increasing energy demand, ensure security of supply, cope with bottlenecks, promote the use of technology such as smart grids and enable the integration of renewable energy.

The list of PCIs is drawn up every two years. In particular, this process involves the Member States, the European Commission, the Agency for the Cooperation of Energy Regulators (ACER), the national regulatory authorities and the project promoters. Currently in force is the third PCI list, from 2017; the process of drawing up the fourth list began in spring 2018.

Due to its central geographic location, Austria is particularly affected by north-south connections and energy flows, and must therefore increasingly balance out volatility in renewable energy generation.

The third PCI list contains the following Austrian PCIs in the electricity sector:

Priority corridor 'North-south electricity interconnections in western Europe':

2.18. Capacity increase of hydro-pumped electricity storage in Kaunertal, Tyrol; Project promoter: TIWAG

Priority corridor 'North-south electricity interconnections in central eastern and southern Europe':

Cluster Austria — Germany, including the following PCIs:

3.1.1 Interconnection between St Peter (AT) and Isar (DE) (380 kV 'Germany line'); Project promoter: APG / TenneT

3.1.2 Internal line between St Peter and Tauern (AT) (380 kV 'Salzburg line'); Project promoter: APG

3.1.4 Internal line between Westtirol and Zell-Ziller (AT) (380 kV); Project promoter: APG

3.2.2 Internal line between Lienz and Obersielach (AT); Project promoter: APG

3.4 Interconnection between Würmlach (AT) and Somplago (IT); Underground lines; 220 kV; Project promoter: Alpe Adria Energia S.r.l.

A further Austrian PCI project to be mentioned here belongs to the following thematic area (no corridor):

Priority thematic area 'Smart grids deployment':

10.5 ALPGRID (Austria, Italy) — An innovative integration of synergetic, mature, technology-based solutions in order to simultaneously increase the operational efficiency of the Italian and Austrian regional electricity systems; Project promoter: Verbund (leadership)

The project promoters for both 3.4 (Somplago-Würmlach) and 10.5 (ALPGRID) have applied for support from the Connecting Europe Facility (CEF). These applications, along with the projects themselves, were supported by Austria (approval outcome not yet known).

Currently, the deadline for submitting applications as a PCI project is 15 November 2018. Austrian takes an active part in the PCI process, and conducts regular exchange with the relevant partners at both national and EU level.

German-Austrian pricing zone

Since the liberalisation of the electricity markets, Germany and Austria have formed a common market zone in the wholesale electricity market. On 1 October 2018 this German-Austrian market zone was split. Austria is guaranteed a free long-term capacity of 4 900 MW of electricity. This leads to an adjustment of the Austrian electricity price index (ÖSPI). The ÖSPI is derived from EEX's energy trade price. The relevant prices are those electricity futures. Previously, the corresponding futures for the German-Austrian electricity market were used to calculate the ÖSPI. This calculation was switched for the first time in September 2018 and the electricity futures for the Austrian market are now used exclusively. The calculation system itself remains in the existing form. Tariffs with a fixed price agreement will not be adapted until the date fixed in the contract.

Gas

Austria occupies a key position in the European gas grid. The Baumgarten gas transfer facility in Lower Austria is one of the most important gas hubs in Europe. The Austrian grid operators' transmission and distribution network is over 45 951 km in length (as of 2017). In addition to the gas distribution system (high and low pressure), end consumers are also supplied by way of transit pipelines. These are pipelines of international importance, which cross Austria, but which are also used for transportation within Austria. Natural gas is transported internationally via a dense network of pipelines, stretching from Russia, through former Soviet states, Slovakia, Czechia and Austria, to destinations in western and southern Europe.

Through the 2011 Gas Act (*Gaswirtschaftsgesetz 2011*) and the gas market model introduced in 2013, an entry/exit system was implemented, the balancing group system was extended to transmission level and a virtual trading point for the settlement of all gas transactions was introduced. Every customer is either directly or indirectly (through their supplier) a member of a balancing group. In the new gas market model, the three previous control areas have been converted into market areas (Eastern, Tyrol and Vorarlberg). The Eastern market area is the only one that also has transmission pipelines. In this market area, the previous system of capacity bookings has been replaced by an entry/exit system. The entry/exit

system allows capacity at entry and exit points to be booked independently of one another and traded. The natural gas storage operators active in Austria — RAG Energy Storage GmbH, OMV Gas Storage GmbH, Uniper Energy Storage GmbH, Astora GmbH & Co. KG and GSA LLC — possess storage with a total working gas volume of approximately 8.085 bcm. This storage consists of partially depleted natural gas reservoirs in rock formations.

Coordinated network development plan

In its role as market area manager, Austrian Gas Grid Management AG is responsible for drawing up a coordinated network development plan once a year, in consultation with the transmission system operators (Gas Connect and Trans Austria Gasleitung GmbH), which must then be approved by the regulatory authority E-Control. The objectives of the coordinated network development plan are, in particular, to meet the demand for line capacity to supply end consumers while taking into account emergency scenarios, to ensure a high degree of availability of line capacity, to cover transport needs and to comply with the obligation to meet the infrastructure standard in the market area.

Projects of common interest — gas

As with the electricity sector, Austrian projects of common interest (PCIs) aim to improve market integration, address bottlenecks at borders and enable cross-border bi-directional gas flows. The process of drawing up the fourth PCI list will begin shortly; however, no deadline has yet been set for submitting an application as a PCI in the gas sector.

Because of its central geographic location, and also due to the Baumgarten gas hub, Austria is particularly affected by capacity expansion projects or new pipeline projects. The third PCI list contains the following Austrian PCIs in the gas sector:

Priority corridor ‘North-south gas interconnections in central eastern and south eastern Europe’:

6.4 Bidirectional Austrian — Czech interconnection (BACI) between Baumgarten (AT) — Reinthal (CZ/AT) — Břeclav (CZ), with capacity up to 6.57 bcm/a (The implementation of BACI as a PCI will depend on the outcome of the pilot project ‘Trading Regional Upgrade’).

6.26

6.26.1 Cluster Croatia — Slovenia — Austria at Rogatec:

Interconnection Croatia — Slovenia (Lučko — Zabok — Rogatec)

Compressor station Kidričevo, 2nd phase of upgrade (SI)

Compressor stations 2 and 3 at the Croatian gas transmission system

GCA 2015/08: Entry/Exit Murfeld (AT); Project promoter: GCA

Upgrade of Murfeld/Ceršak interconnection (AT-SI); Project promoter: GCA

Upgrade of Rogatec interconnection

PCI 6.24

Cluster phased capacity increase on the Bulgaria — Romania — Hungary — Austria bidirectional transmission corridor (BRUA) to enable 1.75 bcm/a in the 1st phase, 4.4 bcm/a in the 2nd phase, and including new resources from the Black Sea in the 2nd and/or 3rd phase:

6.24.1 1st phase, including:

Romanian-Hungarian reverse flow: Hungarian section 1st stage CS at Csanádpalota

Development of the transmission capacity in Romania from Podișor to Recas, including a new pipeline, metering station and three new compressor stations in Podișor, Bibesti and Jupa

Mosonmagyarovar compressor station (development on the Austrian side); Project promoter: GCA

In total, BRUA will link Bulgaria, Romania, Hungary and Austria over a length of 1 318 km. In the third phase, the Romanian transmission system will be extended to carry gas from the Black Sea. This could increase overall security of supply, not only for the parties involved but also for the rest of Europe, contribute to the diversification of sources and routes. In summer 2018, construction work in Romania began. The Romanian project promoter Transgaz made use of funding from the EBRD, the EIB and the CEF for this purpose. Austria supports the BRUA corridor and its design as envisaged in the third PCI list. In Austria's view, any changes to the route (as recently expressed by Hungary) should undergo a critical examination in terms of security of supply, efficiency and market situation. The final investment decision on commercial support for natural gas from the Black Sea is still pending.
Questions of security of supply and diversification of energy sources and routes will be addressed as a priority at national and EU level.

Key laws concerning market integration at federal level

2010 Electricity Industry and Organisation Act (Elektrizitätswirtschafts- und Organisationsgesetz 2010) — BGBl. I No 110/2010

The implementation of the third internal energy market package required regulations in the electricity and gas sector to be comprehensively redesigned. The aim of this Federal Act is to account for these requirements. It contains rules on the production, transmission, distribution and supply of electricity and on the organisation of the electricity industry. It also lays down rules on system use charges, on accounts and on the organisation, unbundling and transparency of the accounting done by electricity companies, as well as their other rights and obligations.

Federal Act laying down new rules for the natural gas sector (2011 Gas Act (Gaswirtschaftsgesetz 2011)) — BGBl. I No 107/2011

This Federal Act aims to account for the requirements of Directive 2009/73/EG, particularly in relation to unbundling. It lays down rules for effective unbundling of transmission networks, for ensuring free market access for suppliers and for developing capacity for new consumer installations. An 'entry/exit market model' was also created with the aim of substantially increasing the liquidity of the gas market by setting up virtual trading points.

Federal Act implementing Regulation (EU) No 347/2013 on guidelines for European infrastructure (Energy Infrastructure Act (Energie-Infrastrukturgesetz)) — BGBl. I No 4/2016

The purpose of this Federal Act is to account for the requirements of Regulation (EU) No 347/2013. The key elements of this are designating the Federal Minister for Science, Research and Economic Affairs as the competent authority (infrastructure authority), selecting the procedure for the comprehensive decision and securing the development of pipeline installations.

Federal Act on the regulatory authority for the electricity and natural gas industry (Energy Control Act (Energy-Control-Gesetz)) — BGBl. I No 110/2010

The Energy Control Act defines the responsibilities and tasks of the Austrian regulator 'Energie-Control Austria for the regulation of the electricity and gas industry' ('*Energie-Control Austria für die Regulierung der Elektrizitäts- und Erdgaswirtschaft*', or E-Control for short) as a public agency with legal personality.

Federal Act imposing a tax on the supply and consumption of electricity (Electricity Tax Act (Elektrizitätsabgabegesetz)) — BGBl. I No 201/1996

By largely exempting sustainable electricity production from the obligation to pay electricity tax and simplifying administration for electricity producers, the aim is to support domestic sustainable domestic electricity production through tax measures. Accordingly, electricity produced from renewable primary energy resources, such as photovoltaics, small hydroelectric power stations, wind generators and similar, are given a tax-exempt allowance of 25 000 kWh per year.

Federal Act supporting the construction of local and district heating and cooling pipelines (Heating and Cooling Pipeline Development Act (Wärme- und Kälteleitungsausbaugesetz)) — BGBl. I No 113/2008

This Federal Act generates CO_2 savings and increase energy efficiency through support for investment. The creation of cooling grids is designed to curb the increase in electricity consumption for air-

conditioning and to make cost-effective use of existing heat and waste heat potential, particularly on an industrial scale.

Federal Act introducing provisions for the combined heat and power sector (Combined Heat and Power Act (KWK-Gesetz)) — BGBl. I No 111/2008

The purpose of this Act is to support new high-efficiency CHP plants through investment grants, provided the plants are not already being supported by means of other State resources.

Dimension 5: research, development and competitiveness

Research and technological development play a key role in global decarbonisation and are central elements in the fundamental conversion of the energy system. Austria still has huge potential to build on past innovation success stories to develop and successfully implement innovative technologies and solutions. The following strategic objectives are in place:

- put energy research and innovation at the heart of solving societal challenges (mission orientation);
- increase the speed at which the results of research and technological development reach the market through the introduction of targeted measures (impact orientation);
- gradually increase funding for energy research and innovation;
- increase the presence of Austrian research institutes and innovation companies at global level (transnational RTI collaboration);
- thereby establishing Austria as a technology leader in energy-related areas and increasing international competitiveness.

In future, energy research and innovation will be organised around these guidelines, a fact which is characterised by an integrated perspective based on a systemic approach. System integration of the growing range of available technology and solutions, in terms of global approaches, is equally as important as the targeted development and advancement of technology and components. The current Austrian government programme established a corresponding research initiative which is open to all kinds of technology. Under this initiative, mission-oriented research and development for specific challenges in the energy system and large-scale testing of technologies and solutions under real operating conditions will be used to achieve technological leadership and boost development and implementation. In the period 2021-2030, these formats will be further developed, building on the experience previously gained.

iii. Key aspects of cross-border relevance

Due to its geographical situation (mountainous, land-locked central European country) Austria has specific characteristics, some of which have a cross-border impact on the energy and transport system. Major trans-European transit routes — both north-south and west-east — travel through Austrian territory, putting great pressure on the transport infrastructure. As well as economic opportunities, this also has negative side effects, in particular with regard to air quality and noise. In addition, significant quantities of fuel are put into tanks in Austria by cross-border transport companies and then largely used up in neighbouring countries. This effect is, in no small part, also due to the fact that diesel is cheaper in Austria than in most neighbouring countries. This has led to a significant increase in greenhouse gas emissions in Austria, as, according to the IPCC, emissions balancing is carried out in accordance with the principle of quantities sold domestically.
Austria occupies a key position in the European gas grid and is a major gas transit country. The Baumgarten gas transfer facility in Lower Austria is one of the most important gas hubs in Europe. In the electricity sector too, Austria has close links with its neighbours. In 2017, the electricity interconnection level in Austria was 15.3 %, well above the 2020 target of 10 %.

For further information see point 1.2, sub-point ii, 'Security of supply' and 'Market integration'.

iv. Administrative structures for implementing national energy and climate policy

Austria is a federal state. Via the federal constitution, legislative competence across the various sectors is shared between the Federal Government and the provinces. There are also some mixed competences. Some sectors (including energy law) follow the principle of basic legislation at federal level and implementing legislation at provincial level. The 'indirect federal administration', through which Federal tasks are handled by provincial enforcement bodies, also ensures a strong 'federalisation' of duties.

Climate policy in Austria is a classic cross-sector matter, in particular as regards the distribution of competences for climate policy measures for reducing emissions and adapting to climate change. The Federal Ministry for Sustainability and Tourism (BMNT) plays a national coordinating role with regard to climate policy. Strategic processes are managed in the same sense by the BMNT (together with other ministries where appropriate). The BMNT also assumes responsibility for reporting on climate issues to the UNFCCC Secretariat and to the European Union.
The BMNT also has key competences for implementing measures, in particular in the energy, waste management, chemicals policy and agriculture and forestry sectors, although these competences are partly shared with the provinces (in particular waste management and agriculture and forestry).

Some key competences for implementing measures, however, are completely outside of the BMNT's control, lying either with other Federal ministries (particularly transport and finance), the provinces (particularly buildings, small combustion plants and spatial planning) or the municipalities (particularly public transport and parking space management).

Not least as a consequence of the strong diversification of competences in climate policy matters, in 2011 the Federal Government (at the initiative of the then Federal Ministry of Agriculture, Forestry, the Environment and Water Management) passed a Federal Climate Protection Act. The purpose of this act is to coordinate Austrian climate policy in line with international and EU law. To this end, a National Committee on Climate Change was established, on which, alongside the competent Federal Ministries, are represented the nine provinces, social partners (employers and employee associations), the political parties represented in Parliament, economic interest groups and environmental NGOs, among others.

One of the key functions of the Climate Protection Act is to ensure a process developing climate protection measures and to lay down emission ceilings (target trajectories) in line with European legislation. The emission ceilings for the period 2013-2020 were also allocated to the emitting sectors and laid down in law.

In 2001, a regulatory authority for the electricity and natural gas industry was founded under the name 'Energie-Control Austria for the regulation of the electricity and gas industry' (E-Control). In 2011, it was converted into a public agency with legal personality (E-Control Act).

1.3. Stakeholder consultation at national and EU level — outcomes

Even in the early stages of the Climate and Energy Strategy (#mission2030), national stakeholders and the general public were fully involved by the Federal Government. In April/May 2018, and extensive public consultation was carried out. This was divided into an online public consultation (which received around 500 responses), multiple round table events with broad stakeholder participation to advance the discussion on certain topics, and a parliamentary enquiry (see below). For the mobility sector, the BMVIT and the BMNT, together with the provinces and numerous experts, held a separate stakeholder process, '*Mobilitätswende 2030*' (Mobility transition 2030).

This National Energy and Climate Plan relates directly to the strategic focus and priority areas of #mission2030. In order to draft the plan, in November 2018 the National Committee on Climate Change was consulted in accordance with the Climate Protection Act and was given the opportunity to submit a written opinion. This body comprises representatives of the following institutions and social groups:

- the relevant ministries (Sustainability, Transport/Innovation, Finance, Economic Affairs, Science, Health/Social Affairs, Justice) and the Federal Chancellery;
- parties from all nine provinces represented in the Austrian National Council (lower chamber of Parliament);
- all nine provinces;
- social partners (Economic Chamber, Chamber of Agriculture, Chamber of Labour, Trade Union Confederation);

- industry, energy and consumer information associations;
- Association of Towns and Municipalities;
- representatives of the scientific community;
- Federal Environment Agency;
- environmental protection NGOs.

i. Participation of the Austrian Parliament

During the consultation phase for the Federal Government's Climate and Energy Strategy, members of the parties represented in the Austrian Parliament were involved in the round table events (in some cases acting as chair). A parliamentary climate enquiry was also organised especially for the Climate and Energy Strategy, involving representatives of the scientific community, the provinces and civil society, among others. The political parties took the opportunity to set out their positions on climate change policy.
This draft of the National Energy and Climate Plan was drawn up with the involvement of the Austrian Parliament by way of the National Committee on Climate Change. Further parliamentary involvement in the National Energy and Climate Plan is scheduled for the first half of 2019, in order to ensure broad political participation in the process of drafting the plan.

ii. Participation of local and regional administrations

During the consultation phase for the Climate and Energy Strategy (see above), the Austrian provinces took part in the round table events and were also involved in the build-up to key aspects of the strategy. The provinces took this opportunity to set out their positions on climate change policy, also doing so through the online consultation on the strategy.

The provinces were heavily involved in drawing up this draft of the National Energy and Climate Plan through the establishment of a working group between the Federal Government and the provinces and further sub-working groups at sectoral level. All province were given the opportunity to actively participate in the (sub-)working groups and to submit concrete proposals for action. The provinces and other city and municipality interest groups (Association of Towns, Association of Municipalities) are also members of the National Committee on Climate Change and were therefore also able to submit final written opinions.

iii. Consultation with stakeholders, including social partners, and participation of civil society and citizens

During the consultation phase for the Climate and Energy Strategy (see above), social partners (employers and employee associations), industry and energy associations and civil society (in particular NGOs in the

environmental and energy sector and companies) were involved in the round table events, and to some extent took part in the online consultation, in order to communicate their concerns in writing. The general public (citizens) were also given the opportunity to participate in the online consultation (see above). This draft of the National Energy and Climate Plan was drawn up with the involvement of social partners and NGOs by way of the National Committee on Climate Change. When finalising the plan in 2019, a further consultation process with the involvement of citizens will take place.

In order to discuss measures on mobility, which is a particularly challenging sector, 'future conferences' were held in all nine provinces as part of the '*Mobilitätswende 2030*' stakeholder process, with widespread participation of local and regional administrations. Common guiding principles were adopted by the Federal Government, provinces, cities and municipalities.

iv. Consultation with other Member States

For resource-related reasons, no bilateral consultation with other Member States has yet taken place as part of the process of drawing up the draft National Energy and Climate Plan. These activities will be introduced when drawing up the final plan in 2019.

v. Iterative consultation process with the European Commission

This process will take place in 2019.

1.4. Regional cooperation in drawing up the plan

i. Elements of coordinated planning with other Member States

For resource-related reasons, only rudimentary regional cooperation has taken place as part of the process of drawing up the draft National Energy and Climate Plan. During autumn 2018, Austria took part in meetings of the Pentalateral Forum (Belgium, France, Germany, Luxembourg, the Netherlands, Austria and Switzerland) and in a conference with eastern neighbours (Slovakia, Hungary, Czechia and Poland).

ii. Consideration of the results of regional cooperation in the plan

The results will be taken into consideration in the final plan by the end of 2019.

2. NATIONAL TARGETS AND OBJECTIVES

2.1. Dimension 1: decarbonisation

2.1.1. GHG emissions and carbon sequestration

i. Austria's objective under the Effort Sharing Regulation

As required by Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 ('effort sharing'), Austria aims to reduce its greenhouse gas emissions in non-ETS sectors by 36 % by 2030 compared to 2005.

In 2016, Austrian greenhouse gas emissions in the non-ETS sector were approximately 50.6 million tonnes of CO_2 equivalent (mt CO_2eq). The target for 2030 is 36.4 mt CO_2eq (a reduction of around 28 %). The EU Effort Sharing Regulation requires a linear target trajectory to be maintained between 2021 and 2030. All non-ETS sectors will contribute to achieving the target. The focus is on the transport and building sectors, which have the biggest potential for reduction. This reduction is to be achieved by introducing measures in Austria that will set us well on the way towards decarbonisation in accordance with the Paris Agreement on climate change.

Transport is currently the most polluting sector, accounting for 45 % of overall (non-ETS) emissions. The plan is to reduce emissions by approximately 7.2 mt CO_2eq to around 15.7 mt CO_2eq (currently 22.9 mt CO_2eq) in order to achieve the overall target by 2030. Austria's strategic approach to achieving low-emission mobility in the future is to follow the principle of 'Avoid (the use of unnecessary transport), Shift (to efficient modes of transport) and Improve (the technologies used)'. This sets a pathway which is compatible with the government programme's goal of fossil-free mobility by 2050 and positions Austria as a leader in electromobility and the expansion of public transport.

The building sector also has huge potential for reduction, especially through thermal renovation, which will create important economic momentum for the domestic trade, by shunning fossil fuels in new buildings and by switching to renewable energy sources and high-efficiency district heating in the existing building stock. This will enable emissions to be reduced in a socially and economically sustainable manner by around 3 mt CO_2eq to around 5.1 mt CO_2eq (2016: 8.1 mt CO_2eq) by 2030.

In the industry sector (excluding ETS installations), the energy efficiency measures pushed through, together with as broad a switch to renewable energy sources or power-based processes as possible, should boost innovation.

In the agricultural sector, emission reductions are a particularly difficult issue. Greenhouse gas reductions are feasible in particular through measures related to animals (fertiliser management, feeding strategies, farming systems) and tillage (humus development and stabilisation / carbon storage, erosion control) and by maintaining permanent grassland, productive arable land and wetlands. In order to achieve climate and energy targets, measures to increase the production and use of renewable energy (agricultural biogas installations, waste heat utilisation, renewable fuels, retrofitting engines) and to increase operational energy efficiency will be required. In order to successfully put reduction measures into practice, awareness-raising activities (training, information, demonstration, consultation) must also continue and be expanded.

As in important measure in Austria's Climate and Energy Strategy, the national bio-economy strategy makes a significant contribution towards achieving climate targets. The bio-economy has a double impact on the climate: On the one hand, carbon sequestration in renewable raw materials leads to a reduction in atmospheric levels, while on the other hand, bioenergy is one of the pillars of the decarbonisation of the energy system. Bio-based products also carry the advantage that they can be thermally recovered at the end of their life cycle, thereby also allowing for climate-friendly disposal.

In agricultural areas, land sealing and changes in land use lead to a conflict of objectives with agricultural production. The continuous and extremely high loss of soil in Austria (currently around 12 ha per day, the target being 2.5 ha per day) makes it clear that, as well as productive arable and grassland areas receiving better protection from spatial planning instruments, there is also a need for more efficient use of source streams from forestry and agriculture and regional circular models. Cross-sector output from the agricultural and forestry sector arising from the increased provision of renewable raw materials must in any case provide an economic and environmental benefit for the sector.

A bio-economy strategy will address all key areas of action to reduce the use of fossil raw materials. The efficient and sustainable use of biogenic raw materials opens up a diverse range of available alternatives for Austria as a location for business. Renewable raw materials from agriculture and forestry and biogenic residues from production processes in the Austrian economy can form the basis for high-quality and innovative products, innovative services and a significant reduction in greenhouse gas emissions and resource consumption. The bio-economy will therefore reduce dependence on non-renewable and fossil raw materials, promote innovation and economic development, create new jobs and support social changes based on sustainability.

In the waste economy and as far as fluorinated gases (F-gases) are concerned, EU law (F-Gas Regulation) and Austrian measures (implementation of the Circular Economy Package) will reduce emissions and ensure international targets are met.

Most greenhouse gas emissions are energy-related and are generated by burning fossil fuels. The best way of driving down greenhouse gas emissions is to increase energy efficiency and switch to renewable energy sources. A mix of measures to reduce greenhouse gases, develop renewable energy and improve energy efficiency is vital in ensuring targets are achieved efficiently.

ii. Austria's obligations under the Land Use Regulation

Agriculture and forestry in Austria are an important source of renewable raw materials and energy sources (and their waste products). In this context, forests play a particularly important role in the global climate system and in achieving the long-term goals of the Paris Agreement. Now that land use has been included in the EU climate targets for 2030 (LULUCF Regulation), emission and carbon storage from agriculture and forestry are now firmly embedded in the objectives of the Effort Sharing Regulation (see above). For accounting purposes, various arrangements have been put in place.

For the accounting of utilised agricultural area (arable land and grassland), but also land used for other purposes, such as settlements, infrastructure, etc., the emission balance for the period 2005-2009 is taken as a basis.

For managed forest land, a reference value based on forest management 2000-2009 is used. If, on the basis of the respective accounting rules, a positive balance is recorded for the entire land use sector, credits for Austria amounting to 250 000 t CO_2 per year can be counted towards the national effort sharing target, if necessary. If, on the other hand, a negative balance is recorded, the effort sharing target is increased.
A particular challenge for the measures in this sector is to maintain productivity and above all to further increase the sustainable harvesting of timber in the forestry sector, and also to support the stability and further development of biogenic carbon pools by increasing biomass in forests and maintaining and, where possible, increasing humus-rich arable land.

In future, therefore, a stronger focus will be placed on an environment and climate policy framework under the EU's future agricultural policy and instruments.

Measures that affect the land use sector will help to achieve the national target for Austria by 2030 in keeping with Article 4 of the LULUCF Regulation. A stronger focus on an environment and climate policy framework under the EU's future agricultural policy and instruments will have a supporting influence moving forward.

iii. Other national targets and objectives in line with the Paris Agreement and the long-term strategy, and sector targets

'The Federal Government wants to set the ball rolling for the Austrian economy and for Austrian society in terms of infrastructure development, security of energy supply, the development of new market models, innovation, research and development, with the aim of turning the energy system into a modern, low-input, carbon-free system by 2050. [...] Austria is hoping to achieve a completely carbon-free energy sector by 2050.' (extract from #mission2030).

The implementation of a decarbonisation pathway by 2050 is a long-term process. A technologically open

framework tailored to the pathway needs to be put in place which is in keeping with European targets and takes account of competition. For companies and installations that are energy intensive yet highly efficient by international standards, comprehensive carbon leakage protection forms an important basis for economic competitiveness.

Further clarifications on the long-term objectives at EU level and in Austria will be provided as part of the long-term strategy, which is to be presented on 1 January 2020 in accordance with the Regulation on the governance of the Energy Union and climate action.

2.1.2. Renewable energy

i. Austria's share of renewable energy by 2030 and indicative target trajectory from 2021 to 2030

Austria's objective is to increase the ratio of renewable energy to gross final energy consumption to 45-50 % by 2030. In 2016, the share was 33.5 %, meaning that the interim target of 34 % by 2020 is already in sight.

Another objective is to generate 100 % of total electricity consumption (national balance) from domestic renewable energy sources by 2030. This expansion takes into account the anticipated increase in electricity consumption, as electricity from renewable sources in Austria will be used in the mobility, building and production sectors to replace imported fossil fuels. It also relies on future trends in digitalisation, decentralisation and participation.

Electricity trading on the European internal market will still have an important part to play. Austria's objective is to balance imported and exported electricity and to meet demand with domestic renewable energy.

Balancing energy and control energy, the flexibility needed for grid operation and assured capacity will continue to be provided, where technically and economically feasible, in order to guarantee security of supply. Balancing energy and control energy for the purpose of stabilising grid operations are not included when calculating the 100 % renewable energy supply.

For reasons of resource efficiency, privately generated electricity in the goods production sector should continue to be generated through the low-input, efficient use of by-products on company premises (e.g. in the steel or paper industry), including from non-renewable energy sources. These are generally firms that are required to participate in emissions trading and to submit certificates for their CO_2 emissions. This means that the above quantities of electricity need not be offset by additional exports.

Although renewable energy is already very important, the heat market still depends heavily on imported fossil fuels. In order to mitigate that dependency, the use of biomass, solar heat and ambient heat will be developed by 2030, both as direct heating and as district heating. In addition, the existing contribution of heat from waste management and industrial waste heat will be maintained or increased. The details will

be set out in a National Heating Strategy in liaison with the regions and in consultation with numerous other stakeholders.
A large proportion of natural gas will be replaced in future by renewable methane. Greening the gas, i.e. using biomethane from biogenic residues and waste, hydrogen and synthetic methane from renewable power sources based on a significantly improved system of proof of origin, are key components in the development of a sustainable energy system.

A constant absolute quantity of sustainably produced biofuels will account for a relatively higher percentage compared to fossil fuels, at least in the period up to 2030, due to the increasing market penetration of e-mobility.

Table 4: Indicative target trajectory for renewable energy

Current situation	Target	Indicative target trajectory			Target
2016	2020	2022	2025	2027	2030
(Share of renewable energy in gross final energy consumption)					
		min. 18 % improvement 2020-2030	min. 43 % improvement 2020-2030	min. 65 % improvement 2020-2030	
33.5 %	34 %	36-36.9 %	38.7-40.9 %	41.2-44.4 %	45-50 %

ii. Estimated trajectories for the sector-specific share of renewable energy in gross final consumption of energy in the period 2021-2030 in the electricity, heating and cooling and transport sectors

According to the RED I calculation method, in 2016 renewable electricity generation was around 51.95 TWh. This corresponds to 71.75 % of domestic electricity consumption in 2016, which stood at 72.4 TWh.

The objective is to generate 100 % of total electricity consumption (national balance) from domestic renewable energy sources by 2030. The Austrian Climate and Energy Strategy #mission2030 sets out additional reasoned exemptions to this: Balancing energy and control energy for the purpose of stabilising grid operations are not to be included when calculating the 100 % target, and privately generated electricity from fossil energy sources in the goods production sector will continue to be possible for reasons of resource efficiency. According to calculations, in 2030 these will amount to around 6 TWh

(5.75 TWh from goods production and 0.5 TWh grid-stabilising balancing and control energy).

For the year 2030, following expert consultation domestic and taking into account the full range of current national scenarios, domestic electricity consumption is anticipated to be in the region of 80-85 TWh. Therefore, taking the exemptions into consideration, in order to achieve the objective, 74-79 TWh of electricity must be generated from renewable sources in 2030, constituting a net increase of 22-27 TWh. 'Net' signifies that existing installations which will be decommissioned before 2030 also need to be replaced.

The estimates of the exemptions and of the gross inland energy consumption in 2030 were drawn up in accordance with the targets set out in the Austrian Climate and Energy Strategy #mission2030 by the Federal Ministry of Sustainability and Tourism in consultation with external experts (Austrian Energy Agency, E-Control, Federal Environmental Agency).

For the heating and cooling and transport sectors, no estimated target trajectories can be provided at this stage. This will require further detailed work, in particular the development of a 'heating strategy' in collaboration with the provinces, and the creation of a 'With Additional Measures' scenario (WAM, first half of 2019). In any event, the measures in the Federal Government's integrated Climate and Energy Strategy (#mission2030) target a significant increase in e-mobility (initially in cars and light goods vehicles) and a gradual replacement of heating systems based on fossil fuels (in particular heating oil) with renewable energy sources, heating pumps and efficient district heating (see Chapter 3).

iii. Estimated trajectories by renewable energy technology that the Member State projects to use to achieve the overall and sectoral trajectories for renewable energy from 2021 to 2030, including expected total gross final energy consumption per technology and sector in Mtoe and total planned installed capacity (divided by new capacity and repowering) per technology and sector in MW

At present, no estimates can be made. Further information on this point will be provided once the 'With Additional Measures' scenario is available (WAM, first half of 2019).

iv. Estimated trajectories for bioenergy demand (disaggregated between heat, electricity and transport) and bioenergy supply (by raw materials and sources, distinguishing between domestic production and imports)

At present, no estimates can be made. Further information on this point will be provided once the 'With Additional Measures' scenario is available (WAM, first half of 2019).

v. Other national development paths and objectives, where available

Development paths related to the supply and use of renewable energy sources are largely determined by

the design of the future incentive scheme. In particular, this concerns the Renewable Energy Expansion Act from 2020 onwards and the development of grid infrastructure and storage facilities. The corresponding measures are set out in detail in Chapter 3 of the Plan. Other objectives are in place which support and complement the renewable energy targets:

Evaluation of all incentive and support schemes

A list of subsidies that run counter to climate and energy targets will be prepared by June 2019 by the Federal Ministry of Finance (BMF), in liaison with the BMNT and the BMVIT. This list will be used as the starting point for abolishing counterproductive incentives and funding.

Education and awareness-raising for a sustainable future

- The aim is for households to play an active role in the energy transition. Digitalisation plays an important role in this area, above all by enabling consumers to make active use of new services and products.
- Public sector bodies serve as a valuable model when it comes to public procurement. The best bidder principle will therefore be applied as standard in climate- and energy-relevant procurement by public sector bodies.

Phasing out coal

Austria has set itself the objective of promoting a rapid phase-out of coal. Austria's energy supply companies are already planning to phase out of coal-to-electricity conversion in the next few years. It is important to further accelerate the process of phasing out electricity generation from coal in Austria.

Bio-economy

The bio-economy is an economic concept which aims to replace fossil resources (raw materials and energy sources) with sustainable raw materials in as many areas and applications as possible. It covers all industrial and economic sectors that produce, handle, process or use biological resources. In order to move towards achieving the knowledge-based bio-economy with the involvement of the relevant stakeholders and using the full range of policy instruments, as part of #mission2030 the Federal Government committed to creating an Austrian bio-economy strategy. The Austrian bio-economy strategy will be a cornerstone of the Climate and Energy Strategy.

Nuclear-free decarbonisation

Austria will consistently defend this position at all levels and will lobby for no more funding for nuclear energy. Austria will therefore continue to fight against the use of nuclear energy at European and international level and to push for continual improvements to nuclear safety.

Shift to zero- and low-emission vehicles

For new registrations, Austria has a clear objective to shift the focus to zero-emission cars and light goods vehicles by 2030. For lorries and buses, specific incentives are planned to help significantly increase the

number of zero-emissions vehicles by 2040.

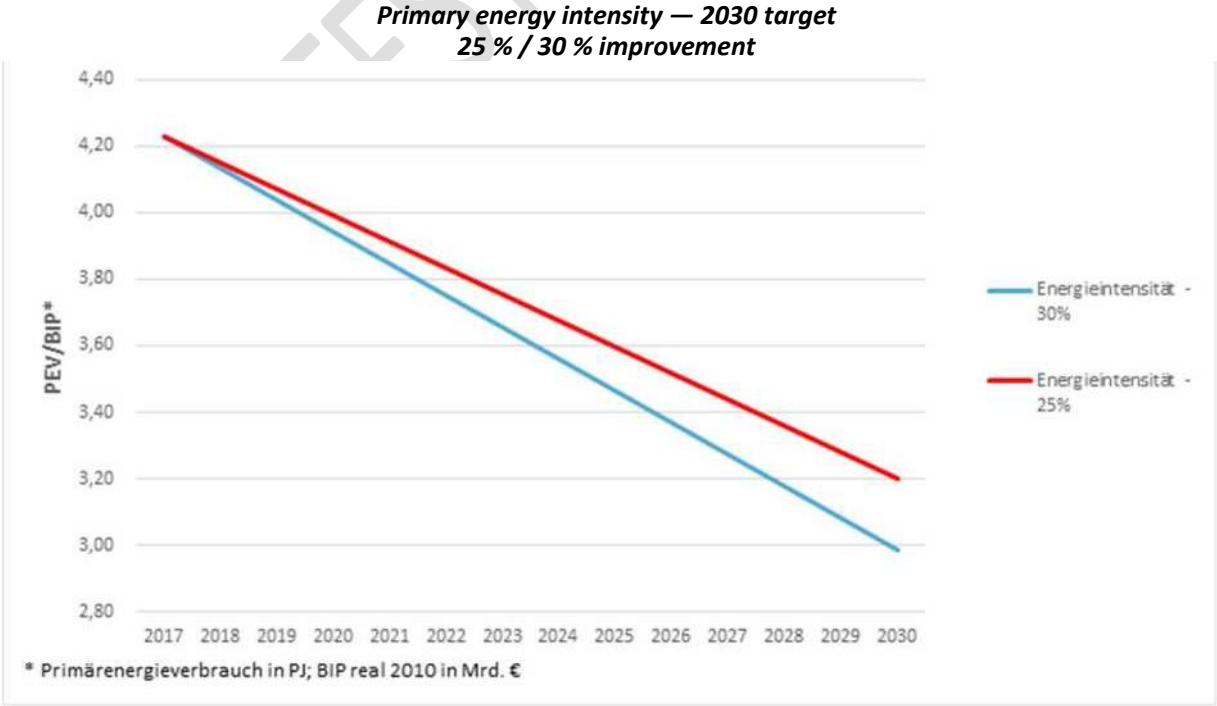
2.2. Dimension 2: energy efficiency

i. Austria's indicative national contribution to the EU energy efficiency target, including indicative development path 2021-2030 and cumulative savings 2021-2030 pursuant to Directive 2012/27/EU

Energy efficiency measures are among the best economic measures for preventing greenhouse gas emissions and are high on the agenda in Austria, as well as being a recurring theme of the energy union ('energy efficiency first' principle). However, energy efficiency measures may exacerbate what are occasionally long amortisation periods in business. Core measures, such as the switch to e-mobility and increased renovation rates, will increase energy efficiency (by a factor of 3 for e-mobility) with no loss of prosperity.

The Energy Efficiency Directive (EED 2012/27/EU) as amended in 2018 under the Clean Energy Package provides for an EU energy efficiency target of 32.5 % for 2030. As part of the Federal Government's Climate and Energy Strategy (#mission2030), Austria set itself the target of improving primary energy intensity by 25-30 % compared to 2015. If primary energy demand exceeds 1 200 petajoules (PJ) by 2030, the excess energy will have to be covered by energy from renewable sources. As the ratio of renewable energy to consumption and the greenhouse gas emission targets are fixed, if energy consumption increases, commensurately more renewable energy will have to be used.

Figure 6: indicative target trajectory



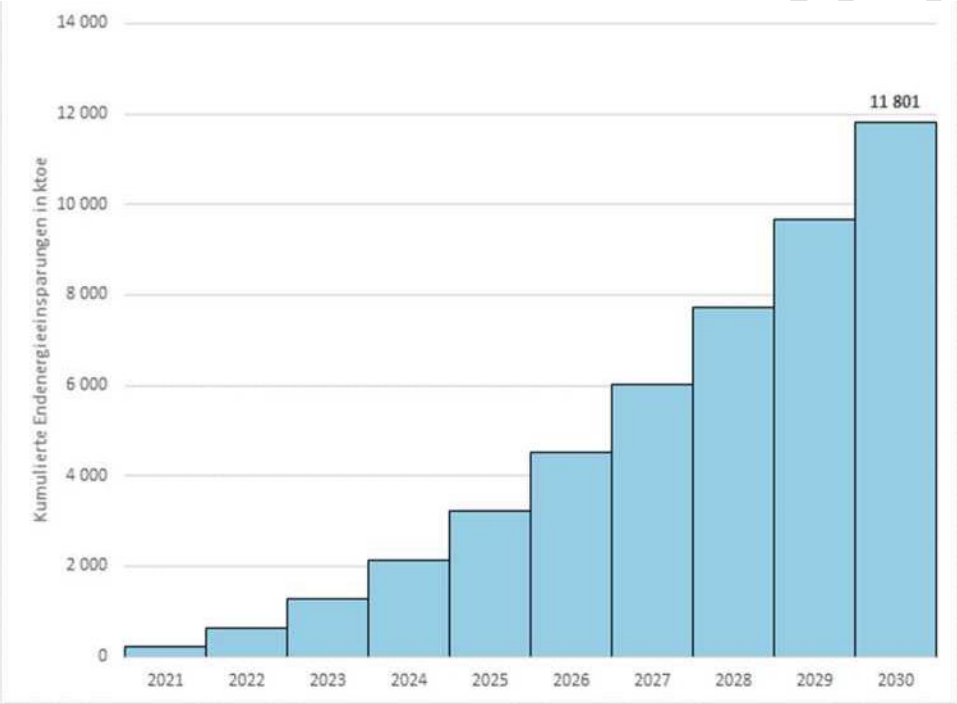
Source: BMNT

PEV/BIP	PEC/GDP
Energieintensität – 30%	Energy intensity — 30 %
Energieintensität – 25%	Energy intensity — 25 %
Primärenergieverbrauch in PJ; BIP real 2010 in Mrd. €	Primary energy consumption in PJ; real GDP in 2010 in billion EUR

Figure 6 shows the primary energy intensity target from 2017 to 2030. The target for 2030 is to improve primary energy intensity by 25-30 % compared to the reference year 2015.

Figure 7: cumulative savings 2021-2030 pursuant to Directive 2012/27/EU

Cumulative energy savings for the period 2021-2030



Source: BMNT

Kumulierte Endenergieeinsparungen in ktoe	Cumulative final energy savings in ktoe

Figure 7 shows the cumulative saving from 2021 to 2030 pursuant to Directive 2012/27/EU. The basis for the calculation (average over the most recent three-year period prior to 1 January 2019) is the final energy consumption of 23 716 ktoe minus own production/consumption. 0.8 % therefore corresponds to a value of 189 ktoe per year. This results in a cumulative saving in the period 2021-2030 of approximately 10 404 ktoe.

Table 5: Absolute values — 30 % improvement in energy intensity

30 % scenario	2020			2021			2030			
	PEC/GDP	**PJ**	**Mtoe**	**PEC/GDP**	**PJ**	**Mtoe**	**PEC/GDP**	**PJ**	**Mtoe**	**ktoe**
Primary energy intensity (PJ)	3.79			3.7			2.99			
Primary energy consumption					1 282	31		1 184	28	
Final energy consumption[13]					1 068	26		986	24	
Cumulative energy savings								494	12	11 801

[13] In order to calculate final energy consumption in 2021 and 2030, a quotient of 0.83333 was used. This value corresponds to the value of the quotient for calculating the primary energy demand, which was also been notified for the implementation of Directive 2012/27/EU for the year 2020. In order to estimate the primary energy demand in Austria, assuming that the final energy consumption target of 1 100 PJ for 2020 will be reached, a quotient of 1.2 (*(gross inland energy consumption — non-energy consumption) / final energy consumption*) is assumed for 2020. This value was calculated on the basis of developments in recent years and assuming a slight improvement in efficiency in the conversion, transport and distribution of energy.

Table 6: Absolute values — 25 % improvement in energy intensity

25 % scenario	2020			2021			2030			
	PEC/GDP	**PJ**	**Mtoe**	**PEC/GDP**	**PJ**	**Mtoe**	**PEC/GDP**	**PJ**	**Mtoe**	**ktoe**
Primary energy intensity (PJ)	3.79			3.7			3.20			
Primary energy consumption					1 318	31		1 268	30	
Final energy consumption[13]					1 098	26		1 057	25	
Cumulative energy savings								494	12	11 801

Tables 5 and 6 provide an overview of the absolute values for 2020 (follow up) and the projected values for 2021 and 2030, assuming 1.5 % economic growth[14] and an improvement in primary energy intensity of 25 % and 30 % respectively in 2030.

ii. Indicative milestones (2030, 2040 and 2050) under the long-term renovation strategy, including savings and area to be renovated

Under Article 2a(2) of the Directive on the energy performance of buildings, in its long-term renovation strategy, each Member State must set out a roadmap with measures and domestically established measurable progress indicators, with a view to the long-term 2050 goal of reducing greenhouse gas emissions in the Union by 80-95 % compared to 1990, in order to ensure a highly energy efficient and decarbonised national building stock and in order to facilitate the cost-effective transformation of existing buildings into nearly zero-energy buildings. The roadmap must include indicative milestones for 2030, 2040 and 2050, and specify how they contribute to achieving the Union's energy efficiency targets in accordance with Directive 2012/27/EU.

14 http://www.statistik.at/web_de/statistiken/wirtschaft/volkswirtschaftliche_gesamtrechnungen/bruttoinlandsprodukt_und_hauptaggregate/jahresdaten/index.html

The renovation strategy will be prepared at national level and submitted to the European Commission by 10 March 2020 in accordance with Article 46(1) of the Regulation on the Governance of the Energy Union and Climate Action.

iii. Other national contributions (long-term, sectoral) where applicable

Under Article 4(4) [*sic*] of the Governance Regulation in conjunction with Article 5(6) of the Energy Efficiency Directive 2012/27/EU, the gross conditioned floor area in government buildings that does not meet the minimum overall efficiency requirements, or the annual energy savings to be achieved from 2021 to 2030, must be indicated. When calculating the energy savings target, it should be borne in mind that the energy savings achieved through energy efficiency measures must correspond to a renovation rate of 3 % of the gross conditioned floor area.

These values were ascertained for the 2014-2020 commitment period and should be updated for the new period 2021-2030. Current data on the gross conditioned gross floor area will not be available until 2021. Estimates of the floor area and the resulting energy savings will be prepared for the final NECP.

2.3. Dimension 3: security of supply

i. National objectives with regard to diversifying energy sources and supply from third countries in order to increase the resilience of regional and national energy systems

The existing grid infrastructure, power plant capacity and domestic energy resources mean that Austria has a high level of security of supply. The top priority in the transformation of the energy system is to maintain that high level of security of supply. The objective is to strengthen the security of supply and become less dependent on imported energy. To achieve this, Austria aims to further develop domestic (especially renewable) energy sources. This includes the objective of generating 100 % of total electricity consumption (national balance) from domestic renewable energy sources, with certain justified exemptions (see point 2.1.2, sub-point i).

On the European stage, Austria is committed to further diversification of energy imports, coordinated at EU level, and to improved international coordination in crisis situations.

ii. Where applicable, national objectives with regard to reducing energy import dependency from third countries, for the purpose of increasing the resilience of regional and national

energy systems

The objective of promoting the development of renewable energy, and above all renewable electricity, provides an opportunity to increase the scale of decentralised domestic energy supply and strengthen regional supply concepts. The development of renewable energy in the electricity sector will also be instrumental in achieving the objective of eliminating dependency on imports by 2030 (see also point 2.3, sub-point i).

iii. National objectives with regard to increasing the flexibility of the national energy system, in particular by means of deploying domestic energy sources, demand response and energy storage

Increasing the flexibility needed for grid operation

With a target of a 100 %-balanced power supply from renewable energy in 2030, sufficient balancing and control energy must be available and the flexibility needed for grid operation must be maintained at all times so that this can be achieved economically and ecologically. High-efficiency combined heat and power plants (CHP plants) needed to maintain the power and heat supply, especially in urban areas, are particularly important here, as are storage and pumped storage facilities.

Storage and infrastructure

More investment in storage infrastructure (from short-term storage up to seasonal storage) and transmission and distribution networks will be made which is adapted to increased demand.

Maintaining efficient existing installations

Optimal use will be made of existing efficient plants in line with climate and energy targets. The economic investments already made in power lines, storage facilities and power plants will make a proactive contribution to the transformation of the energy system.

2.4. Dimension 4: internal energy market

2.4.1. Interconnectivity of the electricity grid taking into account EU interconnectivity targets

In 2017, the electricity interconnection level in Austria was 15.3 %, already above the EU's 2030

target of 15 %. There is therefore no explicit interconnectivity target for 2030 in Austria.

2.4.2. Development of energy transmission infrastructure in the context of the Energy Union, including Projects of Common Interest where applicable

i. Key electricity and gas transmission infrastructure projects, and, where relevant, modernisation projects, that are necessary for the achievement of objectives and targets under the five dimensions of the Energy Union Strategy

Our infrastructure must allow for new developments on the energy market, such as decentralised production, new storage technologies and digitalisation. This will be achieved through socially and environmentally friendly development and by modernising the network infrastructure. The planned measures need to be environmentally and eco-friendly and put an end to soil-sealing and the impact on the man-made environment and natural habitats. The aim is also to accelerate and simplify licensing procedures and reduce the level of bureaucracy involved, in line with civil rights and the relevant EU legislation.
The following cornerstones are to be taken into account:

- Synchronise grid development with the development of renewable energy
  The investments made by grid operators make them key enablers for investments in renewable energy. Grid development and the development of renewable energies must take place systemically. Synchronicity and overall planning will bring about security of supply and planning security, as well as *saving costs*.
- Safeguard reserve capacity
  Reserve capacity should be safeguarded in a cost-efficient manner through the market, e.g. by putting capacity out to tender by all potential market operators.
- Facilitate local networks and storage facility operators
  In order to strengthen the market, regulatory barriers to local initiatives in the production, distribution and storage of electricity and heat should be gradually eliminated.
- Use waste heat
  Aside from supplying district heat from various renewable energy sources (biomass, geothermal energy, solar thermal energy, photovoltaics, etc.) and combined heat and power, storage of waste heat from production processes will also be vital.

In addition, the third PCI list contains the following Austrian PCIs in the electricity, gas and oil sectors:

Electricity

Priority corridor 'North-south electricity interconnections in western Europe':

2.18. Capacity increase of hydro-pumped electricity storage in Kaunertal, Tyrol; Project promoter: TIWAG

Priority corridor 'North-south electricity interconnections in central eastern and southern Europe':

Cluster Austria — Germany, including the following PCIs:

3.1.1 Interconnection between St Peter (AT) and Isar (DE) (380 kV 'Germany line'); Project promoter: APG / TenneT

3.1.2 Internal line between St Peter and Tauern (AT) (380 kV 'Salzburg line'); Project promoter: APG

3.1.4 Internal line between Westtirol and Zell-Ziller (AT) (380 kV); Project promoter: APG

3.2.2 Internal line between Lienz and Obersielach (AT); Project promoter: APG

3.4 Interconnection between Würmlach (AT) and Somplago (IT); Underground lines; 220 kV; Project promoter: Alpe Adria Energia S.r.l.

Priority thematic area 'Smart grids deployment':

10.5 ALPGRID (Austria, Italy) — An innovative integration of synergetic, mature, technology-based solutions in order to simultaneously increase the operational efficiency of the Italian and Austrian regional electricity systems; Project promoter: Verbund (leadership)

Gas

Priority corridor 'North-south gas interconnections in central eastern and south eastern Europe':

6.4 Bidirectional Austrian — Czech interconnection (BACI) between Baumgarten (AT) — Reinthal (CZ/AT) — Břeclav (CZ), with capacity up to 6.57 bcm/a (The implementation of BACI as a PCI will depend on the outcome of the pilot project 'Trading Regional Upgrade').

6.26

6.26.1 Cluster Croatia — Slovenia — Austria at Rogatec:

Interconnection Croatia — Slovenia (Lučko — Zabok — Rogatec)

Compressor station Kidričevo, 2nd phase of upgrade (SI)

Compressor stations 2 and 3 at the Croatian gas transmission system

GCA 2015/08: Entry/Exit Murfeld (AT); Project promoter: GCA

Upgrade of Murfeld/Ceršak interconnection (AT-SI); Project promoter: GCA

Upgrade of Rogatec interconnection

6.24

Cluster phased capacity increase on the Bulgaria — Romania — Hungary — Austria bidirectional transmission corridor (BRUA) to enable 1.75 bcm/a in the 1st phase, 4.4 bcm/a in the 2nd phase, and including new resources from the Black Sea in the 2nd and/or 3rd phase:

6.24.1 1st phase, including:

Romanian-Hungarian reverse flow: Hungarian section 1st stage CS at Csanádpalota

Development of the transmission capacity in Romania from Podișor to Recas, including a new pipeline, metering station and three new compressor stations in Podișor, Bibesti and Jupa

Mosonmagyarovar compressor station (development on the Austrian side); Project promoter: GCA

In total, BRUA will link Bulgaria, Romania, Hungary and Austria over a length of 1 318 km. In the third phase, the Romanian transmission system will be extended to carry gas from the Black Sea. This could increase overall security of supply, not only for the parties involved but also for the rest of Europe, contribute to the diversification of sources and routes. In summer 2018, construction work in Romania began. The Romanian project promoter Transgaz made use of funding from the EBRD, the EIB and the CEF for this purpose. Austria supports the BRUA corridor and its design as envisaged in the third PCI list. In Austria's view, any changes to the route (as recently expressed by Hungary) should undergo a critical examination in terms of security of supply, efficiency and market situation. The final investment decision on commercial support for natural gas from the Black Sea is still pending.

Oil

Priority Corridor 'Oil supply connections in central eastern Europe' ('OSC'):

9.2: Bratislava — Schwechat — Pipeline: pipeline linking Schwechat (Austria) and Bratislava (Slovak Republic)

ii. Where applicable, main infrastructure projects envisaged other than Projects of Common Interest (PCIs)

Key 'electricity line' projects in the 2018 Network Development Plan (NDP)

Weinviertel grid region ('Replacing the APG Weinviertel line')

- In order to integrate renewable energy sources into the grid, the transmission network infrastructure in the eastern Weinviertel must be strengthened (replaced) and substations must be developed. To this end, plans are in place for a new 110 kV grid support system in the northern Weinviertel, in the form of the Zaya substation, and a new 220 kV line connection to the Austrian border. With the completion of the 380 kV line, the old 220 kV line from Bisamberg to the Austrian border is to be dismantled.
- The replacement of the APG Weinviertel line will result in a 380/110 kV grid system by 2022.

Upper Austria central region

- Replacement of the current 110 kV supply lines with 220 kV lines from Ernsthofen/Kronstorf to the motorway intersections and 220/110 kV expansion of the Pichling substation by 2026. The 220/110 kV Wegscheid grid support system is then planned to enter into service in 2028.
- Separation of the 110 kV network in the Upper Austria central region into two sub-networks, on the basis of the increased short-circuit power and so that the 110 kV protection system can continue to operate in a safe and reliable way in the interests of optimum security of supply.

220 kV line St Peter — Hausruck — Ernsthofen (general renovation)

- General renovation and laying of modern cabling along the existing 111 km route. Implementation began in April 2018.

2.4.3. Market integration

i. National objectives related to other aspects of the internal energy market such as increasing system flexibility, in particular related to the promotion of competitively determined electricity prices in line with relevant sectoral law, market integration and coupling, aimed at increasing the tradeable capacity of existing interconnectors, smart grids, aggregation, demand response, storage, distributed generation, mechanisms for dispatching,

re-dispatching and curtailment, and real-time price signals, including a time frame for when the objectives shall be met

Successful transformation of the energy system depends on support for price incentives, energy efficiency and use of renewable energy sources. Competitive pricing mechanisms that take account of tax, duty and incentives will be used to minimise market distortions. Households, commerce and industry will be able to participate actively in the energy market and to react to price signals.

Market economy energy system

If the electricity supply is to be based on renewable energy sources by 2030, functioning, cross-border, liquid wholesale markets and common price zones are needed in order to generate the necessary price signals. The required investments will need to be financed primarily via the market. Market-distorting incentives that conflict with the decarbonisation pathway must be minimised, and undistorted, competitive pricing mechanisms must be (re-)established.

The following cornerstones will need to be taken into account when redesigning the energy system:

- *Ensuring grid stability*
- *Dividing infrastructure costs fairly*
  The cost of maintaining and developing the network infrastructure needed to transform the energy system must be divided fairly between all network users, even in cases of increasing private generation.
- *Sending correct price signals to market operators*
  In order to trigger investment and increase flexibility, the market should send out the right price signals. That means permitting price peaks ('scarcity prices') and limiting intervention in pricing mechanisms. Negative wholesale prices should be avoided in line with European practice.
- Improving the internal energy market and increasing flexibility

For storage facilities, see point 2.3, sub-point ii.

ii. National objectives (where available) on non-discriminatory access for renewable energy, demand response and storage, including an indicative time frame for when the objectives are to be met

See point 2.4.3, sub-point i. Beyond that, no specific objectives are currently in place.

iii. National objectives (where available) with regard to ensuring that consumers participate

in the energy system and the benefits from self-generation and new technologies, e.g. smart meters

Smart meter roll-out 2019

In Austria, in December 2017, the 2012 Ordinance on the introduction of smart meters (*Intelligente Messgeräte-Einführungsverordnung*, IME-VO) was amended. The objective is to provide smart meters to at least 80 % of Austrian electricity customers by the end of 2020 and, where technically feasible, to at least 95 % by the end of 2022.

iv. National objectives with regard to ensuring electricity system adequacy, as well as for the flexibility of the energy system with regard to renewable energy production, including a time frame for when the objectives are to be met

See objectives in point 2.4.3, sub-point i. Beyond that, no specific objectives are currently in place.

v. National objectives (where available) to protect energy consumers and improve the competitiveness of energy traders

There are no explicit objectives in this area that go beyond general consumer protection objectives.

2.4.4. National objectives to prevent energy poverty (including a time frame for implementation), where applicable

A key objective of the Austrian Federal Government's Climate and Energy Strategy is social affordability. Efforts must be made to ensure that all sections of the population can meet their basic energy and mobility requirements. Consumers should be able to manage this now and in future at a socially affordable cost. High energy costs put low-income households in particular at risk of poverty. It is important to incorporate energy poverty into climate and energy targets. Economists, politicians and civil society can work together to find social solutions to help mitigate hardship cases. Maximum transparency in the form of easy and fast access to information and further training should be guaranteed in order to increase social acceptance.

Definition of energy poverty

> 'A household is considered energy poor if its income is below the at-risk-of-poverty threshold and, at the same time, it has to cover above-average energy costs.'

In principle, this definition[15] is one of several possible approaches to the issue of energy poverty. The definition chosen here has already been used in several projects in the energy sector in cooperation with Statistics Austria, and has been discussed during meetings on energy poverty and during a consultation process. It is also the subject of the recent publication '*Studie zur Eruierung einer Definition von Energiearmut in Österreich aus Sicht der sozialwirtschaftlichen und energiewirtschaftlichen Praxis*'[16] [Study establishing a definition of energy poverty in Austria from the perspective of socio-economics and the energy sector] by the Vienna University of Economics and Business on behalf of the Federal Ministry of Labour, Social Affairs, Health and Consumer Protection (BMASGK).

Key analysis results[17]

In an 'energy-poor'[18] household, household energy consumption (heating, hot water, cooking, overall use of electrical energy and other energy uses for the building) is more than 140 % of the average household energy consumption. Energy used for mobility is not included in this definition. According to this definition, in Austria in 2013-14, some 117 000 households — around 20.3 % of households at risk of poverty, or 3.2 % of all households — were affected by energy poverty.

While non-energy-poor households exhibit an average final household energy use of 18 200 kWh per year, this value for energy-poor households is 23 373 kWh (28 % higher; for heating the final energy use is 49 % higher). While in non-energy-poor households, 66 % of final energy is used for heating, in energy-poor households this figure is 77 %. The use of electricity is also 9 % higher in energy-poor households than in non-energy-poor households.

The average annual energy costs for energy-poor households, in the period in question, is EUR 2 593, 39 % higher than the average for all households, which is EUR 1 868. The difference in the average share of energy costs compared to household income is equally high: the average share for non-energy-poor households is around 4.5 %, while for energy-poor households it is 22.8 %. The difference between relative share of each energy source within the overall energy costs for both groups of households is particularly high for heating oil: in the period in question, 2013-14, non-energy-poor households show a share of energy costs for oil heating of 14 %, while for energy-poor households this share is 21 %. On top of the high costs for energy-poor households with mostly oil heating, the high volatility of heating oil prices in comparison with

[15] E-Control (2013), Report 'Energy poverty in Austria (revised version)' https://www.e-control.at/publikationen/fachpublikationen-endkunden/energiearmut

[16] Vienna University of Economics and Business (2018) https://www.sozialministerium.at/cms/site/attachments/2/9/7/CH3434/CMS1535520882546/studie_energiearmut_endversion.pdf

[17] Analysis of the situation of 'energy poverty' in Austria was carried out by the Federal Environment Agency in 2018 on behalf of the BMNT.

[18] See https://www.e-control.at/publikationen/fachpublikationen-endkunden/energiearmut.

other energy sources leads to increased uncertainty regarding future costs. In general, the main reason for the high energy costs incurred by energy-poor households is the poor thermal quality of the building envelope and the use of an expensive energy source for heating.

According to statistics (EU-SILC), as well as households with oil heating systems, those more heavily affected by energy poverty are households in buildings built prior to 1960, households in one- and two-family houses, households with larger heated living areas, single households and homeowners.

During the period in question, 2013-14, while in buildings built prior to 1960 around 5.1 % of households were affected by energy poverty, for buildings built between 1991 and 2005 this figure was only 1.5 % and for post-2006 buildings it was 0 % (average for all buildings: 3.2 %). The percentage of energy-poor households in one- and two-family houses during 2013-14 was 3.8 %, while in multi-family houses it was 2.6 % (average for all buildings: 3.2 %).

Analysis of structural parameters, final energy use and energy costs from the micro-census 'Household energy use' for the different energy sources confirms these results (primarily based on EU-SILC) and also shows that households with oil heating, but also households with natural gas heating, belong to the group of households with high specific energy consumption values (kWh annual final energy use/m^2 of living space), i.e. buildings with poor thermal energy efficiency.

2.5. Dimension 5: research, innovation and competitiveness

i. National strategies and financial objectives (public and private, where available) relating to research and innovation in the energy sector

The Climate and Energy Strategy adopted by the Federal Government in April 2018 clearly sets out the key role that research and technological development have to play in Austria in terms of global decarbonisation.

Mission-oriented research and innovation by business and the government, in collaboration with research institutes and users, is needed to support the development and trial of groundbreaking energy innovations. The strategic considerations required to implement the objectives of the Climate and Energy Strategy are as follows:

Cooperation between business and government

Close cooperation between the government and business is a key factor for success in Austria. Intense collaboration between the state and private investors opens up major opportunities in

Austria. Austria's approach is therefore to use public funds to trigger the broadest industrial research investment possible. A particular feature of Austria's innovation activities is the strong link with business and implementation.

Creation of a research-friendly environment

Transformation of the mobility and energy systems depends on firms and (research) institutes having sufficiently qualified staff. The aim, therefore, is to significantly increase the number of energy researchers in universities, polytechnics and non-university research institutions. Developing and expanding targeted measures to attract young researchers to the energy sector and creating or developing education services along the research/innovation/market value added chain should help to achieve this. Even though the majority of questions are technical/scientific questions, care must be taken to ensure that questions relating to the design of socio-technical and socio-economic systems and interfaces and social science questions (acceptance of techniques, system transition and change in the economic system) are also answered. Networking between the people involved in theoretical research and practical application is important in terms of increasing the relevance of research results. Improving the transfer of knowledge and technology, especially from universities to industry, should help to generate socially relevant applications or added market value from the research results obtained. Creating or developing joint research infrastructure in the energy system and an integrative approach between research and transition to market (e.g. in terms of economic, legal and regulatory requirements) will help Austrian energy researchers and firms to position themselves better on the European and global market.

Integrated funding portfolio from basic research through to transition to market

Breakthrough technologies are used both to save energy and, increasingly, when using energy. In order to boost these advances, a new environment needs to be created for oriented basic research, alongside ways of increasing integration of the innovative capacity of entrepreneurs and start-ups in RTI initiatives. Climate and Energy Fund programmes currently cover the entire innovation process from basic research through to demonstration.

Through the Domestic Environmental Support scheme (UFI), the BMNT supports businesses' demonstration projects on the implementation of innovative technologies that are on the verge of being market ready and that contribute to achieving quantifiable environmental benefits.

In particular, between 2021 and 2030, impact network approaches will also be developed, which enable cooperation between international, national and regional players in relation to solutions and technology providers, users, and enablers and decision-makers in relation to the choice of technology. These approaches will also encourage closer links between various European, national and regional measures and programmes in terms of research, technology and innovation, and implementation.

Mission-oriented research priorities

Future energy systems will comprise connected sub-systems which will need to integrate several parties and types of technology. By pooling actors, resources and expertise, research, development and innovation can be implemented in a mission-oriented way for specific challenges in the energy system.

Development of key technologies

A further objective is that of modernising the energy systems by developing key technologies. The aim is to develop successful technologies and solutions that will allow Austrian industry to position itself as an innovation leader on the global technology markets.

Sector coupling

Development of integrated system solutions for coupling infrastructure, technologies and services for power, heat and mobility.

Digital and smart energy: ensuring system integration of new energy storage and energy supply system flexibility technologies as basic enablers for a high proportion of renewable energy, coupled with security and resilience.

Marketable comprehensive solutions and technology-based services: developing new business models in connection with digitalisation, taking account of new social trends.

Contribution to European and international initiatives

As innovative firms cannot afford not to internationalise, not least due to globalisation and the relatively confined home market, they are supported in this challenging growth phase. The successful positioning of Austrian energy technology suppliers depends, first, on active networking of and collaboration between Austrian operators in international RTI initiatives (e.g. by participating in the global initiative 'Mission Innovation', the EU Strategic Energy Technology (SET) Plan or International Energy Agency collaboration programmes) and, second, on strategic pooling of individual strengths to give comprehensive solutions that can be easily presented and communicated.

ii. National 2050 strategies for promoting clean energy technologies', where available

The immense task of making the decarbonisation agenda technically feasible, economically viable and socially acceptable depends on a long-term research, technology and innovation (RTI) policy.

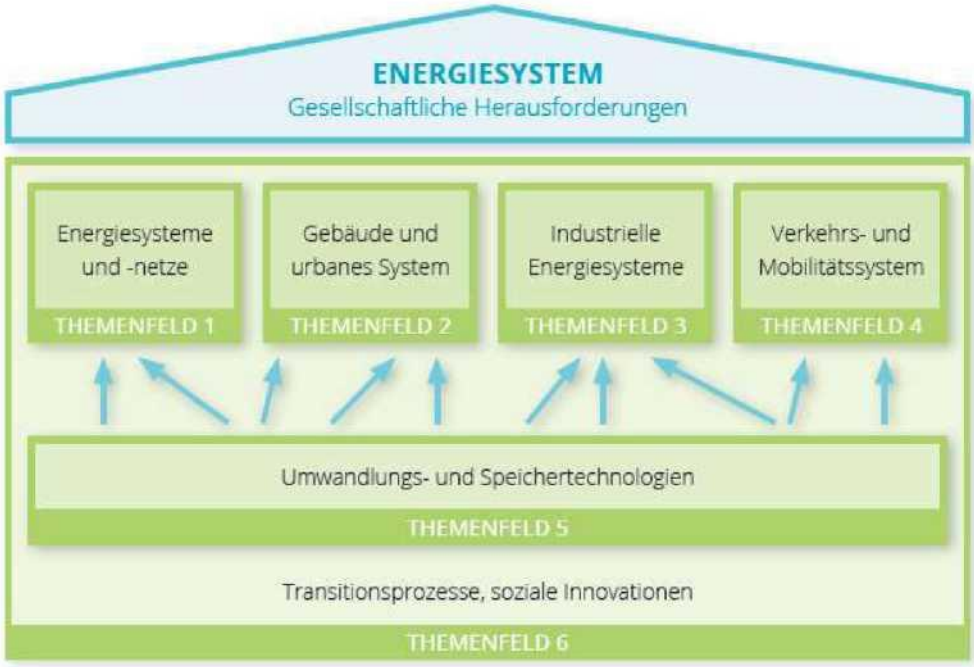
Alongside #mission2030, which, as already mentioned, sets out a decarbonisation pathway and guides the way towards 2050, the ' 2050 Energy Research and Innovation Strategy' drawn up by the BMVIT aims to exploit the economic opportunities of transforming the energy system to promote energy research and innovation as a central pioneer in the gradual decarbonisation of the energy system, thereby enabling Austria to make a significant contribution towards a future with clean, safe and affordable energy.

The further development and future direction of energy research and innovation is characterised by an integrated perspective based on a systemic approach. In addition to technological changes, research will also be carried out into the potential for a socio-ecological transition towards sustainable energy use and the methods of achieving this. In order to allow for long-term decision-making and room for manoeuvre, the following innovation systems, referred to here as 'thematic areas', address the need to define the framework for the future direction of energy research.

Technological development and smart system solutions will aim to generate a corresponding demand for technology on the Austrian and European domestic markets and address the competitiveness of Austrian businesses making products for worldwide export. The adjustment of market and regulatory frameworks and changes in the roles of actors and how they interact are inextricably linked, and require multi-dimensional innovation strategies.

Figure 8: Thematic areas in energy research and innovation in Austria

Source: BMVIT 2050 Energy Research and Innovation Strategy (2017)



ENERGIESYSTEM	ENERGY SYSTEM
Gesellschaftliche Herausforderungen	Societal challenges
THEMENFELD	THEMATIC AREA
Energiesysteme und -netze	Energy systems and grids
Gebäude und urbanes System	Buildings and urban system
Industrielle Energiesysteme	Industrial energy systems
Verkehrs- und Mobilitätssystem	Transport and mobility system
Umwandlungs- und Speichertechnologien	Conversion and storage technologies
Transpositionsprozesse, soziale Innovationen	Transposition processes, social innovations

These priorities are set out in concrete terms in Flagship Project 9, 'Building blocks for energy

systems of the future', and Flagship Project 10, 'Mission Innovation Austria', of the Federal Government's Climate and Energy Strategy, #mission2030 (see Chapter 3.5).

iii. National objectives on competitiveness, where available

The implementation of a decarbonisation pathway is a long-term process. A technologically open framework needs to be put in place which is tailored to the pathway, is in keeping with European targets and takes account of competition. This applies to all sectors of the economy that impact on current and future jobs in Austria as a business location. Public resources must be used efficiently, effectively and in a targeted manner along the entire decarbonisation pathway.

Successful implementation of climate targets must parallel international targets, in order to ensure a level playing field and maintain the competitiveness of the Austrian economy in general and its energy-intensive industry in particular and thus maintain or expand Austria's share of industry. At the same time, outlets for innovations and environmental and climate technologies from Austria to growing export markets must be increased. The objective is to ensure that Austrian businesses will still be able to obtain energy services at economically affordable prices. Comprehensive carbon leakage protection provides an important short- and medium-term basis for the conversion to zero-emission processes by energy-intensive businesses and plants that are highly efficient compared to their international counterparts. The emissions trading system should effectively support full decarbonisation of our energy system by 2050.

3. POLICIES AND MEASURES

The following section contains the main policies and measures which are necessary for delivering on the objectives of the Energy Union. They are all planned measures, to be implemented in the period up to 2030. In several of the areas where action will be taken, similar measures have already been implemented which will need to be adapted appropriately and further reinforced or supplemented by additional instruments (e.g. funding mechanisms in the agriculture or construction fields). Other areas will include completely new measures, in particular in areas requiring appropriate tools in order for new technology or solutions to be used (e.g. introducing storage solutions for surplus electricity, producing 'green gas' and feeding this into the existing gas network).

The Federal Government's Climate and Energy Strategy (#mission2030) and the strategies adopted by the provinces comprise the essential basis for future policies and measures. The objectives of #mission2030 serve as the main guidelines from which the necessary measures are derived. It is also essential that objectives and measures running until 2030 are consistent with the 2050 trajectory (to be defined by the end of 2019 in Austria's long-term strategy in accordance with the Regulation on the Governance of the Energy Union and Climate Action), in particular so that 'lock-in' effects are avoided and adequate or flexible transition solutions are enabled, for example, by constructing future-proof infrastructure.

3.1. Dimension 1: Decarbonisation

3.1.1. GHG emissions and carbon sequestration

i. Policies and measures for meeting the objectives of the Effort-Sharing and Land Use Regulation (addressing all major sectors and taking into account long-term objectives under the Paris Agreement)

Transport

The Federal Government's Integrated Climate and Energy Strategy focused in particular on transport. Alongside the overriding Federal Strategy, all nine provinces have also committed themselves to objectives, with some provinces having already submitted provincial strategies. In order to ensure that the objectives in the transport sector are met, Austria identified eight strategic fields in #mission2030, ranging from infrastructure development, the creation of a

necessary economic and legal framework, adjustment of the subsidy and levy system, strengthening of research and awareness-raising to the use of new technology and climate-friendly spatial planning. The Federal Government, provinces and municipalities have so far announced some 230 specific measures covering the following areas:

Significantly increasing the share of bicycle use

Half of all car journeys in Austria are shorter than five kilometres and more than half of all journeys by motorised transport made to convey goods in towns and cities could in fact be made by bicycle. There is therefore considerable potential for more cycle lanes.

The Federal Government's 2015-2025 Cycling Masterplan (*Masterplan Radfahren 2015-2025*) establishes six priority areas with a total of 24 measures. These measures constitute the basis for increasing the share of bicycle use across Austria from its current level, i.e. 7 %, to 13 % by 2025. Measures range from budgetary safeguarding of funding for cycling at all administrative levels, the expansion or construction of high-quality infrastructure for moving and stationary traffic, to the implementation of awareness-raising measures. Measures can be found in all provincial strategies and will be implemented by provinces, towns/cities and municipalities.

Improvements in relation to walking

Walking is a form of mobility which people throughout society can afford and practice regardless of age, whereby all individuals can make a contribution towards reducing CO_2 emissions caused by transport. Walking also has an important tie-in role with transport and forms the basis for engaging in multi-modal transport. By promoting walking, this also has the effect of increasing the share of cycling and public transport in particular.

The Federal Government's 2015-2025 Walking Masterplan (*Masterplan Gehen 2015-2025*) sets out 26 measures grouped into 10 areas for action. These range from improving walking infrastructure and a corresponding investment plan through to the promotion of pedestrian-friendly transport arrangements, the improvement of traffic safety and necessary awareness-raising.

The primary objective is to create conditions for walking which, in the context of an increased share of cycling, do not result in an increase brought about by a switch from walking but from private cars.

Enhancing public transport

In Austria, an average of 14.6 % of all roads on an average working day are reserved for public transport. The percentage varies on a local level and increases the higher the population density. The highest proportion of roads reserved for public transport is found in urban areas, notably the capital city. The greatest potential for CO_2 savings is by switching from private cars to public transport. Public transport has additional potential depending on occupancy rate and also on the use of energy-efficient and alternatively-powered public transport. The highest energy efficiency comes from rail-mounted and electrified transport such as public trams, underground and suburban lines and local and long-distance electrified railways. However, a significant contribution to reducing CO_2 emissions from transport can also come from the electrification of public road transport by means of battery-electric buses or trolleybuses.

Electrification plan

- It is intended that the level of electrification of the railways will be increased. Electrification of the Austrian Federal Railways network is planned to increase from its current level, i.e. 73 % to 85 % by 2030.
- New research priority on decarbonising the railways (batteries or fuel cells for traction purposes)
- Shunters are sometimes still powered by diesel. By 2025, these will be substituted for electric vehicles when replacements are procured.
- At provincial and municipal level, alternative – and therefore electric – vehicles are increasingly being added to the bus fleet (E-/O- and H_2 buses).

Public procurement

In public procurement or public fleets, the public sector will set an example by switching to zero-emission or low-emission vehicles as part of routine procurement of replacement equipment without special operational requirements by public agencies. Vehicles will be procured according to the total cost of ownership (TCO) principle.

Rail infrastructure plan

Investments in railway infrastructure in recent years and the railway coverage this has resulted in has made Austria a leader in rail passenger transport in the European Union. Nevertheless, looking towards mobility in the future, additional focus is still needed on efficient public transport, in addition to making use of the opportunities offered by digitalisation and placing far greater focus on better services.

According to the framework plan of Austrian Federal Railways, current annual investment by the Federal Government of just under EUR 2 billion is set to increase gradually to EUR 2.5 billion over the coming years in order to improve infrastructure.

Providing greater and attractive mobility

Alongside robust infrastructure which must meet future requirements in terms of both quality and quantity, care must also be taken to simultaneously provide a corresponding range of services. At federal and provincial level, provision of public transport will gradually be increased from 2019 to 2029. Accompanying improvements in the provision of long-distance transport are also planned. These go hand-in-hand with the planned fleet modernisation which will focus on energy efficiency, accessibility and easy mobility.

Enhancing regional public transport

In addition to steadily expanding connections across Austria, additional measures are being implemented at federal, provincial and municipal level with a view to enhancing regional public transport. At federal level, this covers in particular subsidies for private railways, urban-regional public transport, the expansion of underground rail services and decarbonisation of the vehicle fleet. At provincial and municipal level, a number of projects have been planned for improving infrastructure and the provision of public transport across regions and conurbations. From an infrastructure perspective, projects cover the creation of mobility hubs and the extension of regional rail and bus lines. From a service perspective, funding will be provided for regular transport services and micro-public transport. Furthermore, the fare structure will be optimised.

At municipal level, it will also be possible to make better use of existing instruments. These include, e.g. parking regulations as an effective instrument for managing demand for individual means of transport. At provincial level, effective additional measures and instruments will be available, such as spatial/urban planning, support for housing construction and a requirement to provide parking spaces.

Strengthening cooperation with public transport system partners

Investment in infrastructure and services can only have its full impact if people make full use of them. In future, there must therefore be even greater focus on making all public transport more easily accessible and comfortable, something which can only be achieved through improved cooperation between public transport partners. Consequently, work is underway on an Austrian fare pricing and sales system for public transport. The system will be of added value to users of public transport as various mobility providers' existing databases will be linked up in a way which complies with data protection laws by means of the interfaces which will be developed. As a result, the potential for synergies and modern services due to increasing digitalisation will lead to better customer service and, therefore, increased use.

In addition to numerous improvements in bicycle, pedestrian and public transport, overriding policy areas must also be addressed. These include the following areas and measures:

Mobility management to promote climate-friendly, clean mobility

Mobility management is a key aspect of improving the organisation of transport in the home and business environment, in towns/cities and in regions, and makes an important contribution in terms of the change to sustainable mobility and decarbonised transport. Mobility management supports the introduction and use of new, eco-friendly technology so that full use can be made of its potential and counterproductive developments can be avoided. Numerous successful measures to support Austria's towns and cities, municipalities and companies in the area of mobility management and awareness-raising can be cited which have been taken by the federal government – through the 'klimaaktiv mobil' programme – and by provinces and municipalities. In future, these must be safeguarded, further developed and strengthened. All Austrian firms, towns and cities, municipalities, regions and other relevant operators in the mobility system will be encouraged to introduce zero-emission sustainable mobility solutions under mobility management schemes and will be supported in doing so. A significant contribution towards public transport and new forms of mobility becoming accepted is possible by changing attitudes towards other modes of transport or mobility patterns in general.

Spatial planning

The settlement pattern, i.e. the distribution of various land uses has a considerable impact on the transport outlay needed to bring these different uses together. In the past, decision-making processes failed to pay sufficient attention to such links. Spatial planning in recent decades has contributed to a significant increase in the distance driven by road traffic, the energy consumption of buildings and, therefore, an increase in CO_2 emissions. Consideration is therefore being given to anchoring climate and energy objectives into spatial planning and geospatial plans and programmes. In this way, land use should take more of an approach towards limiting land use, preventing sealing, and ensuring condensed, compact settlement and commercial development.

In future, greater emphasis will be placed on proximity to the town centre and the development of public transport or alternative mobility with regard to regulations on parking spaces and the structure of support for housing construction.

Goods transport

In 2016, approximately 38 % of all transport-related GHG emissions were caused by goods transport. Nearly all these emissions are attributable to roadside freight transported by light and heavy goods vehicles, powered almost exclusively by internal combustion engine. In Austria, 2 435 tonne-kilometres per capita were transported by rail. Today, this corresponds to 31.5 % of the entire volume of goods transport measured in tonne-kilometres. Austria therefore has the sixth highest share of rail transport in the EU. Moreover, it aims to increase this share further.

The structure of freight transport logistics also plays a key role in achieving climate and energy objectives in urban areas.

For this reason, the Federal Government wishes to work with the provinces, cities and municipalities on the following:

- Continue support for multi-modal goods transport hubs in order to switch transhipment from road to rail. Developing infrastructure (according to the framework plan of Austrian Federal Railways) and increasing the efficiency of rail freight transport is a condition for doing so.
- Develop measures for making urban logistics environmentally-friendly. The aim is to implement CO_2-neutral urban logistics systems by 2030, with a view to making urban logistics systems CO_2-neutral by 2050 through a mix of regulatory, logistical, cooperative and technological measures.
- Create incentives in order to make road transport more environmentally-friendly.

Electrification plan for passenger and goods transport - roads and infrastructure

For a clean, safe and affordable transport system, the technology which is used is of particular importance. The cleanest, most efficient technology and transport systems must be introduced, offering a high level of user-friendliness, at a socially and economically acceptable cost. Accordingly, several packages of measures must be implemented as part of an electrification plan, covering new support priorities for vehicles such as electric goods vehicles and electric buses. These will be flanked by a strong infrastructure component (e.g. recharging infrastructure for electric buses) and by continuing the successful support priorities established for electric cars and electric bicycles. The motor vehicle industry will again be involved along the lines of the public-private partnership model for promoting electric vehicles. Particular emphasis will be placed on promoting electronic vehicle mobility management, logistics and fleets in the commercial and municipal sectors. Zero-emissions research is an intended priority in the research, technology and innovation field. Furthermore, through targeted adaptation of the legal framework, improvements will be made in order to increase suitability for everyday use and reduce barriers to the use of electric vehicles. This will involve, in particular, establishing incentive systems so that manufacturers more quickly introduce zero and low-emission vehicles onto the market at EU level, introducing incentives for electric vehicle users and modifying housing legislation as soon as possible (potentially as early as 2019) so that charging points can be fitted in apartment buildings. For new registrations, it is intended that focus will thereby shift to zero-emission cars and light goods vehicles by 2030. The aim is for the number of zero-emission lorries and buses to increase significantly by 2040.

Buildings and heating

Between 2005 and 2015, it was possible for GHG emissions to be significantly reduced. Due to

population growth, increasing specific living space and a growing desire for comfort, there has been a sharp rise in the construction of new housing and service sector buildings. At the same time, renovation works have been on the decline. Overall, this has resulted in stable emissions. In order to return to a continuing downward trend in emissions, additional measures are now being planned. The Federal Government's Climate and Energy Strategy and the strategies adopted by the provinces represent an important cornerstone. Specific measures and instruments as part of a 'Heating Strategy' (*Wärmestrategie*) are under discussion between the Federal Government and provinces.

The following focus areas have been earmarked for the building sector.

Construction of new buildings

- As far as possible, buildings constructed after 2020 will not require fossil fuels for heating, hot water or cooling. By 2020 at the latest, all provinces will no longer be using oil for heating in new buildings.
- The thermal quality of buildings constructed after 2020 – which will therefore not undergo thorough renovation before 2050 – must be raised to cost-optimal level[19] in accordance with the EU Energy Performance of Buildings Directive.

Replacement of fossil fuels by renewable energy and efficient district heating

- Phasing out liquid fossil fuels: under the Federal Government's Climate and Energy Strategy (#mission2030), approximately half of the estimated 700 000 oil-fired heating systems currently in use are to be replaced by innovative energy systems powered by renewable energy or efficient district heating. In this way, it will be possible reduce greenhouse gas emission by approximately 2 million tonnes per year. This will be achieved through a package of incentives which are yet to be defined, comprising fiscal measures, regulatory provisions and subsidies for cushioning the social impact.
  - One specific measure will be the 'Renewable by default' measure (*Erneuerbaren Gebot*) under the EPBD. The aim of this measure is that by 2021 only heating systems powered by high-efficiency alternative energy systems will be used for replacing liquid fossil fuel-powered boilers. Exceptions to this rule will only be possible if justified.
  - A further aim is to replace liquid fossil fuel-powered boilers which are over 25 years old with renewable energy or district heating as from 2025.
  - A coordinated mix of instruments will be required in order to move away from liquid fossil fuels. Temporary subsidies which cushion social hardship cases combined with subsidised public advisory services independent of any product, and at the same time the announcement of medium-term regulatory provisions, an increase in the cost of liquid fossil fuels for end consumers and a target of 2040 for phasing out liquid fossil fuels for heating purposes will encourage a transition to be brought about as soon as

[19] More details to be found in the 2019 Heating Strategy.

possible.

- In 2019 and 2020, the Federal Government in conjunction with the provinces will be proposing a funding priority for private individuals and companies to switch from fossil-fuel powered heating systems as part of domestic environmental support. The 'Oil Phase-Out' premium (*Raus aus Öl*) will be granted as part of the renovation plan.

- Replacement of fossil natural gas
  - Where possible, the natural gas grid will no longer be expanded for heating/hot-water purposes. Densification of heating and hot water connections is possible in areas where there is no district heating (if based on renewable energy or high-efficiency cogeneration).
  - In the long term, fossil natural gas will be replaced by renewable gases in the gas grid.
  - Fossil natural gas would only be used in new buildings in duly justified exceptions, whereby compensatory measures[20] would have to be taken.
  - Consistent and harmonised implementation of the requirements of the EU Buildings Directive in relation to 'alternative testing' of new and renovated buildings. Fossil natural gas will thereby also be gradually replaced by renewable alternatives where reasonable and sensible to do so.
  - Spatial planning is intended to identify areas with grid-bound energy infrastructure (e.g. district heating areas) as soon as possible/2025.

- By 2030, liquid fossil fuels will no longer be used in federal and provincial public buildings (owned and used).

Thermal energy renovation

- The renovation rate, meaning comprehensive renovation of the entire housing stock, is to be increased from the current 1 % to an average of 2 % between 2020 and 2030. Comprehensive renovation works may also be carried out in stages under multi-annual renovation plans. Given the current decline in renovation works, considerable extra effort and a coordinated mix of measures are required. Cost-optimal levels will apply in any case to renovation (and part-renovation).
  - Targeted funding for building renovation works in the form of investment grants, subsidised financing models and tax measures, is planned.
  - Part-renovation in particular will also be funded, but only if there is an overall thermal-energy renovation plan and the part-renovation works fit into the overall plan. In this way, it will be guaranteed as far as possible that part-renovation works lead to complete renovation.
  - Regulatory requirements, e.g. socially-responsible renovation requirements and price

[20] More details to be found in the 2019 Heating Strategy.

signals are also under discussion.

Accompanying measures

- Alongside these measures, information and awareness-raising activities and consultations (product-independent, funded and public) are planned, energy performance certificates are to be enhanced and data on the building stock and on building conditioning technology will be collected in a structured way (e.g. a building and housing register).
- Obstacles in housing law (in particular the Condominium Act and Tenancy Act) which are currently impeding renovation measures are to be eliminated.
- Spatial planning, settlement development and energy planning measures are covered under the sections on transport and horizontal action areas.

Overall, under the Federal Government's Climate and Energy Strategy, measures in the building sector will lead to a further reduction in GHG emissions of some 3 million tonnes by 2030 as compared to 2016 (as far as possible, complete decarbonisation of the sector is intended by 2050).

Agriculture and forestry

Current climate and energy measures in the agriculture and forestry sector draw on the possibilities provided for under Pillars I and II of the Common Agricultural Policy (CAP) and other national objectives laid down in federal and provincial agricultural law. The Rural Development Programme, which is vital for the implementation of those measures, will be valid until 2020.

General preliminary talks are underway at European and national level regarding how the future CAP post 2021 will be structured and financed. It is impossible to anticipate how those talks will go. In the interests of achieving climate and energy objectives, bodies responsible for doing so should in any case help to ensure that existing measures may be continued and supplemented by new, more effective measures. Flexibility in the agriculture and forestry sector is limited due to numerous, partly diverging objectives and on account of the small and medium-sized structure of holdings and the typical topography of Austria. In the political statement of intent, priority should be given to voluntary measures which, upon raising awareness amongst managers of agricultural and forestry holdings, should be combined with effective content and incentives. It is up to the respective legislative authority to decide when or from which point federal or provincial rules should deviate from the trajectory.

Specific measures for livestock production will continue to apply to buildings and to reduced-emission housing management in order to reduce methane and nitrous oxide emissions. Increasingly low-emission application and incorporation of organic and mineral fertilisers,

combined with generally low-loss fertiliser management, will help with sustainability and with reducing operating costs. Extending pasture farming as recommended highlights the complex impact of measures with the potential to reduce ammonia emissions whilst having a positive impact on greenhouse gases. In order to have the best possible impact, the entire agricultural nutrient chain needs to be examined with a view to improving efficiency. This starts with inputs which, for the livestock sector, means feed. Improving quality and adjusting needs according to the regional basis for feed should, for example, be supported.

Additional incentives are needed for increasing on-farm efficiency, electrifying production process and increasing the use of renewable energy in the sector.

Work-based training and advisory services with no company affiliation are the basis for farms to be managed in a way which reduces emissions. A legally-adapted environment is needed so that economically and technically feasible solutions can be implemented. Specific agricultural research projects must be launched in certain areas, e.g. feeding, biogas production, waste prevention, power solutions, so that farmers are given investment security.

Not to be forgotten in the context of emissions prevention and energy savings is the idea of strengthening cooperation with the stages of the food chain downstream of primary agricultural production. Cooperation, joint initiatives and consumer education should be given greater importance in this respect.

The success of any instruments used to limit emissions and resource use in the sector will be brought about through intelligent fine-tuning of legislation and through efforts made by all affected stakeholders to pull together.

Land use, land-use change and forestry

With the adoption of the EU Regulation on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry (hereinafter: 'LULUCF Regulation'), emissions and carbon sequestration from the land use sector will be accounted for for the first time as from 2021 and, subject to certain restrictions, will be offset against national effort sharing targets.

When establishing measures, it is important that the Austria's national target under Article 4 of the LULUCF Regulation is complied with until 2030.

In the forestry sector, priority will be given above all to the following measures:

- continuously increasing the amount of wood which is harvested, in compliance with the basic

principles of sustainable forest management and by creating appropriate conditions for domestic wood demand for material and energy purposes;

- preserving the carbon pool in forest floors and biomass through sustainable forest management and, where appropriate, continuously increasing forest growth with a view to improving carbon sequestration in forest stands;
- Securing forest resources as such (adapting to climate change, conserving forest areas, particularly in sub-forested areas, planting locally-adapted, stable and effective tree species, continuing funding streams and programmes).

In agriculture, the focus will be above all on measures which support targeted creation of humus and expansion of organic farming. A further aim is to encourage the preservation of agricultural land (arable and grassland) and its productivity in order to reduce land use responsibly.

A stronger focus on an environment and climate policy framework under the EU's future agricultural policy and instruments will have a supporting influence moving forward.

Waste management

By avoiding food waste and taking a more responsible approach to food, emissions reductions will not only be possible in waste management but also in upstream processes (farming, transport, industry, energy). The aim of the Federal Ministry for Sustainability and Tourism's 'Food is precious!' initiative (*Lebensmittel sind kostbar!*) and increased actions in this area by the provinces is to reduce food waste by raising awareness, by producers or traders offering social welfare organisations more food which is fit for consumption, by optimising all stages where value is added and by promoting research activities to optimise processing and production methods.

By developing projects and networks which increase how long products can be used for (for example repair networks, repair cafes or RE-USE projects), this will help to reduce waste and promote the circular economy.

Biogenic waste will be treated in composting plants according to the latest low-emission operating techniques. By examining the extent to which the guidelines on the latest composting techniques and standards on IPPC composting systems have been implemented in accordance with the new BREF document, adjusting these, where appropriate, to comply with requirements, this will exploit all potential for improvement. People's knowledge of efficient and climate-friendly composting will also be improved through advice on garden composting at home.

The economic viability of turning biogas into biomethane will be improved, e.g. by making it

easier to feed it into the natural gas grid where technically and economically feasible to do so.

When entering waste into landfill, the specific requirements of the 2008 Landfill Ordinance (*Deponieverordnung 2008*) must be consistently implemented as regards reducing residual emissions. This applies in particular to the regular maintenance, repair and, where necessary, restoration of technical equipment for capturing and treating gas released from landfill (ensuring the gas capture systems function properly during the entry and after-care phase), controlling the water balance by means of an optimal surface cover design and, if necessary, irrigating or accelerating the reduction of residual emissions which can no longer be used or eliminated through measures for aerobic in-situ stabilisation adapted to individual cases.

In line with the EU's Waste Package, continued use of thermal waste incineration plants to help increase the share of recovered renewable energy will increase the share of municipal waste which is recycled, in particular waste from plastic packaging. Measures for implementing this are currently under discussion. Moreover, implementation of the Directive of the European Parliament and of the Council on the reduction of the impact of certain plastic products on the environment will also be necessary. This Directive is currently being finalised at European level.

Fluorinated gases

EU law in the area of fluorinated gases is primarily to be implemented by way of Regulation (EU) No 517/2014, in particular by means of enforcement measures in line with the system of indirect federal administration. In the building sector, demand for cooling during the summer needs to be reduced (thermal renovation and efficiency standards for new buildings). Support will be possible under the funding policy in place for phasing out the use of fluorinated gases with a high GWP (e.g. refrigeration and air-conditioning units) at an earlier stage. It will also be ensured that Austrian companies or persons working at such companies have knowledge available to them regarding alternative refrigerants and working with such refrigerants.

Horizontal action areas

Land use and land take

Use of land resources is an important long-term factor in terms of achieving climate goals and making economical use of energy resources. In Austria, 12.9 ha of land is newly taken every day (2015-17 average). Land being newly taken for construction, commercial and transport purposes across many municipalities of Austria is increasing urban sprawl, thereby leading to significant 'land use', or more simply 'land take'. This level still greatly exceeds the original target reduction under the Sustainable Development Strategy of 2.5 ha per day.

Consequently, it is essential for land take to follow more of an approach towards actually limiting

'land use', preventing sealing, and ensuring condensed, compact settlement and commercial development. Urban regeneration also has positive socio-political effects. Land must be developed in coordination with catchment areas for public transport stops and promote the best possible mix of functions such as housing, work and recreation. Spatial planning helps to reverse the rising trend in the distance being travelled by road, with the corresponding increase in CO_2 emissions seen in the mobility sector in recent years.

A major concern for Austria is to reduce or stop urban sprawl. To address this it is essential for buildings to be constructed within existing settlement structures, for settlement areas to have a functional mix and for those areas to be served by public transport. Building regulations and parking laws are further important levers towards making mobility climate-friendly.

Furthermore, greater use will be made of support for housing construction and other investment management instruments for settlement development purposes and energy spatial planning. This should be done during future negotiations between local authorities.

Energy spatial planning

Energy spatial planning is an integral part of spatial planning which addresses comprehensively the spatial side of energy consumption and energy supply.

Forward-looking energy spatial planning which is coordinated at an inter-regional level, especially with regard to large infrastructure projects, leads to a reduction in potential for conflict and therefore greater acceptance among the public.

Energy spatial planning in particular enables innovative energy concepts to be implemented focusing on locally available and cheaper renewable energy, use of waste heat and integrated mobility systems. Analysis and localisation of energy consumption, energy storage and transport, and the potential for energy-savings and recovery offers vital insight into these areas from a spatial perspective with a view to climate-friendly planning. Modern, integrated energy concepts in spatial planning can be used to make decisions on land allocation, investment in infrastructure and the issuing of funding such as support for housing construction. It is also important for energy spatial planning to be enshrined in spatial planning laws and provincial building regulations. Successful examples of this already exist.

Supplying buildings and businesses with efficiently generated district heating will continue to play an important role in the future, in particular in conurbations. Feed-in of waste heat from the plants where it is produced is also of major importance alongside the generation of energy from various renewable sources (biomass, geothermal, solar thermal, photovoltaic, wind, etc.) and cogeneration. Austria is still far from fully exploiting its potential in this area. In future, increased incentives will be offered for using waste heat by way of energy spatial planning instruments.

Climate and energy model regions and smart cities – for which support is granted under the Climate and Energy Fund – are successfully demonstrating these new systems and technologies in

real-world conditions so that the transformation of energy and mobility systems can be brought onto the market quickly.

To improve coordination between the parties involved in spatial planning - in particular the provinces - and energy experts and regional development services, the ÖREK (Austrian Spatial Development Concept) energy spatial planning partnership II was deployed in 2018. Work on implementing priority action recommendations and on applying and developing the energy spatial planning instruments which already exist will be carried out by the Federal Ministry for Sustainability and Tourism as lead partner.

ii. Regional cooperation in this area (where relevant)

Under the draft National Energy and Climate Plan there has so far been no regional cooperation in this area. Austria would refer to the derogation provided for under Article 11 of the Regulation on the Governance of the Energy Union and Climate Action according to which regional cooperation shall not be necessary until finalising the Plan in 2019.

iii. (National and EU) financing measures, where applicable

To implement the planned measures under the National Energy and Climate Plan there will be considerable need for public financing, in particular in the areas of infrastructure development and public support. The overall need for financing remains to be clarified, as does the potential role of new instruments in the area of 'green finance'. Decisions on the national financing strategy – taking into account the potential for matched funding and possible subsidy reductions where these run counter to the dimensions of the Energy Union – will follow in 2019 in conjunction with preparations for the 2020 budget and medium-term planning for the Federal Financial Framework. Where possible, plans will take EU financing instruments into account.

3.1.2. Renewable energy

i. Policies and measures to achieve the national contribution to the binding 2030 Union target (including sector- and technology-specific measures where appropriate)

Renewable Energy Expansion Act

Austria requires an energy system that is secure, sustainable, innovative, competitive and, consequently, affordable. There are considerable opportunities and challenges presented by

consistently pursuing the 100% target, which the Renewable Energy Expansion Act will make a significant contribution to. Building on the 2012 Green Electricity Act (Ökostromgesetz 2012), which is responsible for some 17.3 percentage points of the approximately 73 % of renewable energy in Austria, the new rules will continue developing the system in a positive way. Consequently, the aim of the Renewable Energy Expansion Act is to the transform Austria's energy system.

This omnibus Act comprising several articles is scheduled to enter into force in 2020 and will lay down the framework for expanding renewable electricity generation and introducing renewable gases into our energy system at a far quicker rate. In addition to adapting renewable electricity generation and therefore the 2012 Green Electricity Act to EU state aid rules, measures will be established for expanding and better incorporating renewable energy which will be dependent on the recast of the European Directive on the promotion of the use of energy from renewable sources (2018 Renewable Energy Directive) but also, in particular, on ambitious national targets.

An accompanying integrative approach aimed at achieving decentralised power generation in renewable energy communities, necessary sector coupling, integration of storage technologies and the use of digitisation, and for which network infrastructure needs to be developed further, is dependent on parallel adjustments being made on a number of other legal issues:

In order to develop the necessary market structure, the 2010 Electricity Industry and Organisation Act (*Elektrizitätswirtschafts- und -organisationsgesetz 2010*) and the 2011 Gas Act (*Gaswirtschaftsgesetz 2011*) will be revised. In terms of sectoral coupling, it is necessary not only to consider interface issues in other areas, such as heating, mobility and energy efficiency, but also to lay the foundations for linking these areas which were previously partly considered in isolation. Furthermore, issues such as heating and measures needed in the area of transport and energy efficiency must be addressed through additional legislative initiatives.

It is also important for an integrated network infrastructure plan to be enshrined in the 2010 Electricity Industry and Organisation Act and the 2011 Gas Act. On the one hand, the 2012 Energy Intervention Powers Act (*Energielenkungsgesetz 2012*) transposes EU rules, such as the Regulation concerning measures to safeguard the security of gas supply. On the other hand, modifications and information coming from experience with ongoing processes are being taken into account in order to maintain the high level of supply security in Austria.

System responsibility

From a systemic perspective, the two regulatory areas of financing and aid processing – as previously enshrined in the 2012 Green Electricity Act – need to be supplemented in particular by the principle of system responsibility, which is gaining in importance as a result of the expansion of volatile forms of energy generation:

a. Direct or own-marketing of renewable electricity

At present, renewable electricity must be taken from the settlement centre, irrespective of the time, and may therefore be fed into the grid by producers at any moment, even at negative prices. In future, a self-marketing principle will apply to larger, renewable energy generation installations. This is intended to create incentives for exploiting opportunities in new market segments with innovative partners and technology, and covers e.g. local energy communities and energy balancing and reserve markets. In this way, the grid load will be reduced and therefore the cost of operating the grid. At the same time, supply security will also be increased.

If renewable energy generation installations are cleared for direct and self-marketing, operation on all segments of the electricity market should be possible. In addition to general electricity trading, this applies in particular to the balancing and reserve market and subsequently to mechanisms for securing the grid reserve. Operating exclusions and market entry barriers such as pooling factors should be eliminated as far as possible or tailored to new entrants onto the market.

Small-scale produces are not required to operate on the market but are able to do so. In future, the settlement centre will also offer them an institutional purchaser 'of last resort' who they will be free to choose. The purchaser of last resort would not only market the volume potentially delivered by small-scale producers and enable them to obtain representative market prices, but would be available on the direct marketing segment and, therefore, to larger installations, in the event of unpredictable transactions (bankruptcy, etc). In this way, the transformation of the system would be supervised and no renewable energy would be lost.

In order to qualify for support, facility operators must, in return, guarantee at an early stage that the principles of controllability and adjustability are observed by grid operators in order to optimise the system as a whole. Installations covered by existing funding agreements which currently do not provide for or may even forbid market operation, should also be helped to switch to this new system.

b. Renewable energy communities (see also point 3.2, sub-point viii)

When further developing Section 16a of the Electricity Industry and Organisation Act, which first permitted in 2017 that energy-generating installations in renewable energy communities could form part of a single property, renewable energy communities must be established by transposing the 2018 Renewable Energy Directive. These communities enable bilateral supply contracts to be set up and, likewise, cooperative-type structures for the generation, storage and supply of renewable electricity, even beyond property boundaries. It is also possible to set up and operate local grid structures (microgrids) cost-effectively.

So that disincentives are not introduced – meaning the creation of unnecessary grid structures in parallel to grids which have already been set up and financed – appropriate options must be made available when further developing existing tariff systems for renewable energy

communities and the financing mechanisms behind them. This must be ensured, for example, by means of local tariffs or corresponding rolling cost models in the system fee structure. Regionalisation and decentralisation of renewable electricity generation, taking advantage of progressive digitisation in the interests of establishing 'smart grids' will also improve supply security and the robustness of the system in general.

c. Integrated grid infrastructure plan (for more details see point 3.4.2, sub-point i)

A coordinated, integrated grid infrastructure plan will be drawn up with the involvement of the provinces and municipalities (taking into account spatial-planning concerns, etc.). For this to be done, legal amendments to the 2010 Electricity Industry and Organisation Act and the 2011 Gas Act will also be required.

d. Grid reserve and demand-side measures

In future, grid reserve will be enshrined in the 2010 Electricity Industry and Organisation Act. Units of grid reserve will be reduced to 250-500 kW so that smaller renewable generation units and industrial plants can be integrated. This will apply to industry 'demand-side' measures and aggregated dispatch from decentralised structures by means of pooling.

e. 'Greening the gas'

In future, a significant share of natural gas will be replaced by renewable gas ('greening the gas') by means of bio-methane from biogenic residue, hydrogen and other renewable gas production methods (synthetic methane, etc.). Under the Renewable Energy Expansion Act, feed-in of 'green gas' into the natural gas distribution system will be encouraged, for example by means of a – potentially gradual – quota system.

Feeding in gas rather than generating electricity from biomethane, as enshrined in the last amendment of the current 2012 Green Electricity Act, makes the overall system more robust at the interface between electricity and gas. This is because the gas grid itself can act as a storage facility as it does not depend on absolute temporal synchronisation between generation and consumption as in the electricity system.

In order to guarantee the quality of renewable gases and its provision in the necessary quantities in a comprehensible and transparent way, the electricity sector's system of guarantees of origin must be transformed. If only as a requirement for transposing the 2018 Renewable Energy Directive, guarantees of origin must be established not only for electricity and gas but also for heating and cooling.

The 2011 Gas Act will lay down that on the basis of certain criteria gas network operators will have to take over parts of subsequent investments in renewable gas generation installations. The aim is for renewable gases to be produced locally and be fed directly into the natural gas grid. The sustainability of renewable gases will be governed by guarantees of origin.

As regards hydrogen and renewable gases in general, powers to regulate will be conferred based on the 2020 Renewable Energy Expansion Act which will allow an incorporation rate no greater than the level provided for in the applicable standard of the Austrian Association for the Gas and Water Industries (N.B. ÖVGW G 31).

The scope of the Mineral Raw Materials Act is to be extended to cover mining-related aspects of synthetic natural gas production in geological structures.

Under the existing powers to regulate laid down in Section 69 of the Mineral Raw Materials Act, it will be specified in agreement with the Federal Ministry of Finance that investment in 'power to gas' or hydrogen storage may be accounted for in mineral royalties.

To avoid promoting fossil fuels and to provide legal certainty for investors, hydrogen – and similarly biogas and any other renewable gases – should be classified under the Natural Gas Tax Act and included for tax relief.

f. Digitisation potential and system support measures

In conjunction with measures under the 2020 Renewable Energy Expansion Act and the 2010 Electricity Industry and Organisation Act, installation and operating conditions and the general user-friendliness of storage facilities and recharging infrastructure relating to the expansion of renewables should to be optimised. This should be done by means of the register of recharging points which is already in place, in conjunction with the fuel price calculator successfully implemented by the regulatory authority, i.e. Energie-Control Austria.

This work will ensure the best possible controllability and adjustability of decentralised smaller and medium-sized storage facilities, particularly in the interests of supporting the system. System services would also be possible through recharging points, i.e. through vehicle batteries themselves. This would enable grid load to be optimised and the development of sustainable mobility to move ahead.

Support scheme

The existing support for green electricity will be overhauled as from 2020 so that more renewable energies can benefit from support and, at the same time, more electricity will be produced cost-effectively for every euro of funding. Even more than before, renewables will be made fit for the market and the market fit for renewables. This will be done through market premiums, investment support and, where appropriate, tenders. Funding efficiency will be optimised and adaptation of the electricity market, e.g. through new storage technologies, digitisation or decentralisation will be increasingly required. By redesigning the support scheme, renewable electricity generation will become more easily integrated into the market. At the same time, a positive climate for investment (due to legal certainty and predictability) will be ensured and

administrative obstacles removed.

Transformation processes applying workable solutions should accompany the transition from the old support scheme to the new support scheme, particularly for carrying out projects which are well into maturity.

a. Basic instruments – market premiums and investment support

The transition from the current tariff support system and isolated (or in combination) investment subsidies to a market-driven and competitive support system will be rolled out under the Renewable Energy Expansion Act. It will build on market premiums and investment support and, where appropriate, include competitive and non-competitive tendering models.

The operational support variant, to be implemented in future as a market premium, is intended to have a 20-year term, as compared to the current situation. The specific basis in the sense of the average market price from a technology-based perspective and the exact conditions of the respective tenders are to be laid down in Regulations.

The basic requirements for accessing funding will only change compared to the current situation where necessary based on previous experience. Pre-qualification and basic criteria in terms of predictability and legal certainty will therefore remain unchanged or be subtly adapted or expanded.

Despite the existence of funding, it must be ensured that through the transition to self or direct marketing, every provider is able to participate in the market in a way which is economically acceptable. Moreover, the aim of cost-efficiency will be achieved through tenders with the highest possible number of providers. Under these conditions, it is possible for producers to take responsibility for their product as market operators (price volume, energy balancing and reserve cost risk, grid services, etc.) and for support costs to be kept close to the economic optimum in a way which can be predicted. Consequently, despite the increased market risk, renewable energy producers can claim to have increased technological leadership and innovated in this area as best as possible.

Renewable electricity generation installations with a capacity limit of less than 250 kW qualify for possible investment support. Any funding volumes, as with operational support, must be laid down in a Regulation.

b. '100 000 rooftops' flagship project

The '100 000 rooftops' solar panel and small-scale storage programme is intended to encourage private individuals and businesses to make greater use of roof areas for photovoltaic modules. Moreover, focus will implicitly be on a combination of solar panels and storage by applying a self-supply rate as a ranking criterion for investment support.

In future, buildings will not only have high energy standards but, in particular, will play an active

role in providing energy and storing it for self-supply purposes. To do so, the best possible use will be made of areas of buildings (in particular new and renovated buildings) on the roof and facades for installations and integrated solar panels. Increasing the number of solar panels in conjunction with storage technology, particularly in buildings, will help to systematically reduce the pressure on the distribution and transmission network.

Abolishing the tax on self-produced electricity: Currently, the first 25 000 kWh of self-produced electricity is exempt from tax. Small-scale producers (private and smaller companies) currently benefit from tax relief. Commercial operators and private individuals will make more use of photovoltaic modules on their rooftops in order to produce energy. The tax on self-produced electricity will be abolished as part of the reform of the tax system.

By removing barriers to investment under legislation on residential buildings and installations, the role of buildings as platforms for generating energy will be supported. This includes amending the conditions under residential civil law on the use of shared photovoltaic systems.

c. Photovoltaics in general or on construction sites and on land

In principle, photovoltaic systems on buildings and built structures should be given priority so that other uses are not prevented on valuable space, in particular arable land and grassland. In addition to exploiting fallow land, land on commercial sites constitutes space which is similarly identified specifically for developing photovoltaics. Consequently, alongside the '100 000 rooftops' programme, another priority will be to develop larger PV systems, especially those using innovative solutions on land. With the experience gained in 2018 from awarding funding, it is possible to envisage extending the new system to sites used for landfill (and transport). Discussions are focusing on potentially extending the system further to include traffic embankments, noise protection walls, landfill sites and all types of industrial and commercial premises As a strong incentive for installing solar panels in these areas, large PV-systems with a capacity of 250 kW or more will, as a complement, be able to participate in tenders as an alternative to investment support.

d. Existing installations

All renewable energy generation installations, from solar panels to biomass plants, will continue to contribute towards the 100 % renewable electricity target and towards a renewable heating supply. In particular, this covers existing wind and hydroelectric installations, and high-efficiency biomass plants in agriculture and industry. Land and resource take is minimised by retaining existing high-efficiency plants, thereby transforming the energy system in an environmentally-friendly way.

As such, biomass plants expiring in 2020 or later will be provided with a succession plan following the principles of the new support system This will guarantee continued support for high-efficiency biomass plants when green electricity procurement and purchase contracts with such plants have expired.

In terms of modernising wind turbines, previous investments in existing sites will be maintained and can continue to be used, where technically and economically feasible to do so. 'Repowering' by increasing output volume will therefore be possible. By participating in tenders, projects which can be carried out at existing locations will be able to benefit from market premiums.

For environmental reasons, revitalisation is also the preferred option for hydropower. This will need to be provided for accordingly in the support scheme.

Existing installations will be able to optionally switch to self-marketing. This will offer operators of such installations new opportunities and flexibility. Changes would involve extending the contract period to a maximum of 20 years and enabling operators to engage in direct or self-marketing in all market segments.

e. New (biogas and biomass) installations dependent on raw materials

In order to meet the 100 % renewable electricity target, high-efficiency cogeneration technology (CHP plants) based on solid biomass will also play a role in future. Such installations can play a stronger role than in the past by helping to maintain the electricity and heating supply in conurbations, in particular by helping to support the (electricity) grid, for example through bottleneck management and generally through energy balancing and reserves by means of market mechanisms.

To that end, a separate technology-specific tender for awarding market premiums to solid biomass installations will be run. In terms of biogas plants, the system launched under the 2017 amendment to the 2012 Green Electricity Act will be systematically developed, particularly in coherence with 'Greening the gas' initiative. For both solid biomass-based and biogas-based energy generation technology, the approach to raw materials will have to be adapted, whether relating to the generation of renewable electricity or renewable gas. In general, an approach which considers waste or residue and by-product recovery should be taken so that sustainable biomass plants can continue to be operated. The aim of flagship project 5 (renewable heating) under #mission2030 is to implement measures with a view to more renewable energy in the heating sector, e.g. development of biomass, solar thermal, heat pumps, micro-CHP, etc. Optimal use of existing high-efficiency installations using the intended raw material mix – as described – is to be laid down as a principle so as to encourage transforming the energy system in an environmentally-friendly way.

f. Transformation management

Despite the most recent cut in waiting lists under the 2017 minor amendment to the Green Electricity Act, there is still a waiting list of projects suitable for funding under the existing system, some running until 2023. Those installations must in any case be assimilated into a new system in order to capitalise on this potential in a cost-efficient and timely manner. This may be done, for example, by making it possible to participate in tenders (under certain pre-qualification conditions), or by simplifying other participation or award criteria.

g. Guarantees of origin for renewable energy

If only as a requirement for transposing the 2018 Renewable Energy Directive, guarantees of origin must be established not only for renewable electricity and gas by way of a tradeable good for energy sources but also for heating and cooling. This change in the labelling of renewable energy sources and transformation products will develop the existing system of certification and guarantees of origin further, involving all relevant stakeholders associated with the regulatory authority, i.e. Energie-Control Austria, and the current or future settlement centre.

h. Cross-border feed-in of renewable energy

Renewable electricity installations which can be set up through a direct connection with the Austrian grid will be treated in the same way as installations to be constructed in Austria and will be able to participate in tenders in order to obtain operational support. On the one hand, this transposes the Renewable Energy Directive and, on the other hand, it must be implemented in a way which supports the system. Any prerequisites in terms of bilateral agreements for establishing a certain degree of reciprocity with neighbouring states have yet to be evaluated

Further conditions

a. Administrative simplification of power line regulations (for more details see point 3.4.2, sub-point i)

Power line regulations are due to be simplified by way of an exemption from approval under electricity law for medium-voltage power lines of up to 45 kV, whereby the current threshold of 1 kV will be increased to 45 kV.

b. Transposition of European solidarity mechanisms for electricity and gas

Amendments to the 2012 Energy Intervention Powers Act and the 2011 Gas Act are required by virtue of the EU's Security of Gas Supply Regulation. Areas covered by the amendments will include the definition of protected customers, solidarity measures (authorisation to conclude agreements, arrangements for domestic implementation) and penalties for reporting breaches.

Amendments to the 2010 Electricity Industry and Organisation Act and the 2012 Energy Intervention Powers Act are required by virtue of the EU Regulation on risk-preparedness in the electricity sector. Areas covered by the amendments will include determining a competent authority to carry out the tasks entrusted to Member States under the risk-preparedness Regulation. The most important area where amendments will be required is that of responsibility for drawing up risk-preparedness plans.

c. Institutional issues concerning settlement and statistics

Under the 2018 Renewable Energy Directive, a designated contact point, in the form of a 'one-stop-shop', is required for the expansion of renewable energy. The contact point would also cover

several spatial planning and licensing-related issues before actual funding which may potentially be invested in such projects is started. The future body responsible for settlement (currently OeMAG) must have the appropriate basis and instruments to enable it to carry out the vital role of passing on information to the stakeholder group. In future, in view of the volume of financial resources in circulation, the Federal Public Corporate Governance Code (B-PCGK), which was essentially set up to cover how shareholder and supervisory functions are carried out, will apply to the activities of the body responsible for settling the financing of renewable energy expansion.

A key focus for renewable energy funding is that of increasing self-supply, in particular from a system-based point of view by the producers themselves and through renewable energy communities. So that precisely this continually increasing share of renewable energy can be taken into account and included in the strategic planning for funding itself and in reporting on targets, appropriate rules for statistical recording must be laid down by the regulatory authority or settlement centre.

Timetable:

The Renewable Energy Expansion Act is set to enter into force by 1 January 2020. The indicative timetable is – inter alia – being worked on and discussed intensively in conjunction with all key stakeholders. Furthermore, scientific institutions are also working on the full range of issues, having been commissioned to do so by the BMNT.

Hydrogen Strategy

Using hydrogen produced on the basis of renewable electricity can help to provide grid stability through long-term energy storage and also help to decarbonise energy-intensive industries. Above all, this is important in order to meet the requirement for the energy system to transition fully to renewable energy. To that end, a national Hydrogen Strategy will be developed which will also address the technical, regulatory and economic aspects relating to infrastructure for producing hydrogen based on renewable electricity, and hydrogen storage.

The Hydrogen Strategy will notably have four focal points:

- Hydrogen production
- Infrastructure and storage
- Greening the Gas (hydrogen and biomethane) under the Renewable Energy Expansion Act
- Hydrogen in industrial processes and fuel cells in final consumption, in particular mobility

and buildings

Timetable

The Hydrogen Strategy will continue to be developed until the second half of 2019 through working groups steered by companies alongside relevant stakeholders (academia, associations, NGOs, ministries, provinces).

Additional incentives for renewable energy expansion

Biofuels in the transport sector

The 14 % renewable energy target for transport under the Directive on the promotion of renewable energy, will be implemented by promoting electromobility with electricity and hydrogen from renewable sources and, in the area of fuel, by continuing to use traditional biofuels and by introducing advanced biofuels. Regarding biofuels, it is expected that the volume of sustainably produced biofuels will remain constant at least until 2030 due to the increasing share represented by e-mobility and the associated reduction in fossil fuels.

Domestic Environmental Support

The domestic environmental support scheme (*Umweltförderung im Inland, UFI*) is the central support instrument under Austrian environment policy. It supports Austrian companies and public institutions with investment measures for increasing energy efficiency and, in particular, for thermal renovation of buildings, adoption of renewable energy sources, e-mobility and carrying out demonstration projects, in line with #mission2030.

Overall, the domestic environmental support scheme achieved more than 10 % of Austria's 2020 greenhouse gas target between 2014 and 2016. Furthermore, according to the calculation method set out in the Energy Efficiency Act, the domestic environmental support scheme achieved approximately one quarter of the energy savings target set for 2020 assigned to strategic measures.

ii. Regional cooperation in this area (where relevant) and – optionally – estimates of surplus renewable energy production which may be transferred to other Member States

Under the National Energy and Climate Plan there has so far been no regional cooperation in this area. Austria would refer to the derogation provided for under Article 11 of the Regulation on the Governance of the Energy Union and Climate Action according to which regional cooperation shall not be necessary until finalising the Plan in 2019.

iii. Specific measures on financial support, where applicable, including Union support and the use of Union funds, for promoting the production and use of energy from renewable sources in electricity, heating and cooling, and transport

Renewable Energy Expansion Act

Despite the steady expansion of renewable energy, the amount of funding which will be allocated and, therefore, the cost burden on households, businesses and industry will not be increased significantly compared to current levels. Further expansion of renewables will be cost-efficient and in line with the market. In so doing, aspects of the overall cost can and will be taken into account from a system responsibility perspective when considering how funds are allocated.

a. Fund allocation structure

Funds will continue to be allocated on the basis of a metering-based system comprising the green electricity flat rate (not linked to consumption) and the green electricity support payment (linked to consumption). Likewise, a relief mechanism will remain in place for socially vulnerable households.

b. Energy balancing and reserves financing framework

The guideline on electricity balancing will prompt changes, including to the cost settlement method for energy reserves ('78:22' rule). The regulatory authority, i.e. Energie-Control Austria, and, primarily, the transmission system operator, i.e. Austrian Power Grid (APG), are working to implement individual sub-stages which are currently planned to include an additional accounting method ('ZAM') or 'special account' as a solution. The 2010 Electricity Industry and Organisation Act requires that further rules be adapted and a long-term framework established which enables costs to be allocated in a clear and transparent way to all parties active in the electricity system. Any funds from the special account must be transferred to the system of financing renewable energy in a way which reduces the cost impact.

c. Tax aspects and cost volumes

Assessments by the Federal Ministry of Finance of preferential tax treatment for hydrogen, biogas and other renewable gases will be discussed in the context of the tax reform and considered when examining the overall project system. The same applies to other measures for providing positive supervision of the funding system and ways in which funds are allocated based on #mission2030 or the government programme within the remit of the Federal Ministry of Finance, such as the project concerning the tax on self-produced electricity. In accordance with #mission2030 and the government programme, there are no other funds (from public budgets) associated with this project – save where otherwise defined in detail – other than the costs generated by funds allocated and therefore covered under the 2020 Renewable Energy Expansion Act.

Oher key financing instruments for promoting renewable energy in Austria are:

- The domestic environmental support scheme (under the Environmental Support Act) for operating investments in the heating sector
- The 'renovation plan' for thermal renovation of buildings through replacement of heating systems in the private and business sectors ('Oil Phase-Out' premium)
- Climate and Energy Fund (photovoltaic, solar thermal, bioenergy)
- Provincial support for housing construction

iv. Where applicable, assessment of support for electricity from renewable sources which Member States are to carry out pursuant to Article 6 of the Renewable Energy Directive

Support systems for electricity from renewable sources will be assessed in accordance with Article 6 of the Renewable Energy Directive when drawing up the Renewable Energy Expansion Act, and will be implemented where necessary.

v. Specific measures to streamline administrative procedures, provide information and training, and facilitate the uptake of power purchase agreements

At present, no specific measures are planned.

vi. Assessment of infrastructure measures for district heating and cooling produced from renewable sources

An assessment of infrastructure measures needed for district heating and cooling from renewable sources will be carried out when drawing up the Renewable Energy Expansion Act.

vii. Where applicable, specific measures on the promotion of the use of energy from biomass, including resource availability; measures on sustainable forestry

See point 3.1.1., sub-point i.

3.1.3. Other aspects of the 'decarbonisation' dimension

i. **Where applicable, measures affecting the EU ETS sector and assessment of the complementarity and impacts on the EU ETS**

In accordance with Section 5(1)(9) of the 2015 support guidelines for the domestic environmental support scheme, measures are only eligible if 'all direct effects [...] count towards the corresponding national priorities (from the EU's 2020 climate and energy objectives)'. Climate and energy measures relating to ETS installations are ***not*** eligible for funding under those rules as not all of their effects may count towards national objectives.

Based on Section 7 of the Energy Efficiency Act (monitoring report on climate and energy objectives), the Federal Minister for Sustainability and Tourism, in agreement with the Federal Minister for Digital and Economic Affairs and the Federal Minister for Finance, may introduce provisions which no longer rule out funding 'if the contribution made by the domestic environmental support scheme towards the EU 2020 objectives is not hampered to any great extent' (second sentence of Section 5(1)(9) of the 2015 support guidelines for the domestic environmental support scheme).

In summer 2018, an exemption was agreed between the three Ministries:

ETS installations may also be granted project support under the environmental support scheme provided that the support is for eco-innovation within the meaning of Section 3(2) of the 2015 support guidelines for the domestic environmental support scheme).

Furthermore, the following eligibility criteria apply to eco-innovation in relation to ETS installations:

- Support is limited to improving existing installations. Support is not granted for new installations.
- The technology being tested has specific, quantifiable potential for circulation. The multiplier effect of the eco-innovation benefitting from support is clear.
- Only one demonstration project is granted support for every eco-innovation benefitting from support. Project funding for ETS installations with comparable content in other locations or by other applicants will not be funded under the domestic environmental support scheme.
- The intended environmental impact (energy and CO_2 savings) is significant. i.e. improvements made exceed the extent of effects which are known to occur through ordinary development of the latest techniques. The environmental effects underlying the support can be demonstrated and permanently monitored once the project has been implemented.

Initially, support for eco-innovation related to ETS installations is only possible for applications submitted up to 31 December 2020 and limited to a maximum of EUR 2.5 million of federal funding per year within the total commitment framework under Domestic Environmental Support.

ii. Measures to achieve other national targets, where applicable

Austria is currently also drawing up a national plan for achieving its national emission ceilings (air pollutants). The procedures applicable to the measures go hand-in-hand with this so that synergies can be exploited or potential adverse effects minimised.

iii. Measures to achieve low emission mobility (including e-mobility)

With the 'National policy framework: clean energy for transport' adopted in 2016, Austria committed to significantly reducing diesel and petrol consumption in particular during the coming decade, carrying on until 2030 and beyond. An important step towards low-emission mobility is therefore the switch to alternative fuels (hydrogen from renewable energy, bio-CNG/bio-LNG and biofuels) in transport and electromobility using renewable energy. Under Austrian transport policy, the focus is on electrifying modes of transport as a building block for a modern and efficient transport system overall. A number of support measures, including expanding the necessary infrastructure, have been and continue to be used to promote the development of the market in alternative fuels for the transport sector and electromobility. Measures will be devised at all levels of government and implemented in close dialogue with stakeholders and businesses. The following areas will be covered: legal, tax and support measures, non-financial incentives, simplification of technical and administrative procedures, further infrastructure development, R&D support, and a variety of specific municipal measures.

E-mobility plan

In order to enhance electromobility in particular, a new e-mobility initiative will be implemented from 2019, established as one of the 12 flagship projects under #mission2030. As 99 % of CO_2 emissions in Austria's transport sector are caused by road traffic, a decisive contribution to achieving climate goals would be made by converting to zero-emission and low-emission vehicles. However, even in the most ambitious of scenarios, this will be far from enough to achieve a CO_2 emissions reduction of 15.7 million tonnes CO_2e in the transport sector by 2030.

Enhancing electromobility by increasing transparency with regard to public recharging infrastructure

The spread and availability of public recharging infrastructure are decisive factors influencing the user-friendliness of such infrastructure and are therefore factors in successfully establishing electromobility nationwide. In order to gain an overall picture of public recharging infrastructure in Austria, an official list of all public recharging facilities for electric vehicles in Austria will be

published online from 2019 at the initiative of the BMNT. The list will provide information on the technical equipment, recharging options and charging power available at every public recharging site. The list of recharging points will increase transparency regarding the availability of public recharging infrastructure, stimulate competition between recharging infrastructure operators, boost the confidence of potential vehicle purchasers in electric mobility and counter 'range anxiety' which is currently prevalent.

iv. Where applicable, measures and timeline for the phase out of energy subsidies, in particular for fossil fuels

Support with a counterproductive impact is assessed according to a separate procedure overseen by the Federal Ministry of Finance in line with the Federal Government's Climate and Energy Strategy, and is discussed together with the Federal Ministry for Sustainability and Tourism and the Federal Ministry for Transport, Innovation and Technology. A list of such support will be drawn up by June 2019 and will serve as a starting point for removing counterproductive incentives and support. The results of this work will be considered when finalising the plan during the second half of 2019.

3.2. Dimension 2: Energy efficiency

i. Planned measures and programmes to achieve national energy efficiency contributions and for energy efficiency obligation schemes under Article 7a and 7b of Directive 2012/27/EU, including measures in the building sector

Improving energy efficiency and thereby reducing energy consumption in the long term is an important lever in achieving long-term climate goals, alongside the use of renewable energy. In Austria's Climate and Energy Strategy special emphasis is therefore placed on policies and new technology which may greatly help to improve energy efficiency. This includes, for example, continuously improving the energy efficiency of the building stock (thermal renovation and high standards for new buildings) and focusing on electromobility in transport. These and other initiatives will be stepped up over the coming years in order to comply with the 'energy efficiency first' principle under the Regulation on the Governance of the Energy Union and Climate Action.

Austria believes it is essential for primary energy intensity to be continuously reduced (energy/GDP). Austria has set itself a target of improving primary energy intensity by between 25 % and 30 % as compared to 2015. In order to meet this target, the following measures are laid down in the Climate and Energy Strategy (#mission2030) and in the current government programme:

A number of these measures for promoting energy efficiency have already been discussed under point 3.1., sub-point i on transport, buildings and heating. The most important areas are outlined below:

- Evaluate and develop the Energy Efficiency Act. Much of the Energy Efficiency Directive will be transposed by the Federal Energy Efficiency Act. In addition to the energy saving obligation scheme, provisions are being laid down in respect of Austria's overarching efficiency target, the example being set by the public sector and rules on combatting energy poverty (minimising energy poverty in accordance with climate and energy targets).
- By pushing for SMEs to introduce energy management systems, energy consumption will be reduced and competiveness bolstered as a result.
- A support programme for implementing energy management systems for SMEs.
- Use of commercial and industrial waste heat through geographically tailored information on existing waste heat potential (a Heat Map in accordance with Article 14 of the Energy Efficiency Directive) and through cost-benefit analyses on the use of waste heat potential and support.
- Preparation/implementation of pilot projects for 'energy efficient towns' and 'energy efficient villages'.
- Investment in thermal building renovation, high-efficiency home technology and energy management systems in buildings (see also point 3.1., sub-point i on buildings and heating).
- Examining a reduction in the depreciation period for investments in certain energy efficiency measures.
- Including energy efficiency and climate change in learning curricula and technical training programmes.
- Greater integration of energy use, energy efficiency, resources and climate change in education overall will make energy-saving attractive.
- Improving training for professionals.
- Extensive awareness-raising initiatives will familiarise all members of society with the importance of climate change, energy efficiency and of using energy resources carefully.
- Promoting energy advisory services in all sectors will enable efficient use of energy.
- The 'Energie.Frei.raum' support programme will be set up by the BMNT in coordination with the BMVIT as a preparatory phase for the experimental clause. It will provide an experimental space for companies to test the systematic application of new integration and market models for system integration of renewable energy technology, storage and energy efficiency technology.
- Further development of support for commercial energy efficiency improvements and energy-saving measures.
- Public authorities (federal government, provinces, municipalities) setting an example as regards energy efficiency and energy savings under the Energy Efficiency Act (federal government), agreements (federal government and provinces) and support

(municipalities).

- Applying the best tenderer principle by incorporating life cycle energy consumption into public procurement (total cost of ownership).

ii. Long-term renovation strategy (residential and service buildings, public and private)

Residential buildings:

The renovation strategy will be prepared at national level and submitted to the European Commission by 10 March 2020 in accordance with Article 46(1) of the Regulation on the Governance of the Energy Union and Climate Action.

Service buildings:

The renovation strategy will be prepared at national level and submitted to the European Commission by 10 March 2020 in accordance with Article 46(1) of the Regulation on the Governance of the Energy Union and Climate Action.

Public buildings (federal government):

A new energy saving target for the period 2021-2030 will be set for central government buildings, i.e. buildings owned and used by the federal government. A building survey and calculation of the savings target in accordance with Article 5 of Directive 2012/27/EU (Energy Efficiency Directive) were used as a basis for the estimate. Details will be provided in the final NECP in 2019.

iii. Description of measures to promote energy services (e.g. contracting) in the public sector

The savings obligation for federal buildings (buildings owned and used by the federal government) under Section 16(1) of the Federal Energy Efficiency Act (BGBl. I No 72/2014) is a major incentive for savings contracting measures. The target for the period 2014-2020 is 48.2 GWh. The Federal Energy Efficiency Act refers to energy savings contracting, energy management measures and renovation measures. Projects are established in an action plan. Notably, energy savings contracting measures have been successful to date, resulting in the savings achieved representing further incentives for future energy savings contracts.

iv. Other planned measures for achieving the indicative target by 2030

The national Energy Efficiency Act, which transposes, amongst other legislation, the new Energy Efficiency Directive, is currently being evaluated. Consequently, no specific measures have yet been put in place.

v. Measures for improving the energy efficiency of gas and electricity infrastructure

At present, no specific measures are planned.

vi. Regional cooperation in this area (where applicable)

Under the draft National Energy and Climate Plan, no regional cooperation has yet been agreed in this area. Austria would refer to the derogation provided for under Article 11 of the Regulation on the Governance of the Energy Union and Climate Action according to which regional cooperation shall not be necessary until finalising the Plan in 2019. A meeting on regional cooperation took place on 20 November 2018 in Bratislava with the involvement of Slovakia, Czechia, Hungary and Poland.

vii. (National and EU) financing measures

To implement the planned measures under the National Energy and Climate Plan there will be considerable need for public financing, in particular in the areas of infrastructure development and public support. The overall need for financing remains to be clarified, as does the potential role of new instruments in the area of 'green finance'. Decisions on the national financing strategy – taking into account the potential for matched funding and possible subsidy reductions where these run counter to the dimensions of the Energy Union – will follow in 2019 in conjunction with preparations for the 2020 budget and medium-term planning for the Federal Financial Framework. Where possible, plans will take EU financing instruments into account.

viii. Measures for supporting local energy communities

e5 programme

The e5 programme offers support for municipalities looking to use energy in a more efficient and environmentally-friendly manner and to step up their use of renewable energy. To this end, each province has a programme promoter who is available to help municipalities. Ideas, knowledge and personal commitment to energy matters from residents are, above all, an important pillar of the programme. Each e5 community forms an e5 team composed of residents, experts, representatives of environmental groups, companies, municipalities, etc. who are unassociated with political structures. As an initial step, the e5 team examines which options for improving energy use are already in place on the basis of a list of measures. Subsequently, suggestions are made as to how energy efficiency could be further improved. e5 municipalities undergo regular independent reviews and are awarded a rating of between one and five 'e's, with the best rating being 'eeeee'. Approximately 220 Austrian municipalities are already on the e5 programme.

Climate and energy model regions

Extending beyond municipalities, the Climate and Energy Fund's 'climate and energy model regions' help regions make optimal use of their local renewable energy resources, harness the potential for energy savings, and sustain their economies. Climate and energy model regions promote cooperation between municipalities. A key factor behind the success of the regions is that they bring about procedural and structural change due to the close ties with decision-makers and citizens. Moreover, they are able to initiate a considerable number of measures. Domestic Environmental Support and the Climate and Energy Fund offer tailor-made investment support for climate and energy model regions, resulting in more than 4 000 successful projects so far in fields such as renewable energy, energy efficiency, sustainable mobility and awareness-raising. The *in situ* driving force behind every climate and energy model region is the model region manager. Model region managers initiate and organise projects so as to successfully implement the climate and energy policy objectives of regional plans and act as the central contact person. There are currently 91 climate and energy model regions in Austria.

Since 2016, the methodology applied under the e5 programme has also been used to ensure the quality of climate and energy model regions. Currently, some 3 million people live in an e5 municipality or climate and energy model region.

Austrian Climate Alliance

The Climate Alliance is a global partnership dedicated to combating climate change. It was founded in Frankfurt in 1990 and now brings into contact over 1 700 municipalities and towns/cities in 26 European countries with the indigenous peoples of Latin America. Through this partnership, Climate Alliance Austria has been supporting the indigenous peoples of the Upper Rio Negro, in the extreme northwest of Brazil, since 1993.

With its eight regional offices, Climate Alliance Austria is active in every province of Austria (Vienna/Burgenland, Lower Austria, Upper Austria, Salzburg, Styria, Carinthia, Tyrol and Vorarlberg). Provinces, municipalities, businesses and educational establishments are able to join the Climate Alliance. The common objectives of the Climate Alliance are to reduce greenhouse gas emissions in Europe – with their negative impact on the climate – by supporting indigenous partners in implementing local climate action measures and preserving the rainforest in South America. The core work of Climate Alliance Austria consists of information and awareness-raising, networking, training of Climate Alliance partners, and projects and campaigns.

Renewable energy communities under the Renewable Energy Expansion Act (see point 3.1.2, sub-point i for further information)

The 2018 Renewable Energy Directive requires that renewable energy communities are established. This Directive is transposed by the Renewable Energy Expansion Act. These communities enable bilateral supply contracts to be set up and, likewise, cooperative-type structures for the generation, storage and supply of renewable electricity, even beyond property boundaries. In so doing, it is also possible to set up and operate local grid structures (microgrids)

cost-effectively. Regionalisation and decentralisation of renewable electricity generation, taking advantage of progressive digitisation in the interests of establishing 'smart grids' will also improve supply security and the robustness of the system in general.

3.3. Dimension 3: Energy security

i. Policies and measures related to diversifying energy supply (including third countries), reducing dependence on imports and increasing the flexibility of the national energy system, in particular through the deployment of domestic energy sources, demand response and energy storage

Maintain efficient existing installations

Key to integrated urban development is a central heating and cooling supply to conurbations which uses waste heat from existing high-efficiency CHP plants, waste incineration, industrial waste heat and the efficient use of heat from biomass plants. Existing wind and hydroelectric installations, and high-efficiency biomass plants in agriculture and industry will continue to contribute towards the 100 % renewable electricity target and towards a renewable heating supply. Land and resource take is minimised by retaining existing high-efficiency plants, thereby transforming the energy system in an environmentally-friendly way.

Long-term supply security, in particular in energy-intensive industries, is largely based at present on natural gas, which will only be partially possible to substitute in the medium term. Sufficient quantities of stored natural gas will also be available in the future in order to help overcome any crisis situations.

Storage capacity

Significant investment in storage infrastructure and transmission and distribution networks will be made which is adapted to increased demand. Previous economic investment (e.g. in infrastructure facilities, pipelines, storage facilities, power plants) will contribute towards transforming the energy system. It is essential for existing capacity to be used and for available energy infrastructure to take on additional tasks (e.g. power-to-gas, power-to-heat, wind-to-hydrogen, power-to-liquids).

Austria also plays an important role as a key hub in the European gas market, including for gas storage in storage facilities. It will continue to play this role in the context of overall supply security in Europe. Austria works closely with international energy organisations in multilateral energy policy matters, actively participating in order to ensure secure, transparent, competitive

and sustainable energy markets and systems.

Furthermore, electrochemical energy storage facilities will be promoted as both large and small-scale storage units represent a possible solution to balancing the supply-dependent generation characteristics of renewable energy.

Storage facilities will also be remunerated for operating in the interests of the system. Given that new storage technology makes a significant contribution towards transforming the energy system, the flexibility of the technology will be recognised in how grid tariffs are designed. Storage facilities will be exempt from fees applicable to end consumption and will benefit from support for green electricity.

Storage facilities in deep geothermal energy systems will also benefit from support. Geothermal energy as a renewable energy source which is capable of feeding into baseload capacity can contribute considerably to supply security. Contrary to shallow geothermal energy, deep geothermal projects allow higher temperatures to be used. Use of existing oil and gas wells in exhausted deposits offers potential synergies, in particular by minimising the risk of unsuccessful drilling and high drilling costs.

Energy storage facilities are also a focus of the Austrian energy innovation plan. The availability of competitive energy storage facilities able to store renewable electricity on a larger scale for longer periods of time is becoming very important. Special emphasis will therefore be placed on promoting applied research projects with pilot plants demonstrating the marketability of scalable storage technology.

Demand response

See point 3.4.3, sub-points ii and v.

ii. Regional cooperation in this area

Under the draft National Energy and Climate Plan, no regional cooperation has yet been agreed in this area. Austria would refer to the derogation provided for under Article 11 of the Regulation on the Governance of the Energy Union and Climate Action according to which regional cooperation shall not be necessary until finalising the Plan in 2019. A meeting on regional cooperation took place on 20 November 2018 in Bratislava with the involvement of Slovakia, Czechia, Hungary and Poland.

iii. (National and EU) financing measures

Currently, there are no further details to report. We aim to provide details in the final NECP in 2019.

3.4. Dimension 4: Internal energy market

3.4.1. Electricity infrastructure

i. Policies and measures to achieve interconnectivity of the electricity grid taking into account EU interconnectivity targets

Austria has not set itself an interconnectivity target for 2030 as its electricity interconnection level in 2017 was 15.3 %, i.e. already above the EU's target for 2030 of 15 %.

ii. Regional cooperation in this area

Under the draft National Energy and Climate Plan, no regional cooperation has yet been agreed in this area. Austria would refer to the derogation provided for under Article 11 of the Regulation on the Governance of the Energy Union and Climate Action according to which regional cooperation shall not be necessary until finalising the Plan in 2019. A meeting on regional cooperation took place on 20 November 2018 in Bratislava with the involvement of Slovakia, Czechia, Hungary and Poland.

iii. (National and EU) financing measures, where applicable

Currently, there are no further details to report. We aim to provide details in the final NECP in 2019.

3.4.2. Energy transmission infrastructure

i. Measures related to the elements set out in point 2.4.2, including Projects of Common Interest (PCIs)

Accelerating, reducing bureaucracy and simplifying licensing procedures

Innovation and investment require a suitable framework. In order to resolve underinvestment, it is crucial to provide planning and legal certainty and to reduce bureaucracy. This applies in particular to infrastructure projects which are essential for energy transition.

At present, the procedures in place are too complicated and lengthy. This is slowing the transformation of the energy system and, in the medium term, is a risk to supply security. The aim is therefore to accelerate, reduce bureaucracy and simplify licensing procedures in line with civil rights and relevant EU legislation. In this way, obstacles will be removed and investment in the energy system increased.

Integrated grid infrastructure plan (see also point 3.1.2, sub-point i)

At present, European law requires that long-term plans be put in place to expand gas and electricity grids within the overall transmission network. Not only are those plans currently being drawn up separately, meaning that fundamental issues in terms of a strategically positive balance between the two energy sources are being overlooked, no consideration is being given to challenges at the level of the distribution network and potential consistency.

In order to exploit existing potential for optimisation by way of closer mutual consideration of the electricity and gas system, an integrated grid infrastructure plan at the level of transmission and distribution networks will act in future as a cornerstone of the supply strategy, demonstrating the interfaces and potential to be found. It will do so, for example, by identifying optimal locations for large storage and conversion facilities such as power-to-gas and similar options.

A coordinated, integrated grid infrastructure plan will be drawn up with the involvement of the provinces and municipalities (taking into account spatial-planning concerns, etc.). For this to be done, legal amendments to the 2010 Electricity Industry and Organisation Act and the 2011 Gas Act will also be required. These amendments will include definitions for the roles of the Federal Ministry for Sustainability and Tourism, the transmission system operator and the regulatory authority. Moreover, they will lay down the planning period for provisions and establish how this plan is evaluated. The same applies to enshrining the principle of fairly distributing costs between those who incur them, for example, in the event of choosing alternative or potentially more expensive transmission or route variants.

Simplification of power line regulations (see also point 3.1.2, sub-point i)

Power line regulations are due to be simplified by way of an exemption from approval under electricity law for medium-voltage power lines of up to 45 kV, whereby the current threshold of 1 kV will be increased to 45 kV. This is hugely important as there will be increased demand in the coming years to expand the medium-voltage sector due to the need for charging points in the field of e-mobility, a greater number of installations for generating renewable energy and grid infrastructure which is adapted to greater decentralised production and increased flow rates. Exempting transmission installations of up to 45 kV from approval would result in fewer approval procedures under power line regulations, thereby relieving the processing burden on operators of such installations (in particular distribution system operators) and the approval authorities (in particular provincial governments responsible under provincial legislation on power lines).

Legislation establishing district heating transmission rights

District heating is disadvantaged by the fact that transmission rights may not be established by issuing a decision where approval is denied by the owner of the land. This creates unnecessary additional costs, resulting in a cost barrier for connections.

Planned measures in relation to PCIs

With regard to PCIs, it is necessary to refer to the procedure for approving PCIs at national level established under Regulation (EU) No 347/2013 (see also first paragraph). That procedure includes a rapid approval process, streamlined administrative structures and stakeholder participation. Austria has yet to approve any projects under this procedure as no corresponding applications have been received.

ii. Regional cooperation in this area

Under the draft National Energy and Climate Plan, no regional cooperation has yet been agreed in this area. Austria would refer to the derogation provided for under Article 11 of the Regulation on the Governance of the Energy Union and Climate Action according to which regional cooperation shall not be necessary until finalising the Plan in 2019. A meeting on regional cooperation took place on 20 November 2018 in Bratislava with the involvement of Slovakia, Czechia, Hungary and Poland.

iii. (National and EU) financing measures, where applicable

At EU level, financial aid for PCIs can be applied for through the Connecting Europe Facility (CEF). The Innovation and Networks Executive Agency (INEA) is the settlement centre for CEF support. However, this is due to be replaced by a new Regulation (see proposal for a Regulation of the European Parliament and of the Council establishing the Connecting Europe Facility and repealing Regulations (EU) No 1316/2013 and (EU) No 283/2014, 2018/0228(COD)).

Nevertheless, financial aid is possible to obtain from the EIB (e.g. EFSI) or EBRD under different

criteria.

3.4.3. Market integration

i. Measures related to the elements set out in point 2.4.3

Sending correct price signals to market operators

This implies, above all, allowing price spikes (scarcity pricing) and limiting interference with pricing mechanisms. Negative wholesale prices should be avoided in line with European practice.

Making entry into the energy balancing and reserve market more attractive

Important measures include amending regulatory requirements, helping to reduce intervals and encouraging the entry of new participants.

This will also prevent counterproductive incentives in relation to climate and energy targets.

Introducing annual flexibility reporting

In order to better understand the energy balancing and reserve market, it is essential to examine each year the potential for flexibility, the number of flexibility providers on the energy balancing markets and the number of industrial customers providing flexibility.

Promoting stable conditions and reduction of bureaucracy for aggregators.

Aggregators will be supported by stable conditions and a reduction in bureaucracy involved in participating in the market. To do so requires a clear legal framework for aggregators and third parties.

Non-balancing of meter points

In order to fairly distribute the cost of maintaining and expanding the grid infrastructure needed to transform the energy system, non-balancing of meter points will be ensured.

ii. Measures to increase the flexibility of the energy system with regard to renewable energy such as smart grids, aggregation, demand response, storage, distributed generation, mechanisms for dispatching, re-dispatching and curtailment, real-time price signals, including the roll-out of intraday market coupling and cross-border balancing markets

Making energy systems more flexible

To maximise the use of renewable energy when making efficient use of existing and new infrastructure, flexibility in the energy system must be encouraged, including:

- flexibility in the area of energy provision (sector coupling, targeted temporal use of non-volatile sources such as biomass, etc.)
- flexibility in consumption (e.g. thermal buffering for heating and cooling building stock, adapting industrial and commercial processes)
- flexibility through storage (e.g. electricity, heating and gas storage facilities)
- flexibility through smart grid management (e.g. smart electricity grids, flexible heating grids)

Sector coupling

Sector coupling is a vital part of developing a decarbonised energy system. This means linking together previously separate systems (electricity, heating, mobility, industry). Through renewable energy sources which supply electricity in particular, sector coupling will help decarbonise all sectors of the economy. Furthermore, through the use of energy-efficient technology, e.g. heating powered by heat pumps, electric vehicles, etc. energy consumption will be reduced significantly. Sector coupling makes it possible for large, cost-effective energy storage facilities to be used outside of the electricity sector and for the flexibility of electricity demand to be increased significantly. In this way, fluctuations in variable renewable energy sources, such as wind and solar energy, can be offset without having to rely too much on more expensive electricity storage. The following coupling is currently in use or being tested: power-to-gas, power-to-heat, power-to-chemicals and cogeneration.

Storage capacity

See point 3.3, sub-point i

Extending alternative financing instruments and citizen participation

'Green finance' is one of the flagship projects of the Austrian Energy and Climate Strategy. Further details are expected to follow in 2019. In this regard, an 'energy transition bond' for renewable energy and efficiency projects is being considered.

iii. Where applicable, measures to ensure non-discriminatory participation of renewable energy, demand response, etc.

See point 3.4.3, sub-points ii and v.

iv. Where applicable, measures to protect consumers, especially against energy poverty

Numerous safeguards have already been put in place to protect consumers:

- Basic social services for households are mandatory (see Section 77 of the 2010 Electricity Industry and Organisation Act (= contracting obligation))
- A tariff calculator has been set up by the regulatory authority so that price-related data and conditions are published in a way which is transparent and non-discriminatory in order to also make it easy to switch supplier (see Section 65 of the 2010 Electricity Industry and Organisation Act)
- A rigorous electricity labelling system is in place aimed at providing end electricity users with a breakdown of the share of each energy source (primary energy sources) found in the energy mix used by suppliers the previous year. In this way, end customs are also able to assess the electricity supplied on the basis of qualitative characteristics (see in particular Section 79a of the Electricity Industry and Organisation Act)
- Dynamic pricing: smart meter rollout + accompanying measures such as a right to monthly billing in accordance with Section 81(6) of the 2010 Electricity Industry and Organisation Act

As an integral part of end-customer services, E-Control has set up an arbitration body – notified by the Federal Ministry of Labour, Social Affairs and Consumer Protection (BMASK) to the European Commission – through which electricity and gas customers may seek help in the event of difficulties with grid operators or suppliers.

Furthermore, in order to strengthen market integration and as a 'service and advice' initiative, guidelines, for example, have been developed for consumers, electricity traders and suppliers by the regulatory authority in order to explain more clearly the complex legal bases and correlations in the form of an overview and as regards the processes carried out.

Measures for combatting energy poverty

See point 3.4.4.

v. Description of measures to enable and develop demand response, including those addressing tariffs to support[21] dynamic pricing

Balanced tariff structure

Flexible grid tariffs which work in the interests of the system can have a balancing effect on the

[21] In accordance with Article 15(8) of Directive 2012/27/EU.

energy system and thus reduce overall system costs. Grid tariff structures will be simplified and made more transparent for consumers so that they can also take future dynamic pricing into account.

Adapting the grid tariff structure Promoting smart meters and prosumer grid tariffs for households and businesses

To exploit grid stabilisation and load balancing potential, households and businesses applying innovative models using interruptible installations, such as heat pumps, photovoltaic systems, electricity storage facilities and electric vehicles, should be able to benefit from low-cost 'prosumer grid tariffs'. Opportunities to join up to electricity or heat generation facilities will be extended on a voluntary basis. All prosumers will be entitled to a smart meter and will therefore have the right to join up to such innovative models.

Smart meter roll-out 2019

Under Austria's Smart Metering Regulation, 95 % of all households must be equipped with a smart metre by 2022. Smart meters will be rolled out by distribution system operators based on technical and economic considerations. The actual timetable for switching meters will be drawn up individually by the distribution system operators.

3.4.4. Energy poverty

i. Where applicable, policies and measures to achieve the objectives set out in point 2.4.4.

In Austria, the federal government and provinces have support instruments suited to directly or indirectly combatting energy poverty. These include, in particular, minimum income instruments, housing subsidies (subject support) and building support granted for housing construction and renovation works. The latter is object-specific support, which in many cases may be supplemented by subject-specific characteristics (in particular, income ceilings, families, etc.).

In line with the analysis under section 2.4, long-term effective investment in the building stock is needed to overcome energy poverty in Austria, targeting both building envelopes and heating and hot water systems. Such measures usually involve high investment costs which precisely those households living in or near poverty would struggle to handle using their own resources. Measures involving relatively modest investments can often also have a significant impact. Such measures should offer households sufficient information which is easy to put into practice and financial support. In addition to adapting support, accompanying measures of an informal and organisational-legal nature are needed to improve access to independent and public information and advice, and to reduce organisational barriers (e.g. liabilities for renovation loans) for households in energy poverty.

3.5. Dimension 5: Research, innovation and competitiveness

i. Policies and measures related to research targets (including the 2050 targets for certain types of clean technology)

In order to implement Austria's Energy and Innovation Strategy, an energy research plan was laid down under the Climate and Energy Strategy with the following priorities:

Energy research initiative 1 – Building blocks for energy systems of the future

(Flagship 9 of the Austrian Climate and Energy Strategy)

Future energy systems will comprise connected sub-systems which will need to integrate several parties and types of technology. Under these measures, technology and solutions for particular challenges in the energy system will be developed on a targeted basis as part of mission-oriented research and development.

In addition to integrating energy sources and infrastructure, the interplay between different fields and sectors (mobility, business and industry, agriculture, etc.) in this mission-oriented approach is as important as the interaction between different innovation systems (e.g. regional players and global start-ups). Socio-economic and socio-technical issues will need to be solved in conjunction with technical issues. New business models, processes for gaining acceptance and user behaviour need to be better understood and taken into account. Involving future users in co-creation processes at an early stage will be crucial to long-term success.

The following 'building blocks' of the future energy system will be developed:

Plus energy areas which, by optimising civil infrastructure, are able to cover all energy needs via renewable energy – the highest possible efficiency in all areas of end energy consumption and the development of suitable business models. They are a prerequisite for CO_2-neutral towns/cities and urban areas. In this way, energy generated locally will mainly be used locally by making end consumption more flexible whilst exploiting storage facilities and synergy effects from infrastructure.

Smart systems and grids which will enable the local and regional energy supply to become up to 100 % renewable in the foreseeable future and help businesses and private individuals become part of regional value chains and inter-regional markets. Such systems and grids are key to making energy systems flexible in the interests of integrating sectors, energy sources and infrastructure, and providing and using a noticeably high percentage of renewable energy. They enable municipalities and regions to set ambitious

energy targets, create regional value chains and trade energy between regions.

Breakthrough technology for industry which enables raw material and energy consumption to plummet, emissions to fall significantly and resource and energy independence to increase whilst maintaining constant output. They are key to decarbonising industrial processes and products, in particular in energy-intensive industries. New products and processes will focus on energy and resources being used in a highly efficient and, as far as possible, hierarchical manner and will enable the energy needs of industrial installations and the fluctuating supply of energy from renewable sources to be matched. Issues related to CO_2-neutral steel production play just as important a role as processes and products using bio-based raw materials.

Energy-efficient mobility systems of the future: To meet the EU's mandatory targets and avoid purchasing emissions allowances, intensive research into mobility is needed. At the same time, the competitiveness of the Austrian car and aeronautics industries will need to be safeguarded by promoting R&D as technology continues its revolution towards zero and low-emission vehicles, lightweight construction and automated transport. Moreover, organisational and social innovation will also need to be applied. It is also important to support EU initiatives, such as battery cell production in Europe, through complementary national funding programmes so that e-mobility achieves its breakthrough. The domestic industry must also be integrated into international value chains across the entire battery/vehicle/energy supply system, from production to recycling.

Energy research initiative 2 – 'Mission Innovation Austria' programme

(Flagship 10 of the Austrian Climate and Energy Strategy)

An additional package of measures on transforming the energy system will be implemented through the 'Mission Innovation Austria' programme under flagship project 10 from #mission2030. This programme was set up by the Ministry for Transport, Innovation and Technology and the Ministry for Sustainability and Tourism.

In order to increase the international visibility of Austrian solutions on global markets, to introduce incentives for investing in the domestic economy, to stimulate implementation on domestic European markets and to prepare as best as possible for new challenges posed by Horizon Europe and the SET Plan, large-scale testing of technology and solutions is essential in real operating conditions, with the involvement of users and building on previous R&D findings. The 'Energie.Frei.raum' support programme will be set up with the agreement of the Ministry for Transport, Innovation and Technology in preparation for the experimental stage in order to test the systematic application of new integration and market models for system integration of renewable energy technology, storage and energy efficiency technology. This 'living lab' approach is important for the required transformation of energy and mobility systems as research results often fail when implemented in real-world environments or when scaled up.

In large test areas, innovative energy technology from Austria will be used to develop and demonstrate model solutions for smart, safe and affordable energy and transport systems for the future. Projects will be developed with a wide range of innovators from business, science, regional actors and stakeholders. Model energy regions are intended to show that a 100 % renewable energy supply using Austrian innovation is feasible. Innovative energy technology will be tested in model regions and subsequently rolled out nationwide through market programmes under the Climate and Energy Fund.

Three model regions (in place between 2018 and 2025) are already up and running The Federal Government's Climate and Energy Fund, which is financed by the Ministry for Transport, Innovation and Technology, will invest up to EUR 120 million by 2021 in three model regions: WIVA P&G (hydrogen/methane), NEFI (100 % renewable energy supply for domestic industry) and GreenEnergyLab (smart grids/demand-side management/demand response).

The model regions will bring new technology and applications to market maturity through joint research, technology and innovation by stakeholders in the Austrian research field. Significant financing will also be provided by the private sector. More than 200 project partners from business, science and research (companies representing 60 %) are working on how our energy will be in the future and are successfully positioning Austria at the forefront of international efforts. The following issues are vital for the 'energy model regions' research, technology and innovation initiative:

- applying Austrian energy innovation which will enable energy to be 100 % renewable,
- sector coupling and system integration,
- making Austria more of a leading market in innovative energy technology,
- achieving the greatest possible use and acceptance of the public.

'Innovative energy storage at home and abroad' research, technology and innovation priority

In future, more flexible energy systems will have to integrate different energy sources (solar, wind, biogenic sources) and various means of transport and storage (electricity, heating, gas) and make available different energy products for the corresponding domains in which they are applied (mobility, heating, industrial applications, etc.). To do so, Austria requires new energy storage technology with a capacity of some 5 TWh, in particular for electricity and heating in the housing, industry and mobility sectors.

The issue of storage systems (including hydrogen technology) is currently being treated as a top priority and cross-cutting issue, interwoven with mission-oriented priorities and broad implementation initiatives.

Austria already plays a key role in the field of storage, a role which needs to be developed and

strengthened through research and development, through the creation of research infrastructure and pilot installations, and by providing market entry support to companies. Model projects which can be taken further already exist in the residential sector, e.g. through 'component activation' for individual buildings or seasonal large-scale storage facilities connected to district heating networks, and in the industrial sector in the field of 'hydrogen/ammonia'.

Alongside the Climate and Energy Fund, the Federal Ministry for Transport, Innovation and Technology has developed recommendations with respect to innovation and for the stages involved in implementing the 'Innovative energy storage at home and abroad' priority. As part of this initiative, research, technology and innovation priorities are planned for stationary and mobile applications. In the coming years, between EUR 40 and 50 million from existing research programmes will be invested in energy storage systems.

ii. Where applicable, cooperation with other Member States and how the SET Plan objectives are being translated into national policy

For the purposes of implementing the Federal Government's Climate and Energy Strategy, European and international cooperation are key factors in, on the one hand, bringing Austrian stakeholders together and, on the other hand, joining forces and developing a range of comprehensive solutions. This is happening through international initiatives such as the Strategic Energy Technology Plan (SET Plan), collaboration programmes organised by the International Energy Agency, and participation in Mission Innovation.

European cooperation through the SET Plan

The Strategic Energy Technology Plan (SET Plan) is considered an essential mechanism within European energy technology policy aimed at developing low-carbon technology and improving its competitiveness. Financing is provided by the EU, Member States and the private sector according to the 'public-public-private' principle. Through active participation, considerable opportunities are being opened up for businesses.

Austria takes the view that an essential driver for implementing the SET Plan are the energy research calls for tender under the European Framework Programme for Research and Innovation ('Horizon 2020') and multilateral research funding cooperation between European countries, e.g. under 'Joint Programming Initiatives' or 'ERA-NETs'. Austria is represented in energy-related areas of Horizon 2020 and the SET Plan by the Federal Ministry for Transport, Innovation and Technology and the Federal Ministry for Sustainability and Tourism.

Austria is actively involved in selected SET Plan key actions currently focused on:

- new technologies and services for consumers

- resilience and security of the energy system
- new materials and technologies for buildings
- energy efficiency for industry

Transnational cooperation

In view of the fact that more than 80 % of research funding in Europe is provided publicly by national authorities, mainly through national and regional research programmes, more coordination and agreement between national and regional research programmes is intended in order to achieve Europe's major strategic goals. Following this basic idea, ERA-NET was developed under the 6th and 7th EU Framework Programmes and further enhanced under Horizon 2020 in order continue facilitating cross-border cooperation in research and technology issues. The Federal Ministry for Transport, Innovation and Technology is currently coordinating the 'ERA-Net Smart Grids Plus' and 'ERA-NET Smart Cities and Communities' initiatives and is involved in further energy-related action covered by ERA-NET.

One example of a successful international venture is the transnational Smart Energy Systems Joint Programming Platform based on an Austrian initiative. The Federal Ministry for Transport, Innovation and Technology is coordinating a network of 30 national and regional research, technology and innovation grant schemes in 23 European or associated countries covering smart and digital energy systems and integrated regional energy systems. The Joint Programming Platform has already become an integral part of SET Plan Action 4. The 'National Stakeholders Coordination Group' organised by Member States under the European Technology and Innovation Platform 'Smart Networks for the Energy Transition" (ETIP SNET) ensures that discussions are continuing with industry. The SET Plan Action 4 Working Group, also organised by Member States, has developed a joint implementation plan in close cooperation with ETIP SNET, ETIP Renewable Heating and Cooling, ETIP PV and ETIP Geothermal.

The objective of the ERA-NET Smart Energy Systems Joint Programming Platform is to initiate and promote transnational research, technology and innovation projects in co-creation with regional operators and users in participating countries. Cooperation under transition-to-market programmes in participating countries and with private investors has begun.

To date, four tenders have been organised on 'Smart Grids' and 'Integrated Regional Energy Systems' corresponding to total funding in excess of EUR 100 million of public funds from participating countries. For 2019, the focus is planned to be on storage systems and, for 2020, on digitisation of energy systems and grids. Further development of the priorities and additional annual tenders are envisaged.

Global initiatives

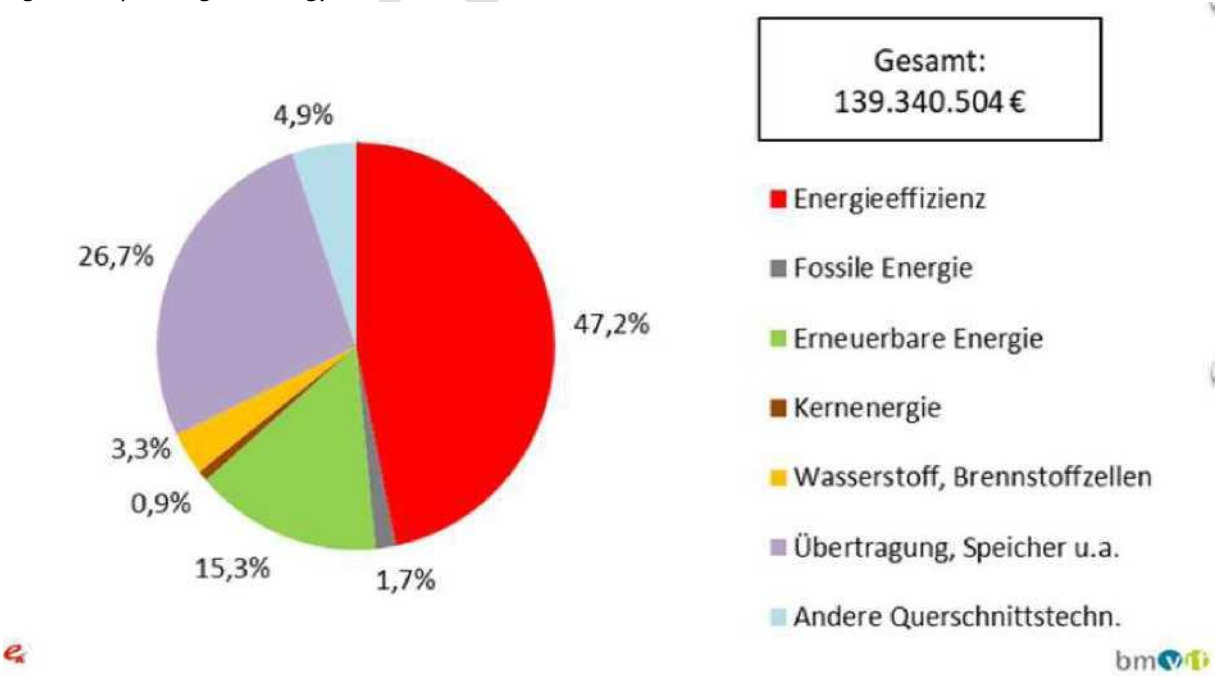
By joining 'Mission Innovation' in 2018, a global clean energy initiative, another step was taken towards increased international cooperation and coordinated research and development efforts. Together with the Chamber of Commerce, a governance structure was set up in Austria for the purposes of participating in Mission Innovation. With the agreement of Austrian stakeholders, participation in Mission Innovation will initially focus on Smart Grids (ICI), Heating and Cooling of Buildings (IC7) and Hydrogen (IC8).

Austrian experts and business are also active in numerous expert groups and technology programmes organised by the International Energy Agency ('IEA Technology Collaboration Programmes'). These are another important mechanism for Austria to assert its global position in the field of energy and environmental technology. Every year, approximately EUR 4 million in funding is provided by the Federal Ministry for Transport, Innovation and Technology so that Austrian stakeholders are able to participate.

iii. Where applicable, (national and EU) financing measures

In 2017, public spending on energy research in Austria amounted to EUR 139.3 million, i.e. EUR 1.6 million less than in the previous year. The priorities for state-funded energy research in Austria are energy efficiency, transmission/storage technology (smart grids) and renewables.

Figure 9: Spending on energy research in Austria in 2017



Total spending on energy research in Austria in 2017 according to IEA codes

Source: Austrian Energy Agency, BMVIT

	Total: EUR 139 340 504
	Energy efficiency
	Fossil fuels
	Renewable energy
	Nuclear energy
	Hydrogen, fuel cells
	Incl. transmission, storage
	Other cross-cutting technologies

SECTION B: ANALYTICAL BASIS

4. Current situation and projections 'with existing measures' (WEM)

4.1. Projected evolution of main exogenous factors influencing energy system and GHG emissions

i. Macroeconomic forecasts (GDP and population)

Table 7: Population and GDP growth

WEM parameter scenario	2016	2030	2040	2050
Population [million]	8.74	9.33	9.56	9.70
GDP growth [%]	2.0	1.5	1.5	1.5

GDP 2020: 1.8 %

Source: Federal Environment Agency, 2018

ii. Sectoral changes expected to impact the energy system and GHG emissions

No fundamental sectoral changes expected in 'with existing measures' (WEM) scenario.

iii. Global energy trends, international fossil fuel prices, EU ETS carbon price

Table 8: European Commission price recommendations

WEM parameter scenario	2016	2030	2040	2050
International oil price (USD 16/boe]	47.5	121	134	149
International gas price [EUR 16/GJ]	4.7	10.5	11.6	12.9

Allowance price [EUR 16/t CO_2]	7.8	34.7	51.7	91.0

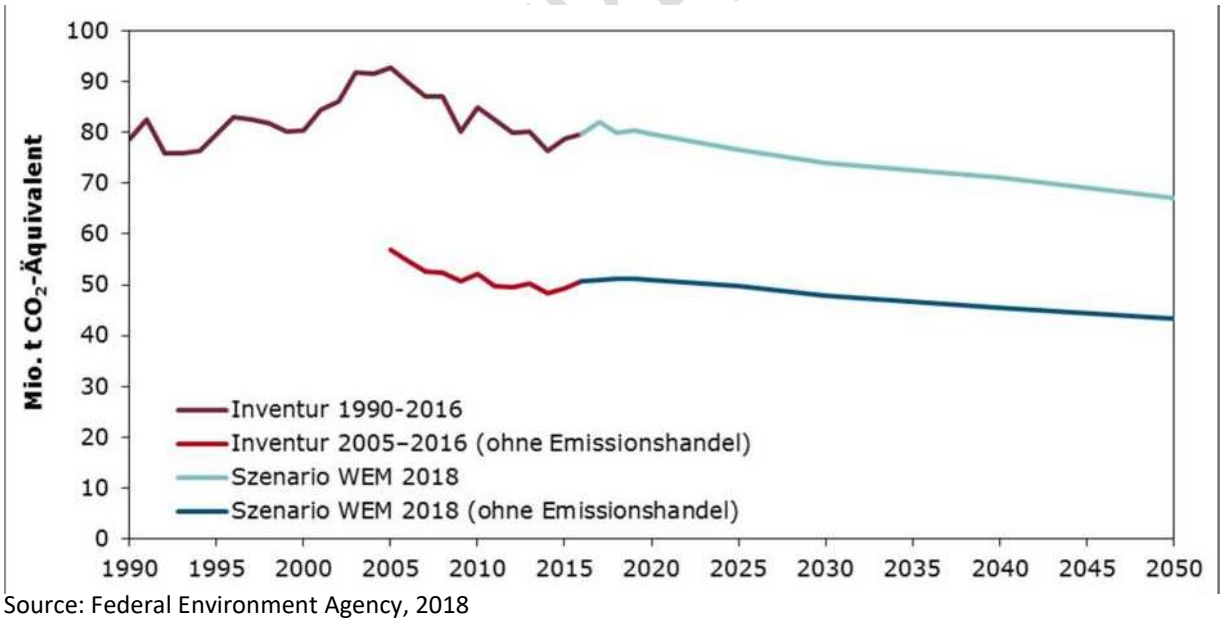
Source: Federal Environment Agency, 2018

4.2. Dimension: Decarbonisation

4.2.1. GHG emissions and removals

i. Trends in current GHG emissions and removals in the EU ETS, effort sharing and LULUCF sectors and different energy sectors

Figure 10: GHG emissions inventory and WEM scenario with and without emissions trading



Source: Federal Environment Agency, 2018

	mt CO_2 eq
	1990-2016 inventory
	2005-2016 inventory (without emissions trading)
	2018 WEM scenario
	2018 WEM scenario (without emissions trading)

Table 9: Total GHG emissions and broken down between EU ETS, Effort Sharing and LULUCF

(in mt CO_2 eq) excluding emissions trading as of 2013

	2005	2010	2015	2020	2030	2040	2050
Total (excluding LULUCF)	92.7	84.9	78.9	79.7	74.0	71.1	67.2
ETS	35.8	32.7	29.5	28.7	26.1	25.6	23.8
Effort Sharing	56.8	52.2	49.3	51.0	47.9	45.4	43.3
LULUCF	-10.6	-5.9	-4.4	-7.7	-4.6	-6.4	-2.5

Source: Federal Environment Agency, 2018

N.B.: Differences due to rounding

ii. Projection of sectoral developments with existing national and Union policies and measures at least until 2040 (including for 2030)

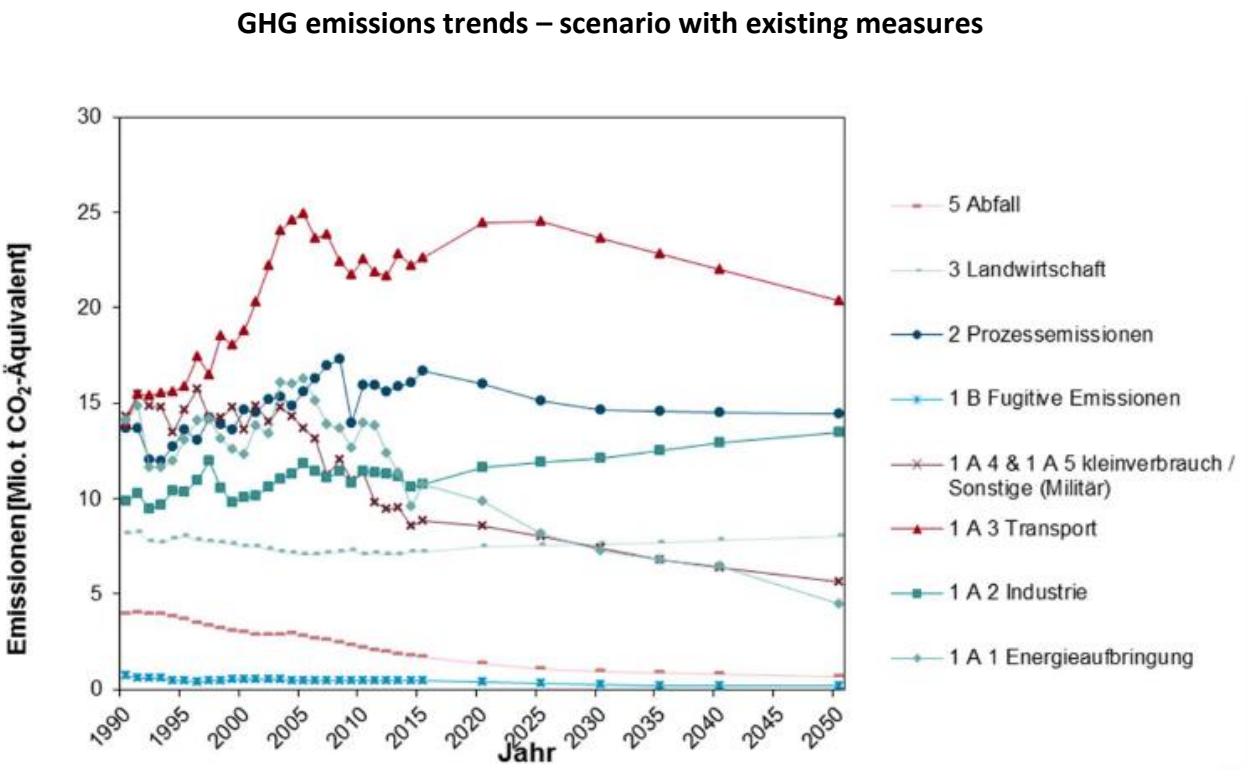
Table 10: GHG emissions according to CRF sector breakdown (including emissions trading) in mt

CRF sector	1990	2005	2010	2015	2020	2030	2040	2050
Total	78.7	92.7	84.9	78.9	79.7	74.0	71.1	67.2
Total (including LULUCF)	*66.7*	*82.1*	*79.1*	74.4	*72.0*	*69.*4	64.7	64.7
1 A 1 Energy supply	14.1	16.3	14.0	10.8	9.9	7.3	6.5	4.5
1 A 2 Industry	9.9	11.8	11.4	10.7	11.6	12.1	12.9	13.5
1 A 3 Transport	14.0	24.9	22.5	22.6	24.5	23.7	22.0	20.3
1 A 4 Small-scale use	14.2	13.6	11.3	8.8	8.5	7.3	6.3	5.6
1 A 5 Other (military)	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1
1 B Fugitive emissions	0.7	0.4	0.5	0.4	0.4	0.3	0.2	0.2
2 Process emissions	13.7	15.6	15.9	16.7	16.0	14.7	14.5	14.4
3 Agriculture	8.2	7.1	7.1	7.2	7.5	7.6	7.8	8.0
5 Waste	3.9	2.8	2.2	1.7	1.3	0.9	0.8	0.7
4 LULUCF	-12.0	-10.6	-5.9	-4.4	-7.7	-4.6	-6.4	-2.5

Source: Federal Environment Agency, 2018

N.B.: Differences due to rounding

Figure 11: GHG emissions according to CRF sector breakdown (including emissions trading)



Source: Federal Environment Agency;

Emissions [mt CO_2 eq]	Emissions [mt CO_2 eq]
5 Waste	5 Waste
3 Agriculture	3 Agriculture
2 Process emissions	2 Process emissions
1 B Fugitive emissions	1 B Fugitive emissions
1 A 4 & 1 A 5 Small-scale use/other (military)	1 A 4 & 1 A 5 Small-scale use/other (military)
1 A 3 Transport	1 A 3 Transport
1 A 2 Industry	1 A 2 Industry
1 A 1 Energy supply	1 A 1 Energy supply
Year	Year

4.2.2. Renewable energy

i. Current share of renewable energy in gross final energy consumption and in different sectors (heating and cooling, electricity and transport) as well as per technology in each of these sectors

In Austria in 2016, the share of renewable energy within the gross final consumption of energy was 33.5 %. The target of 34 % by 2020 is therefore already in sight.

With regard to energy use for heating and air conditioning, the share of renewable energy in 2016 was 33.3 %.

With regard to gross electricity consumption, the share of renewable energy in 2016 was 72.6 %.

With regard to energy use in transport the share of renewable energy in 2016 was 10.6 %.

ii. Indicative projection of developments in existing policies and measures by 2030 (looking forward to 2040)

Table 11: Developments in renewable energy and share, expressed as total

	2016	**2020**	**2030**	**2050**
Final energy consumption (PJ)	1 121	1 155	1 180	1 226
Gross inland consumption (PJ)	1 435	1 464	1 474	1 525
Renewable share	33.5 %	34.3 %	35.8 %	43.4 %

Source: Federal Environment Agency, 2018

Table 12: Electricity supply from renewable energy sources and fossil fuels

Supply (TWh)	**2015**	**2020**	**2030**	**2050**
Fossil	15	14	11	7
Hydroelectric power	37	42	42	45
Biomass	4	5	5	6
Ambient heat, etc.	0	0	0	0
Photovoltaics	1	2	3	13
Wind energy	5	8	9	18
Total	**62**	**70**	**71**	**89**
Imports	10	6	14	19
Supply	**72**	**76**	**84**	**108**

Source: Federal Environment Agency, 2018

N.B.: Differences due to rounding

4.3. Dimension: Energy Efficiency

i. Current primary and final energy consumption in the economy and per sector (including industry, residential, service and transport)

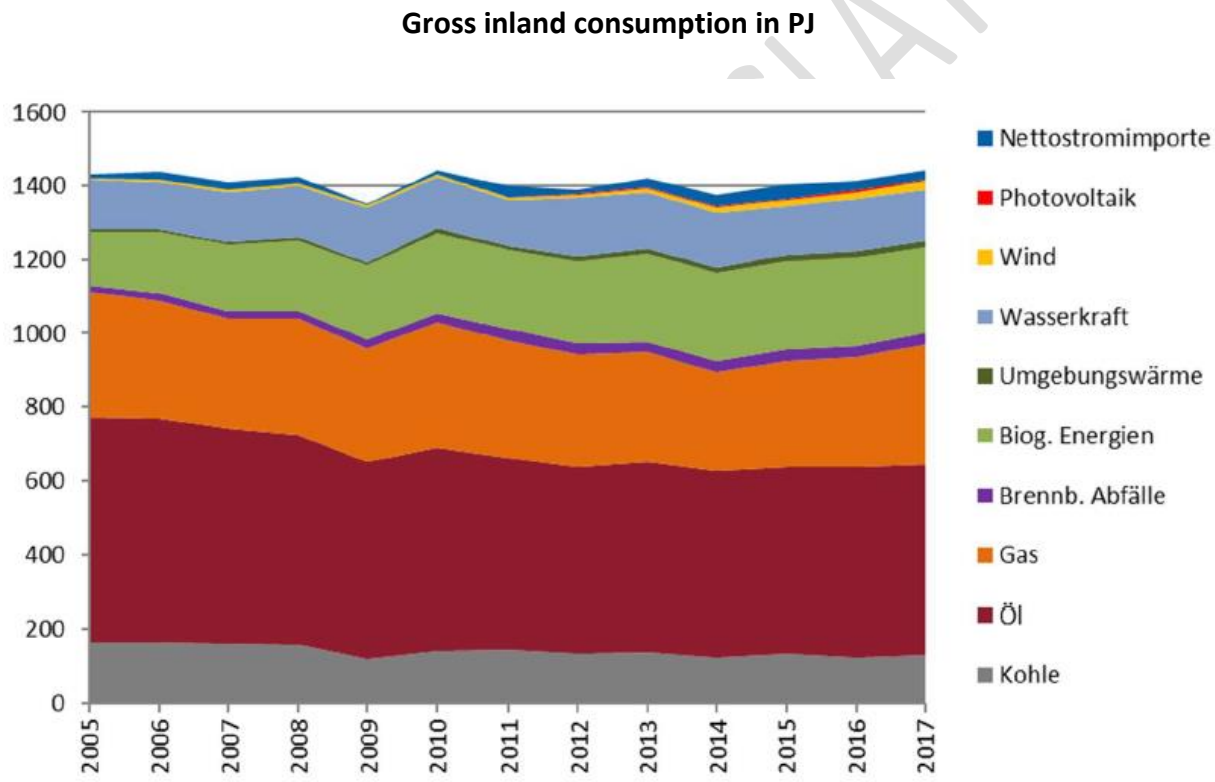
Total economy: See sub-point iii.

Table 13: Final energy consumption 2016 (1 121 PJ); share of all energy sources by sector

2016	Fossil	Renewable	Electricity	District heating
Industry	50 %	18 %	28 %	3 %
Transport	91 %	6 %	3 %	0 %
Residential	35 %	29 %	24 %	12 %
Services	23 %	8 %	45 %	24 %
Agriculture	45 %	33 %	19 %	2 %

Source: Federal Environment Agency, 2018

Figure 12: 2005-2017 gross inland consumption by energy source

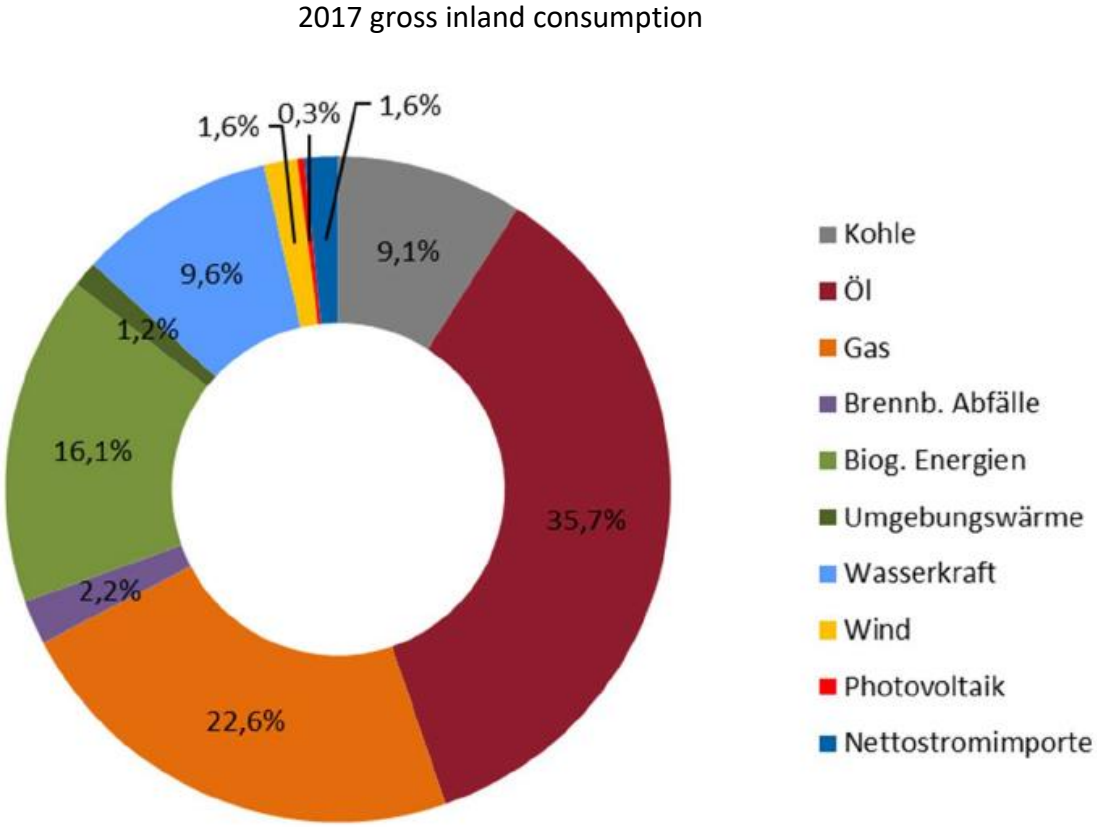


Source: BMNT, Energy in Austria 2018 – figures, data, facts

	Net electricity imports
	Photovoltaics
	Wind energy
	Hydroelectric power
	Ambient heat
	Biogenic energy
	Combustible waste
	Gas

	Oil
	Coal

Figure 13: Gross inland consumption (2017, share per energy source)

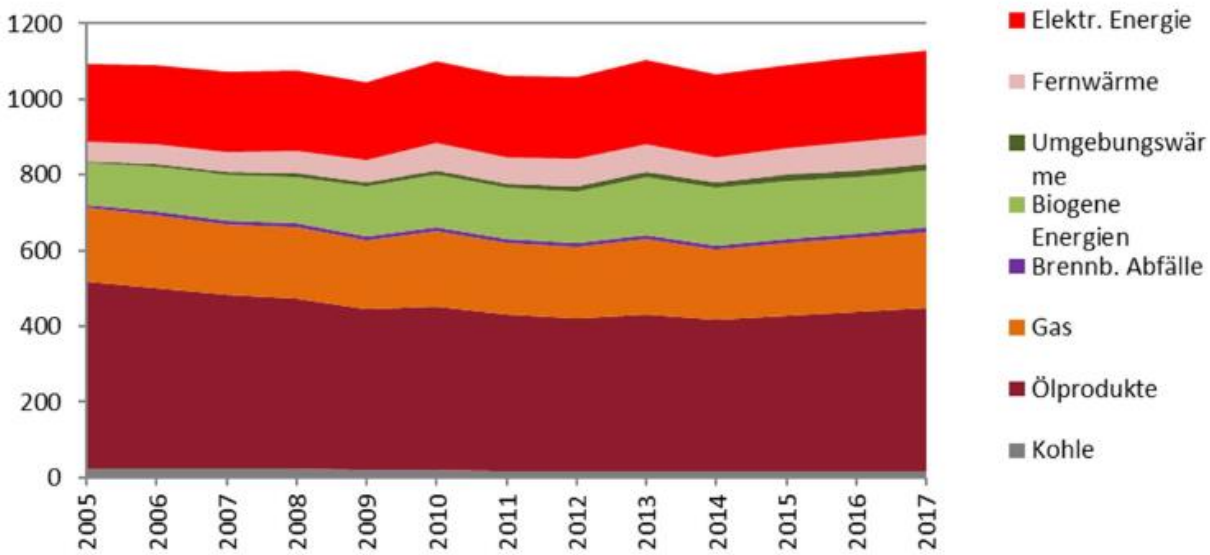


Source: BMNT, Energy in Austria 2018 – figures, data, facts

	Coal
	Oil
	Gas
	Combustible waste
	Biogenic energy
	Ambient heat
	Hydroelectric power
	Wind energy
	Photovoltaics
	Net electricity imports

Figure 14: 2005-2017 final energy consumption by energy source

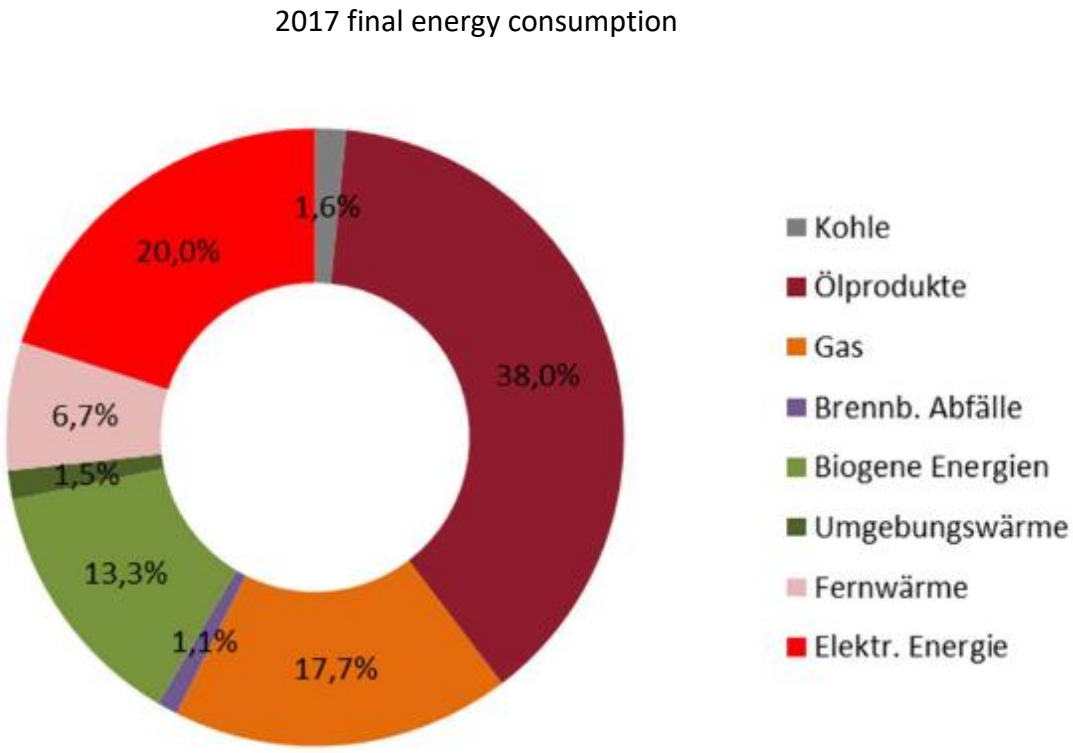
Final energy consumption in PJ



Source: BMNT, Energy in Austria 2018 – figures, data, facts

	Electrical energy
	District heating
	Ambient heat
	Biogenic energy
	Combustible waste
	Gas
	Oil products
	Coal

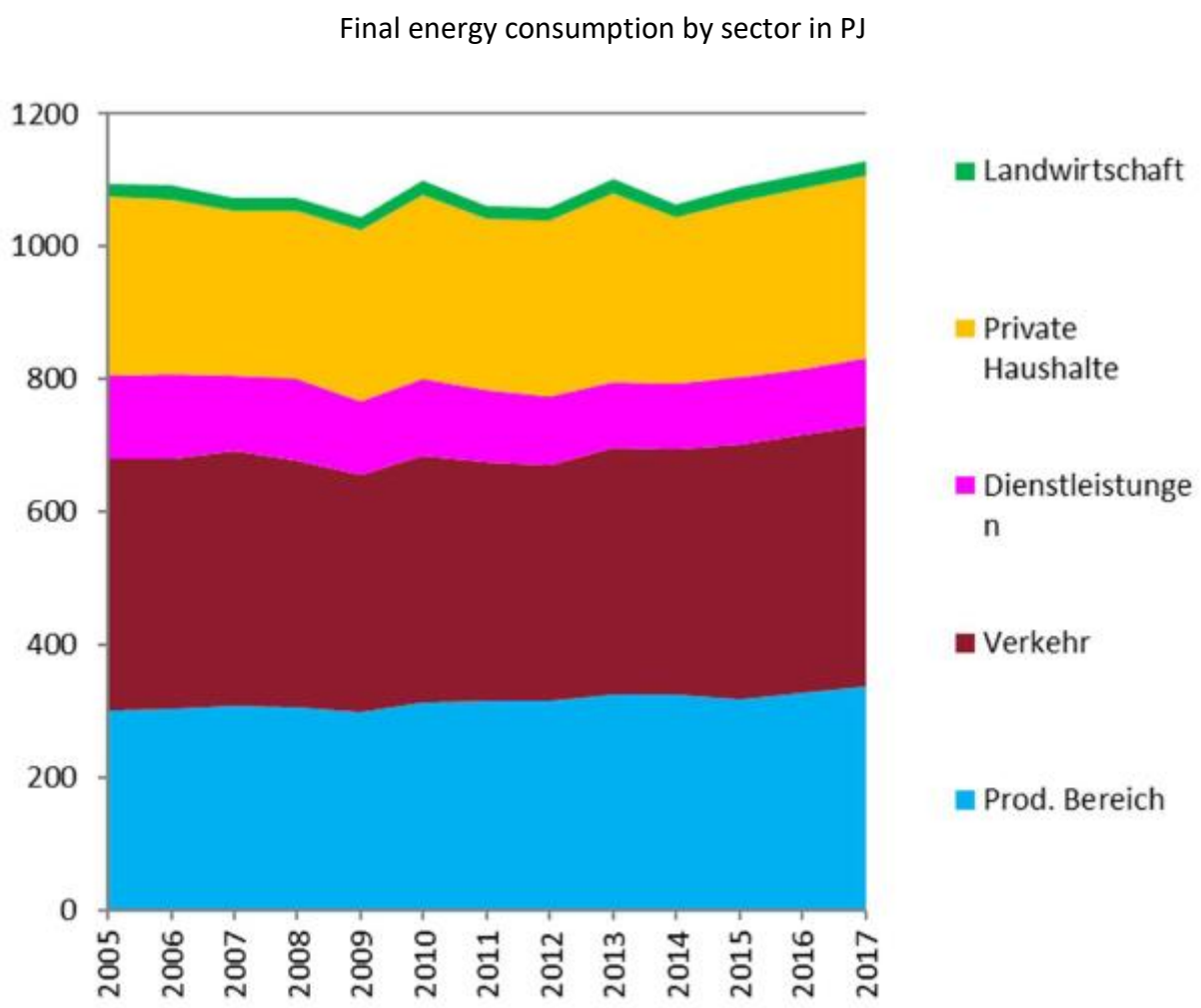
Figure 15: Final energy consumption (2017, share per energy source)



Source: BMNT, Energy in Austria 2018 – figures, data, facts

	Coal
	Oil products
	Gas
	Combustible waste
	Biogenic energy
	Ambient heat
	District heating
	Electrical energy

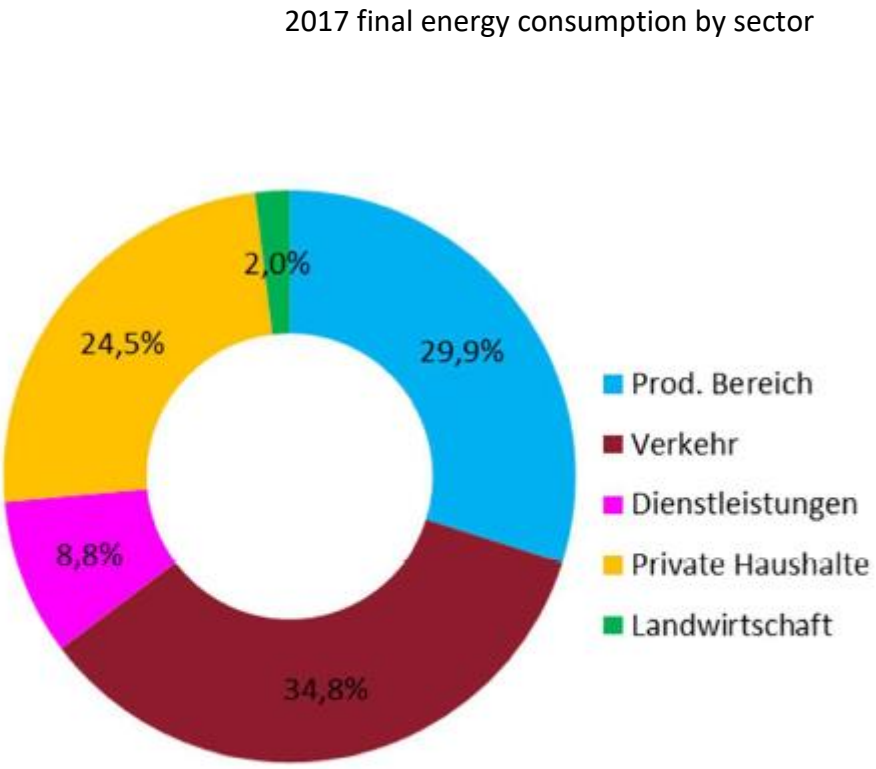
Figure 16: 2005-2017 final energy consumption by sector



Source: BMNT, Energy in Austria 2018 – figures, data, facts

	Agriculture
	Private households
	Services
	Transport
	Production sector

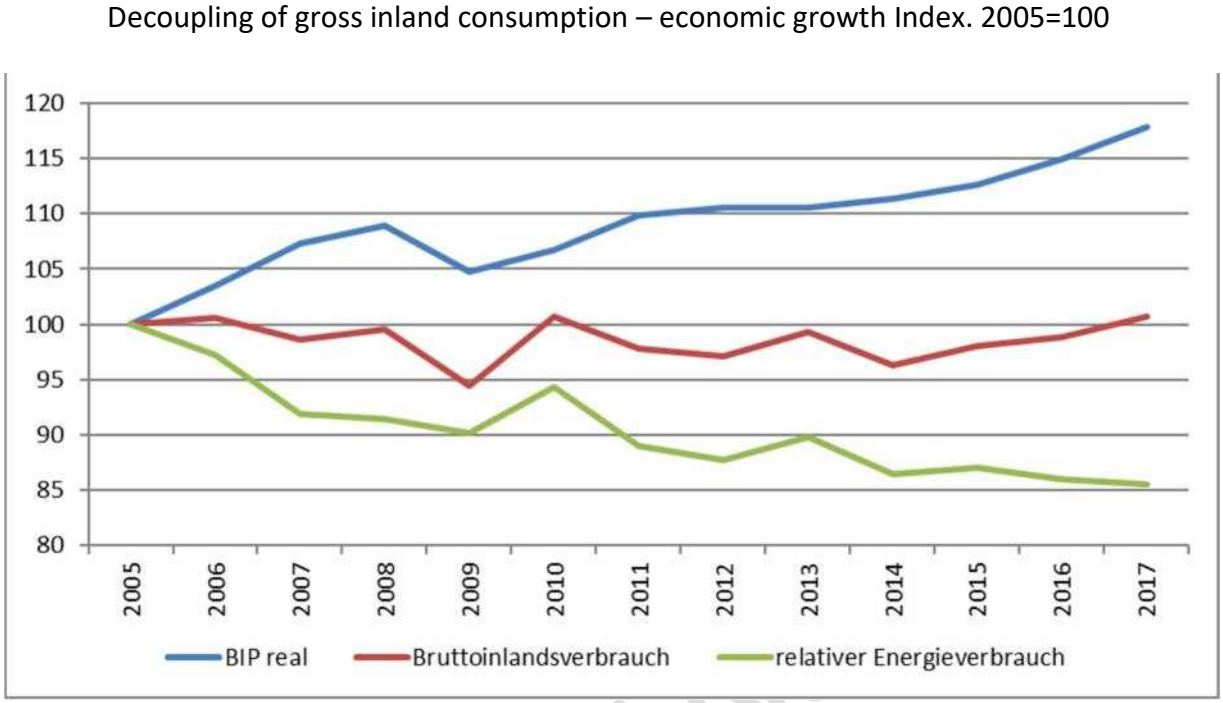
Figure 17: Final energy consumption (2017, share per sector)



Source: BMNT, Energy in Austria 2018 – figures, data, facts

	Production sector
	Transport
	Services
	Private households
	Agriculture

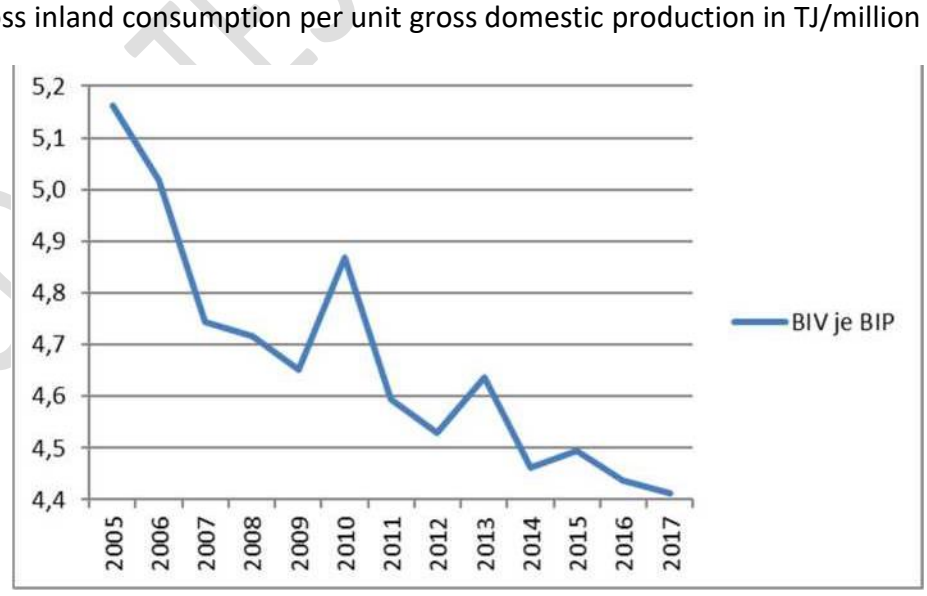
Figure 18: Developments in GDP, gross inland consumption and relative energy consumption 2005-2017 *(2005=100)*



Source: Federal Ministry for Sustainability and Tourism, 2018

	Real GDP
	Gross inland consumption
	Relative energy consumption

Figure 19: Gross inland consumption relative to gross domestic production, 2005-2017



Source: Federal Ministry for Sustainability and Tourism, 2018

	GIC per unit

	GDP

ii. Current potential for the application of high-efficiency cogeneration and efficient district heating and cooling

In Austria, significant use is already being made of high-efficiency cogeneration and efficient district heating and cooling. Grid densification is ongoing. The area of households and services includes a further slight increase in district heating in the 'with existing measures' scenario.

iii. Projections considering existing energy efficiency policies, measures and programmes as described in point 1.2, sub-point ii for primary and final energy consumption for each sector at least until 2040 (including for the year 2030)

Table 14: Projection of final energy consumption and gross inland consumption (total)

	2016	2020	2030	2050
Final energy consumption (PJ)	1 121	1 155	1 180	1 226
Gross inland consumption (PJ)	1 435	1 464	1 474	1 525

Source: Federal Environment Agency, 2018

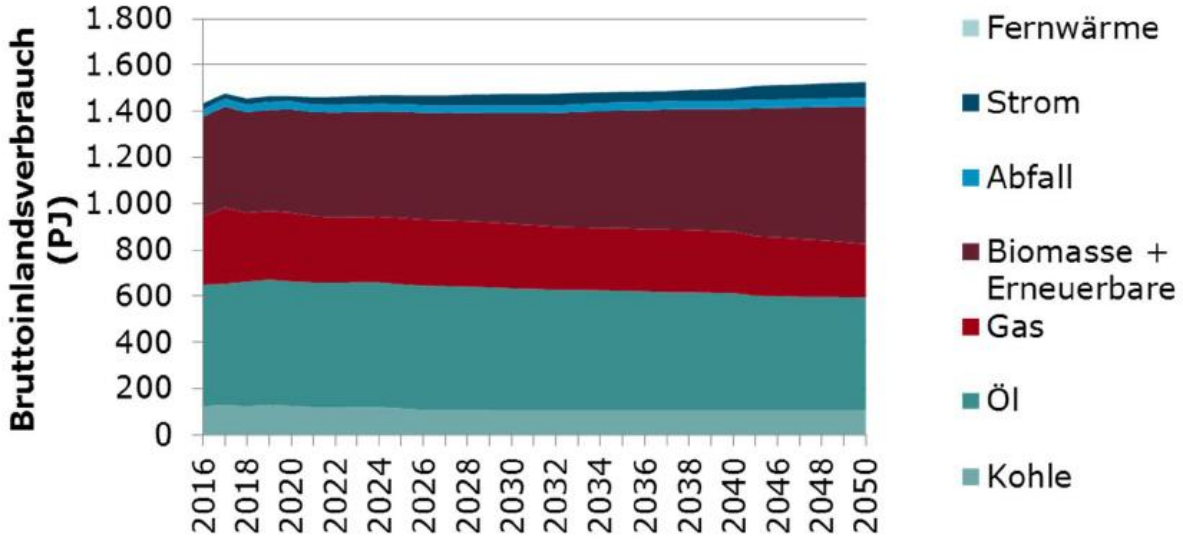
Table 15: Projection of final energy consumption by sector

in PJ	Balance	Scenario	Scenario	Scenario	Scenario
	2015	**2020**	**2030**	**2040**	**2050**
Transport incl. off-road	403	429	439	434	427
Industry	301	337	370	413	451
Households and services	375	377	358	341	334
Agriculture	12	12	13	14	15
Total	**1 091**	**1 155**	**1 180**	**1 203**	**1 226**

Source: Federal Environment Agency, 2018

N.B.: Differences due to rounding

Figure 20: Gross inland consumption by energy source, 2016-2050



Source: Federal Environment Agency, 2018

	Gross inland consumption (PJ)
	District heating
	Electricity
	Waste
	Biomass + renewables
	Gas
	Oil
	Coal

iv. Cost-optimal levels of minimum energy performance requirements resulting from national calculations in accordance with Article 5 of Directive 2010/31/EU

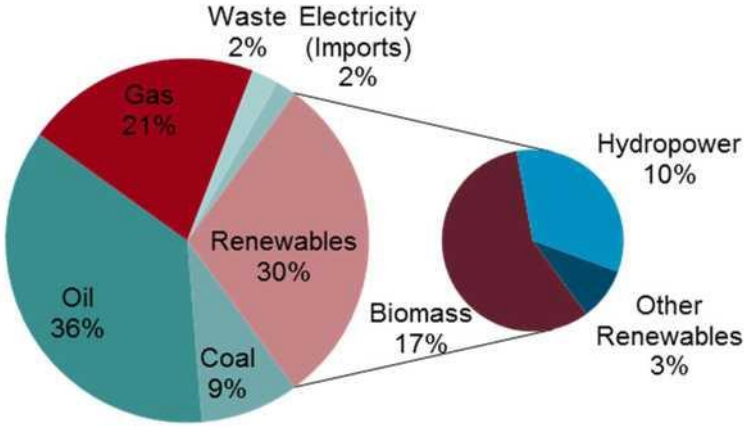
To be completed in 2019.

4.4. Dimension: Energy Security

i. Current energy mix, domestic energy resources, import dependency, including relevant risks

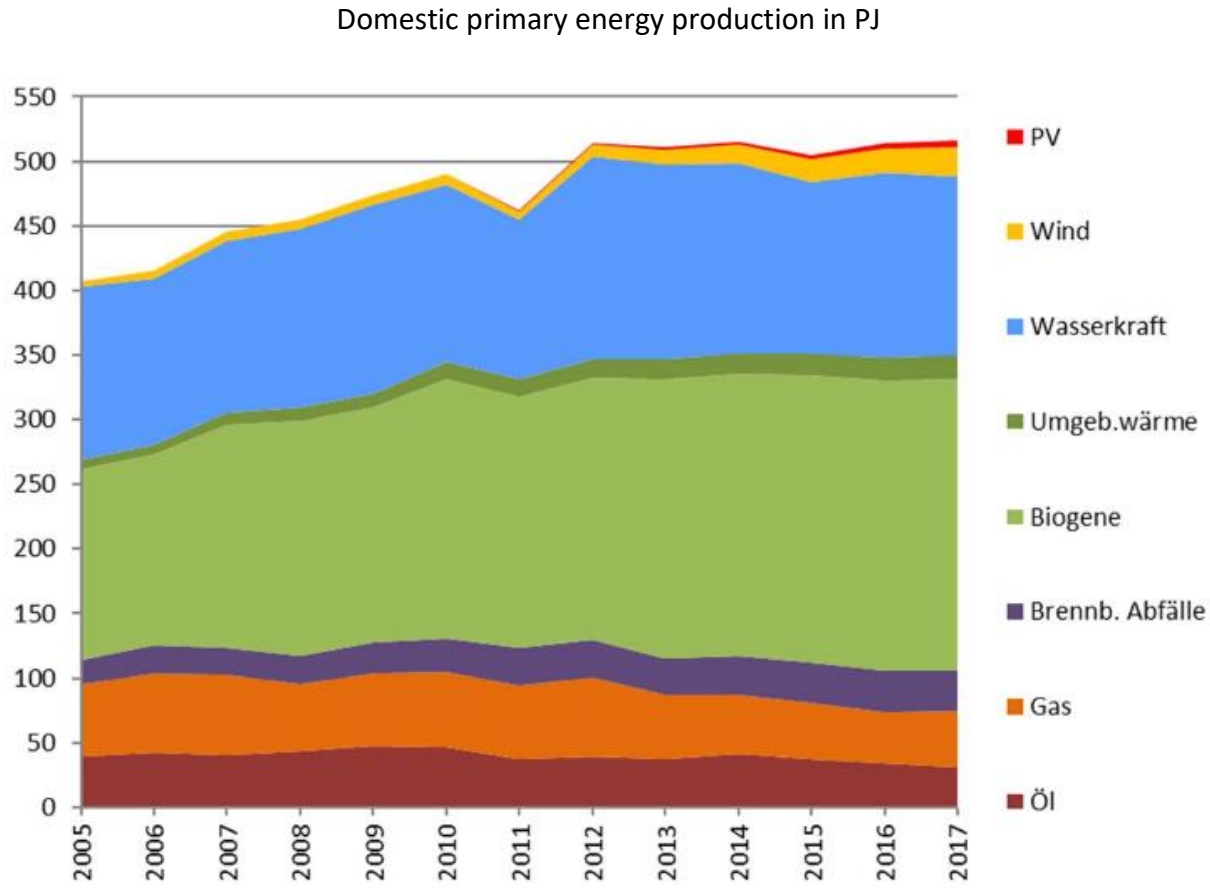
- 2016 gross inland consumption: 1435 PJ (2017: 1442 PJ)
- Share of renewable energy in gross final energy consumption: 33.5 % (2016), share of renewable energy in gross electricity consumption: 72.6 % (2016)
- In 2016, renewable energy already accounted for almost 80 % of all domestic primary energy production.
- Dependence on energy imports: 64 % in 2016
  - Coal: 100 %
  - Oil >90 %
  - Gas: >80 %
  - Renewables: high degree of self-sufficiency

Figure 21: 2016 gross inland consumption by energy source



Source: Statistics Austria, Energy Balance, Chart: Federal Environment Agency

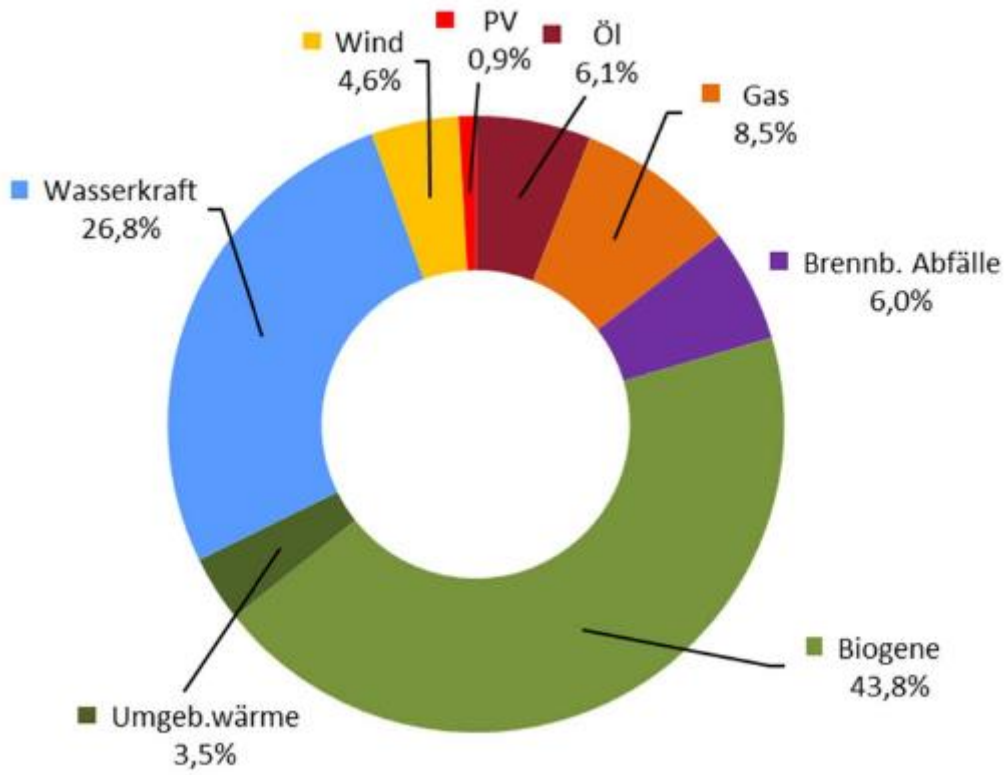
Figure 22: Domestic primary energy production, 2005-2017



Source: BMNT, Energy in Austria 2018 – figures, data, facts

	Photovoltaics
	Wind energy
	Hydroelectric power
	Ambient heat
	Biogenic energy
	Combustible waste
	Gas
	Oil

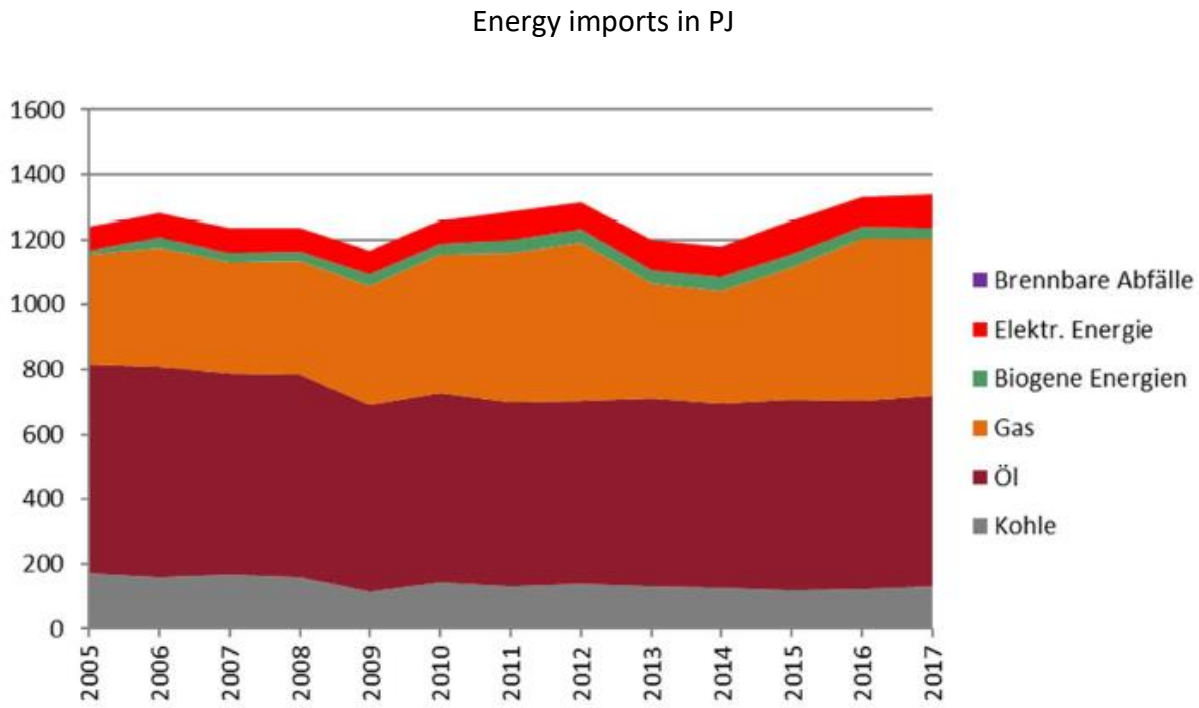
Figure 23: 2017 domestic primary energy production (share per energy source)



Source: BMNT, Energy in Austria 2018 – figures, data, facts

	Photovoltaics
	Oil
	Gas
	Combustible waste
	Biogenic energy
	Ambient heat
	Hydroelectric power
	Wind energy

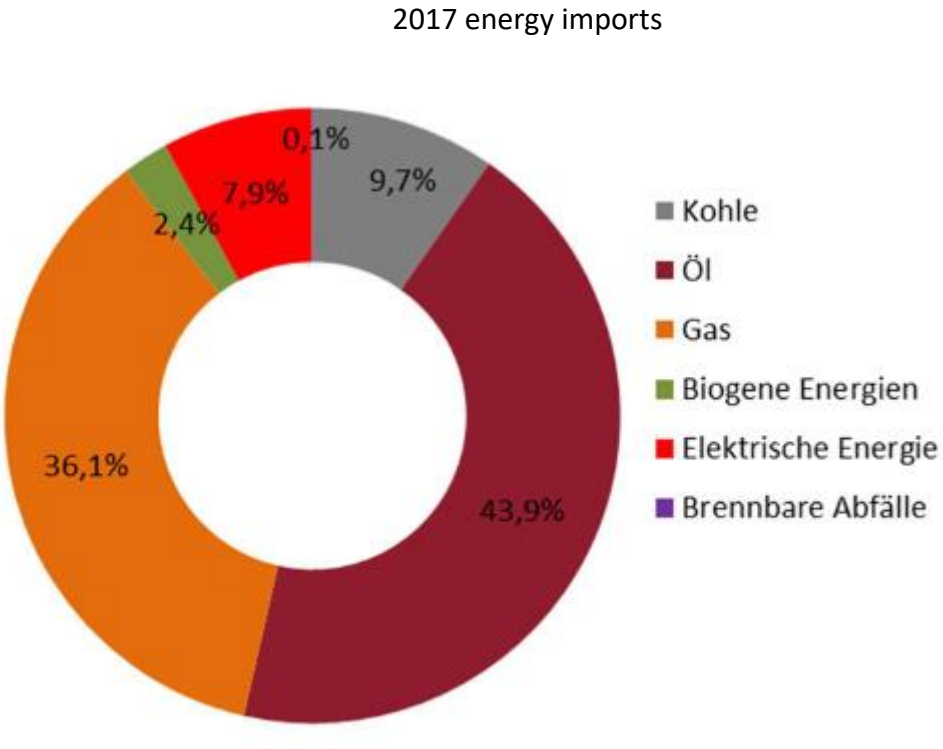
Figure 24: Energy imports by energy source, 2005-2017



Source: BMNT, Energy in Austria 2018 – figures, data, facts

	Combustible waste
	Electrical energy
	Biogenic energy
	Gas
	Oil
	Coal

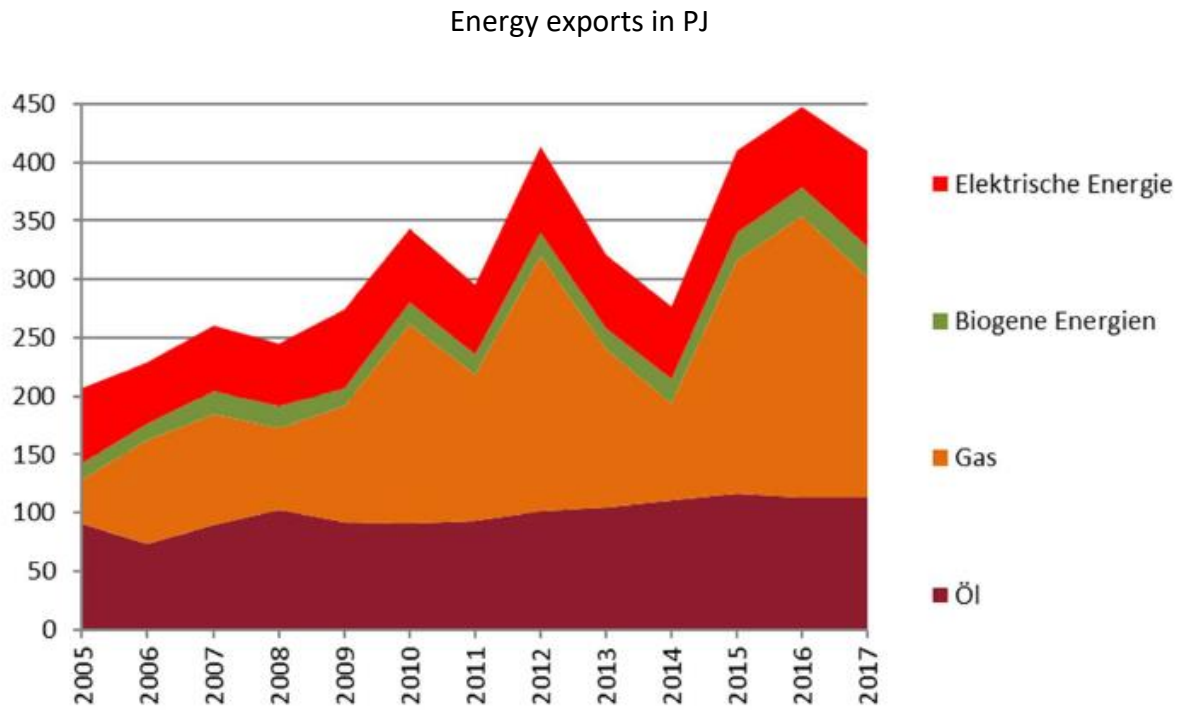
Figure 25: 2017 energy imports (share per energy source)



Source: BMNT, Energy in Austria 2018 – figures, data, facts

	Coal
	Oil
	Gas
	Biogenic energy
	Electrical energy
	Combustible waste

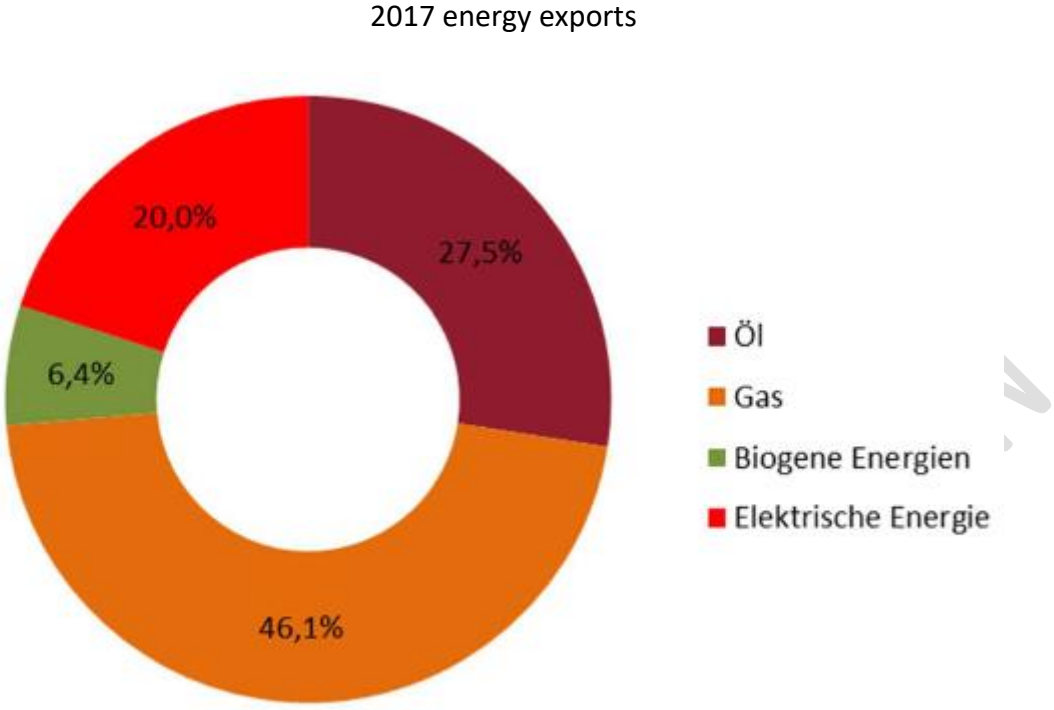
Figure 26: Energy exports by energy source, 2005-2017



Source: BMNT, Energy in Austria 2018 – figures, data, facts

	Electrical energy
	Biogenic energy
	Gas
	Oil

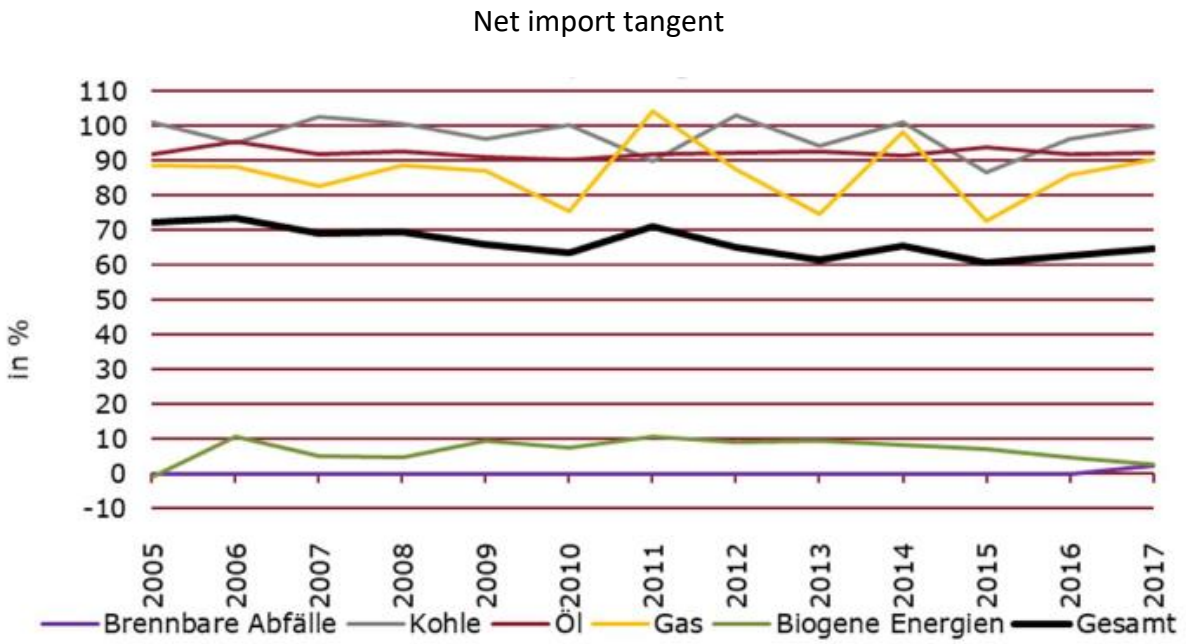
Figure 27: 2017 energy imports (share per energy source)



Source: BMNT, Energy in Austria 2018 – figures, data, facts

	Oil
	Gas
	Biogenic energy
	Electrical energy

Figure 28: 2005-2017 net import tangent by energy source



Source: BMNT, Energy in Austria 2018 – figures, data, facts

	Combustible waste
	Coal
	Oil
	Gas
	Biogenic energy
	Total

ii. Projection of developments with existing policies and measures at least until 2040 (including for 2030)

Table 16: Projection of final energy consumption and gross inland consumption (total)

	2016	**2020**	**2030**	**2050**
Final energy consumption (PJ)	1 121	1 155	1 180	1 226
Gross inland consumption (PJ)	1 435	1 464	1 474	1 525

Source: Federal Environment Agency, 2018

Table 17: Projected electricity supply (domestic production plus net imports)

Supply (TWh)	**2015**	**2020**	**2030**	**2050**
Fossil	15	14	11	7
Hydroelectric power	37	42	42	45
Biomass	4	5	5	6
Ambient heat, etc.	0	0	0	0
Photovoltaics	1	2	3	13
Wind energy	5	8	9	18
Total	**62**	**70**	**71**	**89**
Imports	10	6	14	19
Supply	**72**	**76**	**84**	**108**

Source: Federal Environment Agency, 2018

N.B.: Differences due to rounding

4.5. Dimension: Internal Energy Market

4.5.1. Electricity interconnectivity

i. Current interconnection level and main interconnectors

For details see Section A, point 1.2, sub-point ii, Dimension 4: market integration.

ii. Projections of interconnector expansion requirements (including for the year 2030)

For details on PCIs, see Section A, point 1.2, sub-point ii, Dimension 4: market integration.

4.5.2. Energy transmission infrastructure

i. Key characteristics of the existing transmission infrastructure for electricity and gas

For details see Section A, point 1.2, sub-point ii, Dimension 4: market integration.

ii. Projections of network expansion requirements at least until 2040 (including for 2030)

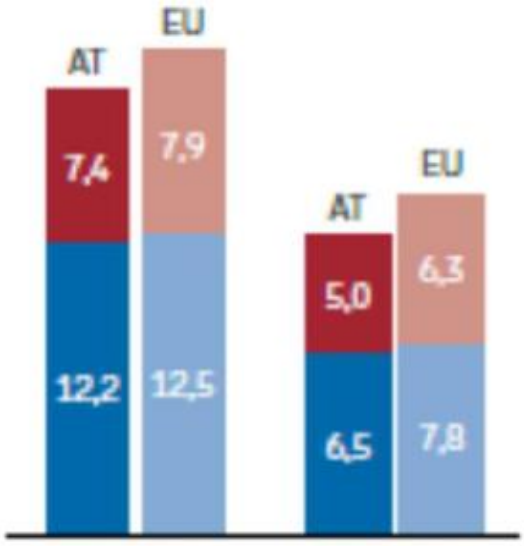
For details on PCIs, see Section A, point 1.2, sub-point ii, Dimension 4: market integration.

4.5.3. Electricity and gas markets, energy prices

i. Current situation of electricity and gas markets, including energy prices

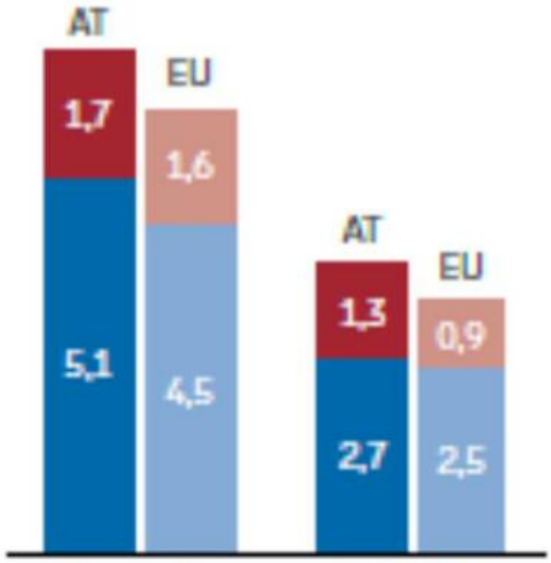
Figure 29: 2017 electricity and gas prices

2017 industry and household electricity prices
by component, in cents/kWh
● Tax and duty
● Energy components, incl. grid*



* Energy and grid components shown as totals
Source: Eurostat

2017 industry and household gas prices
by component, in cents/kWh
● Tax and duty
● Energy components, incl. grid*



* Energy and grid components shown as totals
Source: E-Control und Statistics Austria

Source: BMNT, Energy in Austria 2018 – figures, data, facts

ii. Projection of developments with existing policies and measures at least until 2040 (including for 2030)

Table 18: Projected electricity supply (domestic production plus net imports)

Supply (TWh)	**2015**	**2020**	**2030**	**2050**
Fossil	15	14	11	7
Hydroelectric power	37	42	42	45
Biomass	4	5	5	6
Ambient heat, etc.	0	0	0	0
Photovoltaics	1	2	3	13
Wind energy	5	8	9	18
Total	**62**	**70**	**71**	**89**
Imports	10	6	14	19
Supply	**72**	**76**	**84**	**108**

Source: Federal Environmental Agency, 2018

N.B.: Differences due to rounding

4.6. Dimension: Research, Innovation and Competitiveness

i. Current situation in the low-carbon-technologies sector and, to the extent possible, its position on the global market (that analysis is to be carried out at European or global level)

Roadmaps and research strategies

Energy Research and Innovation Strategy

In order to bring the Energy Research and Innovation Policy on course, the Ministry for Transport, Innovation and Technology and the Climate and Energy Fund have been working hard since 2016 to prepare the new Energy Research and Innovation Strategy. As part of a multi-stage dialogue process, a strategy paper was developed with economics, administration and research experts. The paper sees the wholesale transformation of the energy supply system as an opportunity for domestic companies and lays down the future strategic pathway for energy research and innovation.

https://nachhaltigwirtschaften.at/de/e2050/publikationen/energie-forschungs-innovationsstrategie.php

For various sectors and types of technology, national technology roadmaps are in place. These present the development status of the technology and markets in question and describe development scenarios:

Technology roadmap - energy storage systems at home and abroad (2018)

https://www.klimafonds.gv.at/wp-content/uploads/sites/6/Technologieroadmap_Energiespeichersysteme2018.pdf

R&D roadmap for district heating and cooling (2015)

https://www.klimafonds.gv.at/wp-content/uploads/sites/6/FEFahrplan-FernwaermeFernkaelte.pdf

R&D roadmap for energy efficiency in industry (2014)

https://www.klimafonds.gv.at/wp-content/uploads/sites/6/KLIEN2014FuE-FahrplanEnergieeffizienzinderenergieintensivenIndustrie.pdf

Solar technology roadmap (2016)

https://nachhaltigwirtschaften.at/de/e2050/publikationen/technologie-roadmap-fuer-photovoltaik-in-oesterreich.php

Photovoltaics have seen a breakthrough in recent years, from a marginal technology to a key part of the energy supply. The roadmap describes the potential for photovoltaics in Austria, focusing in particular on

industry, the development of buildings and towns/cities, and energy infrastructure.

Heat pump technology roadmap (2016)

https://nachhaltigwirtschaften.at/de/e2050/publikationen/oesterreichische-technologieroadmap-fuer-waermepumpen.php

Heat pumps are a versatile technology in terms of making use of renewable energy and energy efficient technology. The roadmap identifies the considerable technological and economic potential of heat pumps as part of the future energy system and produces recommendations for national research, technology and innovation policy, industry and business.

Research, technology and innovation: power-to-gas roadmap (2014)

https://nachhaltigwirtschaften.at/de/e2050/publikationen/fti-roadmap-power-to-gas-fuer-oesterreich.php

A study of technological and systemic aspects relating to chemical storage of electrical energy in the form of gaseous substances as a possibility for long-term energy storage.

'Solar heat 2025' roadmap – An analysis of the technology and market, with recommendations (2014)

https://nachhaltigwirtschaften.at/de/e2050/publikationen/roadmap-solarwaerme-2025.php

From an energy policy and social perspective, solar heat has an important role to play in terms of future, long-term energy supply. The roadmap comprises an analysis of the technology and market, a discussion of more than 100 targeted recommendations and a presentation of their potential impact in three different development scenarios.

Smart grids technology roadmap 2020 (2015)

https://nachhaltigwirtschaften.at/de/e2050/highlights/fti-strategie-smart-grids-2-0/technologie-roadmap-smart-grids-2020.php

In 2014/15, Austrian Smart Grid experts developed the Smart Grids Austria 2020 technology roadmap as part of the Smart Grids Austria technology platform. The roadmap provides a complete overview of the current development status and presents specific steps forward. It also describes benefits for industry, the e-economy and society as well as education and awareness-raising amongst the public.

Innovative energy technology in Austria – 2017 market developments

Biomass, photovoltaics, solar thermal, heat pumps and wind energy[22]

[22] Innovative energy technology in Austria – 2017 market developments – biomass, photovoltaics, solar thermal,

In 2017, there was a mixed picture in terms of the development of low-carbon energy technology. Biomass fuels, biomass boilers, photovoltaics and heat pumps saw considerable growth, whilst biomass stoves, solar thermal and wind energy saw sales figures fall. A slight increase was observed compared to 2016. Persistently low fossil fuel prices, an increase in the price of solid biomass and competition between certain low-carbon energy technologies were major factors which influenced market activity.

Further details on market developments in individual sectors are presented below:

a) Solid biomass – fuel

Use of solid biomass for energy – of which there is a long tradition in Austria – is one of the central pillars in terms of how renewable energy is used in Austria. Between 2016 and 2017, use of pellets increased by 6.7 % to reach 16.3 PJ (960 000 tonnes). There are 32 Austrian pellet producers ensuring the supply of pellets who have built up their production capacity to 1.61 million tonnes/year.

In 2017, 10.2 mt CO_2eq was saved thanks to solid biogenic fuel. The biofuel industry generated a total revenue of EUR 1.606 billion in 2017, with an impact on employment corresponding to 18 967 full-time jobs in this sector.

The availability of suitable competitively-priced raw materials is critical to the success of bioenergy. Improved measures to increase the use of biogenic residue and waste are also a prerequisite. In addition to its traditional use for heating purposes, bioenergy is increasingly taking on the role of becoming part of an overall system which combines with other renewables.

b) Solid biomass – boilers and stoves

In Austria, the market for biomass boilers experienced sustained, rapid growth between 2000 and 2006. In 2007, sales of all types of boiler fell due to low oil prices. That same year, there was also a shortage of wood pellets, leading to a significant increase in pellet prices. This caused the pellet boiler market to slump by 60 %. With the economic and financial crisis in 2009, sales fell by a further 24 %. In 2011 and 2012, sales of pellet boilers rose sharply. Between 2013 and 2016, a decline in sales of biomass boilers was again observed. This was caused by rising biomass fuel prices, early investments in the years following the economic and financial crisis, low oil prices and high average temperatures. 2017 saw renewed growth in sales of all types of boiler, with the exception of log wood boilers (-13.4 %). Sales of wood chip boilers (<100 kW) rose by 11.8 % as compared to 2016, and pellet boilers by as much as 19.3 %.

Austrian biomass boiler manufacturers typically sell approximately 80 % of their production abroad. Economic activity in the biomass boiler and stove market generated sales of EUR 863 million in 2017, with

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heat pumps and wind energy, Peter Biermayr et al, published by BMVIT, part of the 'Energy and Environmental Research' series, 4/2018, June 2018, https://nachhaltigwirtschaften.at/de/iea/publikationen/innovative-energietechnologien-in- oesterreich-marktentwicklung-2017.php

an impact on employment corresponding to 3 601 jobs. Research into biomass boilers is focused on how to reduce emissions further and how to use biomass as an energy source in industrial and commercial processes with high heat demand. So that success on the international market continues to be possible, it is essential for the cost of installation technology to be reduced further, while at the same time maintaining high technical quality.

c) Photovoltaics

For the first time in three years, 2017 saw a notably increase in newly installed photovoltaic capacity in Austria. Photovoltaic systems connected to the grid with a total capacity of 172 479 kWpeak and self-sufficient systems with a total capacity of 476 kWpeak were installed, which represented an increase of 11 %.

In 2017, photovoltaic installations operating in Austria were able to produce electricity of at least 1 269 GWh, thereby reducing CO_2 emissions by 377 392 tonnes.

The Austrian photovoltaic industry is active in the production of modules, inverters and other additional components, the installation of equipment, and in research and development. 2 813 full-time jobs were recorded in this sector in 2017. In Austria, the average system price of a 5 kWpeak photovoltaic system connected to the grid fell from EUR 1 645/kWpeak in 2016 to EUR 1 621/kWpeak, i.e. by 1.47 %.

The development of photovoltaic equipment for integration into buildings is of strategic importance to Austria as this is precisely the sector where a particularly high level of national added value is deemed attainable. With building-integrated photovoltaic systems as a research and innovation priority, the Austrian industry may be able to enter a niche market, opening up opportunities on major export markets worldwide.

d) Solar thermal energy

Following considerable growth during the period up to 2009, the Austrian market has seen eight consecutive years of decline. The causes of this initially included the effects of the financial and economic crisis. However, there are now other causes, namely the significant fall in the price of photovoltaic systems, increased use of heat pumps and persistently low oil prices.

In 2017, 101 780 m^2 of new solar panels were installed, corresponding to a capacity of 71.1 MWth. The solar thermal market in Austria therefore saw a decline of 9.1 % as compared to 2016. The share of solar panel exports hit 84 % which represents a slight increase. The estimated turnover of the solar thermal sector in 2017 was EUR 178 million. Approximately 1 500 full-time jobs can be inferred from this. Large seasonal heat storage projects are being considered an option for the future of solar thermal energy. Many such projects have already been set up in Denmark.

e) Heat pumps

Total sales of heat pumps (domestic market plus export market) increased from 33 094 units sold in 2016 to 36 446 units in 2017. This corresponds to 10.1 % growth. Considerable growth was registered on both the domestic market (+9.1 %) and export market (+12.5 %). In particular, heat pumps with a capacity of up to 20 kW saw strong growth. Domestic hot water heat pumps registered an increase of 7.7 % on the domestic market and a decline of 8.5 % on the export market.

Research and development efforts in respect of heat pump systems are currently focused on installations which work in combination with other technology, e.g. solar thermal systems or photovoltaic systems. Efforts are also focused on the development of new energy services, e.g. cooling and air-conditioning, and building drainage in the renovation sector. The use of other fuels such as natural gas and its feed-in into smart grids is broadening the scope for innovation.

f) Wind power

In 2017, 63 new wind turbines with a total capacity of 196 MWel were installed in Austria.

By the end of the year, 1 260 wind turbines with a rated capacity of 2 844 MWel were on the grid. This capacity means that between 6.5 and 7 TWh of electricity can be produced each year, corresponding to approximately 10 to 11 % of electricity consumption in Austria. Electricity production potential has therefore increased by 19 % or 1.3 TWh since the end of 2016. Assuming the substitution of ENTSO-E imports, Austria was able to save more than 1.9 mt CO_2eq in 2017. When substituting the share of fossil fuels in the ENTSO-E mix, savings amount to 4.3 mt CO_2eq.

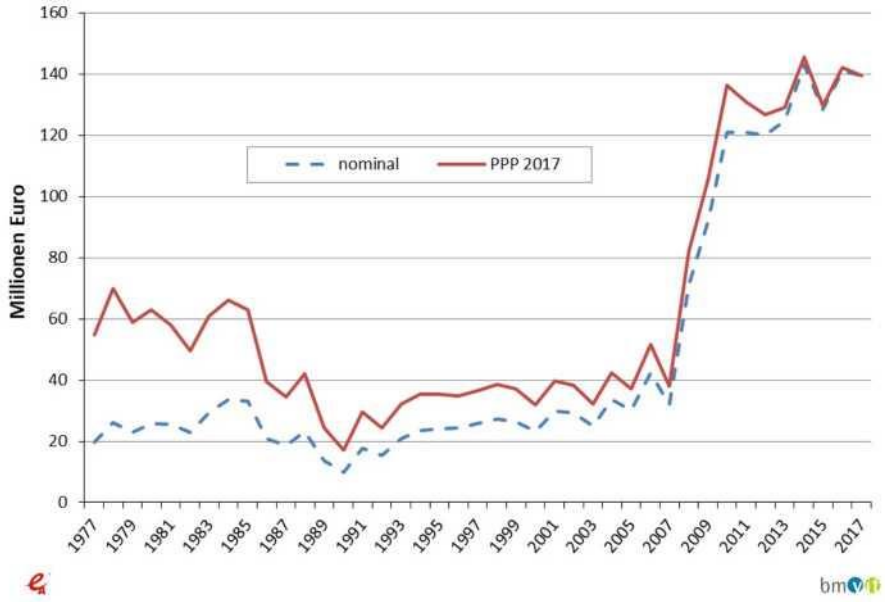
In 2017, Austrian operators realised just under EUR 551 million through the sale of wind power. Investments of more than EUR 323 million by those companies enabled more than EUR 92 million in domestic value-added to be generated. By operating those installations over the next 20 years, it will be possible to generate a further EUR 216 million in domestic value-added. In 2017, the turnover of the Austrian supply industry was almost EUR 454 million, with the wind power sector generating a total turnover of EUR 1 005 million. 2017 saw 1 330 people directly employed in the wind power supply industry, with a further 3 074 jobs in the construction, maintenance and demolition of wind turbines. Of those jobs, 372 were with domestic operators. In total, this therefore corresponds to at least 4 404 jobs.

ii. Current level of public and, where available, private research and innovation spending on low-carbon-technologies, current number of patents, and current number of researchers

According to the Austrian Energy Agency, public spending on research, development and demonstration projects in the energy sector amounted to EUR 139.3 million in 2017, down EUR 1.6 million on the

previous year.

Figure 30: Time series of public spending on energy research between 1977 and 2017, nominal and adjusted for inflation



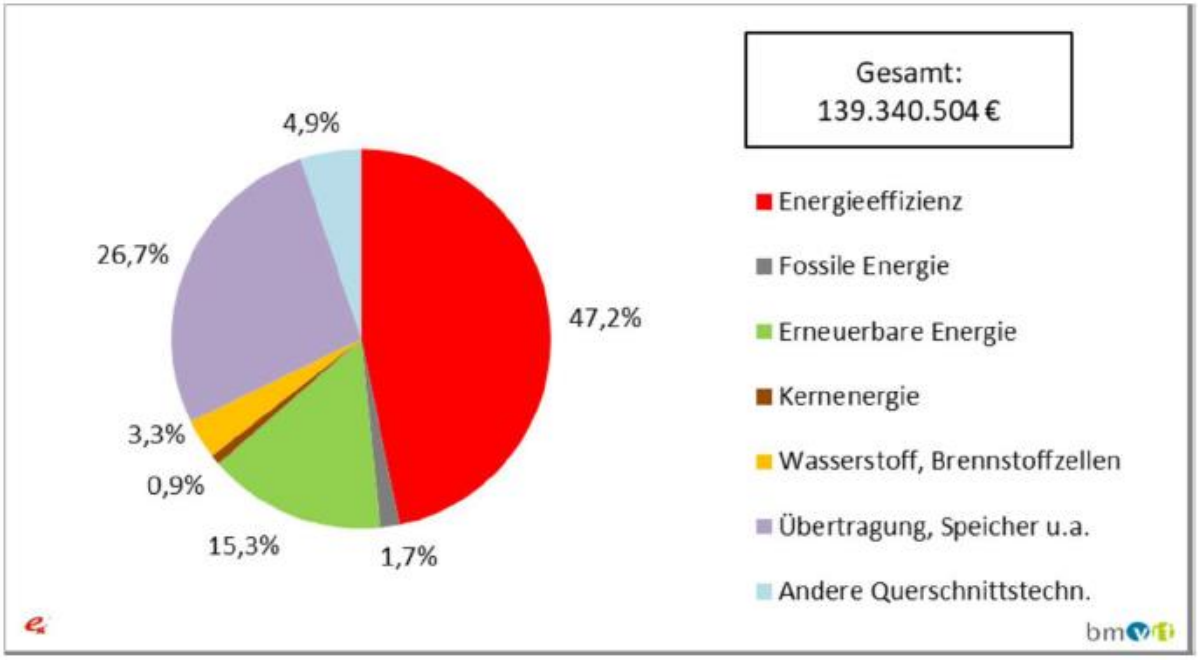
Source CPI: Statistics Austria, 2018

	Million EUR
	Nominal
	PPP 2017

There were around 850 projects and activities in 2017. 63.9 % of funds were used for applied research and 22.8 % for experimental development. 8.1 % came under 'initial demonstrations'. The smallest share, at 5.2 %, went to energy-related basic research.

As in previous years, most expenditure was on 'energy efficiency', i.e. EUR 65.7 million or 47.2%, followed by 'transmission, storage, etc.' which increased in 2017 by EUR 6.2 million to EUR 37.2 million.

Figure 31: Total spending on energy research in Austria in 2017 classified according to IEA codes

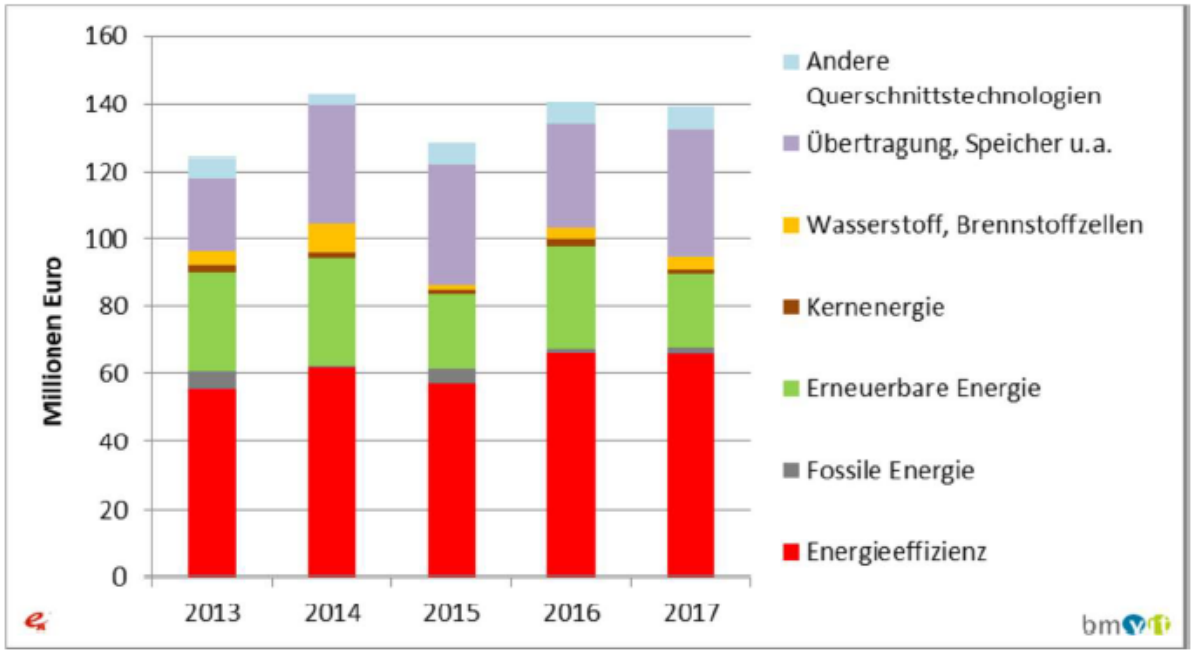


Source: Energy Research Compilation 2017

	Total: EUR 139 340 504
	Energy efficiency
	Fossil fuels
	Renewable energy
	Nuclear energy
	Hydrogen, fuel cells
	Transmission, storage, etc.
	Other cross-cutting technology

Spending on renewable energy sources fell significantly in 2017, with a decline of about one third to EUR 21.4 million. These three areas, corresponding to 89 % of spending, clearly reflect Austria's priorities for publicly financed energy research. Comparatively speaking, far less funding went to the other four areas , namely fossil fuels, nuclear energy, hydrogen and fuel cells and other cross-cutting technology.

Figure 32: Public spending between 2013 and 2017, in nominal terms



Source: Energy Research Compilation 2017

	Million EUR
	Other cross-cutting technology
	Transmission, storage, etc.
	Hydrogen, fuel cells
	Nuclear energy
	Renewable energy
	Fossil fuels
	Energy efficiency

Three quarters of the spending from 2017 presented in this report was direct financing through funding bodies (federal, provincial, funds). The remainder was 'own research' financed by the federal or provincial governments (using 'own resources').

In 2017, as is the case since 2008, the Climate and Energy Fund received the most public funding for R&D, albeit significantly less than the previous year (EUR 38.7 million). The federal ministries made EUR 25.1 million available, i.e. EUR 5.4 million less than in 2016 (of which EUR 15.8 million came from the Federal Ministry for Transport, Innovation and Technology). Spending under the research funding companies' basic programmes primarily for companies in respect of experimental development activities, was as high as Federal Government spending, reaching EUR 25 million thanks to an increase of EUR 10.8 million. Provincial spending in 2017 (EUR 10.5 million) increased significantly as compared to the previous year.

There are currently 22 public universities in Austria. In recent years nine of those universities announced self-financed spending on energy research. As in previous years, 2017 saw a reduction in self-financed activities.

In contrast to 'traditional' public universities, privately-run technical college (*Fachhochschule*) degree programmes are relatively recent. They were first introduced in 1994 as university-level academic vocational training There are currently 21 technical colleges in Austria. In recent years, 13 of these have announced self-financed spending on energy research, with considerable variation between them.

Self-financed energy-related R&D amongst non-university research institutions rose slightly between 2016 and 2017, in particular because the Austrian Institute of Technology (AIT) was able to increase its own funds in the energy sector to EUR 27.4 million in 2017. AIT accounted for the lion's share (97 %) of total self-financing used in this sector for energy purposes.

Private spending on research

Whereas data on public spending on energy research in Austria has been gathered on a regular basis for 40 years and is available in detail, only rough estimates had previously been available on the significantly higher spending coming from the business sector. For this reason, detailed surveys and in-depth analyses were carried out by the Austrian Energy Agency in 2017 on behalf of the Federal Ministry for Transport, Innovation and Technology based on Statistics Austria's surveys from 2007 to 2015.

3 611 Austrian companies declared self-funded R&D totalling EUR 7.5 billion in 2015, of which spending from 571 companies – amounting to EUR 485 million – was classified under the socio-economic priority 'energy'. Energy was therefore the sixth largest of the fourteen areas, corresponding to a share of 6.5 %.

Almost half of this amount came from companies in the electrical equipment sector. By quite some margin, mechanical engineering was second with 8.4 %, closely followed by manufacturers of electronic components and printed circuit boards. By contrast, energy suppliers contributed just under 2 % of energy research spending from businesses.

iii. Breakdown of current price elements that make up the main three price components (energy, network, taxes/levies)

Further information will be provided in the final plan in 2019.

iv. Description of energy subsidies, including for fossil fuels

A list of subsidies that run counter to climate and energy targets will be prepared by June 2019 by the Federal Ministry of Finance (BMF), in liaison with the BMNT and the BMVIT. This list will be used as the starting point for abolishing counterproductive incentives and funding. The results of this evaluation will be taken into account in the final NECP.

5. Impact assessment of planned policies and measures[23]

[23] Will be provided during the first half of 2019

Part 2

List of parameters and variables to be reported in Section B of National Plans[24]

[24] This part will be provided in a separate Excel spreadsheet, the template for which will be provided by the European Commission.

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