Working Paper

Instruments for a low carbon energy transformation in Austria

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Abstract

To reduce the use of fossil fuels, and hence the emission of greenhouse gases, Austrian government has set up several programmes that foster a low-carbon society. The Austrian energy strategy is based on energy efficiency, energy demand and energy supply, and so are the instruments in place. This paper gives on overview of different policy approaches and the status quo of these instruments and their past implementation development. The analysis shows that especially renewable electricity production has increased in both absolute and relative terms with support of financial mechanisms, and the increase in the heating sector is smaller. Regarding the share of renewable energy, the transport sector is particularly lacking. For a transition to a low-carbon economy, more stringent instruments would be required.

Content

1. Introduction

To mitigate climate change and protect the environment, Austria has developed several programmes. The goals have grown more ambitious over time and follow the EU targets for 2020 (20% GHG emissions reduction, 20% more energy efficiency, 20% renewable energy). Regarding renewable energy production, Austria has agreed to aim for 34% in 2020 (Maurer et al., 2016). In 2009, an energy strategy was developed, suggesting different measures to achieve the targets. The strategy builds on the three main topics which are also reflected in the EU 20/20/20 goals: raising energy efficiency, reducing energy demand, and increasing the production of renewable energy (BMLFUW & bmwfi, 2009).

Different approaches of policy instruments can be introduced to achieve environmental goals. In general, policies can be production and consumption based. Production based policies affect mostly manufacturers, e.g. through the restriction of fossil inputs or setting standards in the production. Consumption-based approaches consider end-products, and give incentive to behavioural changes. Many policy types can be designed to be either production or consumption based, e.g. carbon pricing can refer to emissions released in the process of production or to the implicit carbon content of goods (embodied emissions) (Girod, 2016).

Girod (2016) gives an overview over different categories of environmental policy instruments, based on the WTO and UNEP report on trade and climate change (Tamiotti, World Trade Organization, & United Nations Environment Programme, 2009). Girod (2016) identifies four categories of policy instruments: carbon pricing, financial mechanisms, standards, and labels, which are also discussed in Steininger et al. (2017).

Market mechanisms based on carbon pricing set a price on carbon to reflect externalities and can be enforced through a carbon tax or a cap-and-trade system, like the European Union Emissions Trading Scheme (EU ETS). Revenues can be used to further mitigate emissions. Cap-and-trade systems are traditionally production-based, but can also be consumption-based if border tax adjustments are introduced. Austria is part of the EU ETS, and has set taxes on fossil fuels as discussed in section 3.1.

Financial mechanisms give incentives to innovation and developing and deploying environmentally friendly technologies. They include investment subsidies and feed-in tariffs, which are both implemented in Austria, and can aim at production and consumption. Financial mechanisms are the main focus of this paper.

Standards are a more specific policy approach and control certain aspects of a product or production (e.g. used technology, emission standards). Labels, on the other hand, can be mandatory or voluntary, and can be implemented by governments or private firms or NGOs. Their main function is to provide information (Girod, 2016; Steininger et al., 2017).

Austria has introduced several initiatives, laws and decrees for each of the three pillars of climate policy identified in the EU 20/20/20 goals, drawing from several policy instrument categories. Renewable energy production in Austria is mainly focussed on electricity production. To enhance renewable electricity generation, feed-in tariffs and investment subsidies have been introduced since 2002. Energy efficiency and the reduction of energy demand also build on investment subsidies as incentive for new and climate friendly technologies.

This paper discusses the status quo of nationwide political measures in Austria and their development up to 2016 (respectively early 2017), with a focus on financial mechanisms. Even for state-wide subsidies, there is a number of institutions involved, making it difficult to get an overview. This paper highlights the most important state-wide subsidies (i.e. at the federal level) in the fields of energy generation and use. There are various policy instruments implemented on provincial level, as well as instruments implemented on a larger geographical scale (e.g. EU ETS), both are not discussed further in this paper. Also, standards and labels are not covered here.

Section 2 sets the focus on the shift of energy supply to renewable sources, starting with electricity production, and then discussing heating in Austria. Section 3 highlights energy demand and increasing energy efficiency, including electricity and heating as well as eco-taxes giving further incentive to move away from fossil fuels.

Section 4 gives an overview over mobility in Austria, which accounts for a large part of Austria's energy demand. A special focus lies on the electric vehicles. Section 5 highlights more comprehensive initiatives and programs, which serve as a connection between the government and municipalities, private households and companies. Finally, section 6 supplies an overview on the relative importance of each of the programmes covered before.

2. Inducing the energy supply to shift to renewables

2.1 Electricity transformation to renewables

Austrian electricity generation is traditionally strongly based on hydro power. Due to Austria's topology, the domestically produced electricity mix has consisted of at least 55% hydro power since

1970 (Statistik Austria, 2016a). The development of the Austrian electricity production is illustrated in Figure 1.

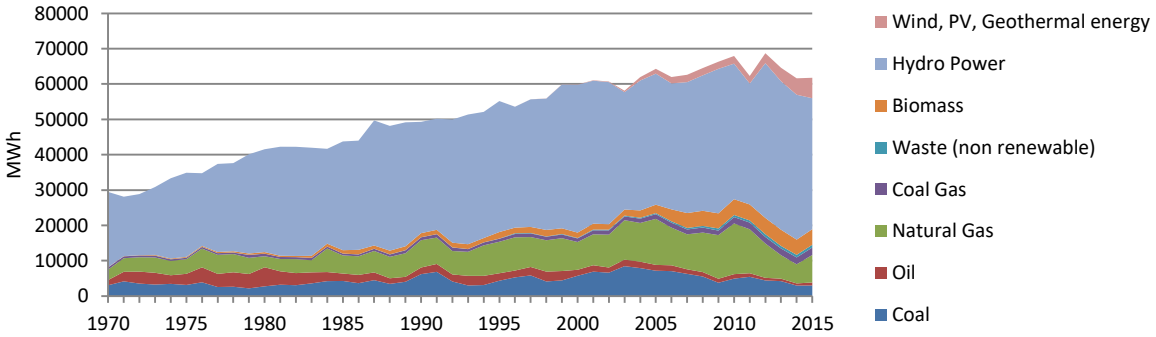

Figure 1 Austrian electricity production by energy source, 1970 – 2015

Source: Statistik Austria (2016a)

As shown in Figure 1, rising electricity production has been primarily due to increases in hydro power generation. Other renewable sources, such as biomass (including solid and fluid biomass as well as biogas) and wind power, PV, and geothermal energy have steadily grown since the 1980s and 1990s, respectively. The relevance of fossil energy sources has stayed largely constant or has declined during this time period, accounting also for a declining share in the electricity mix (see Figure 2).

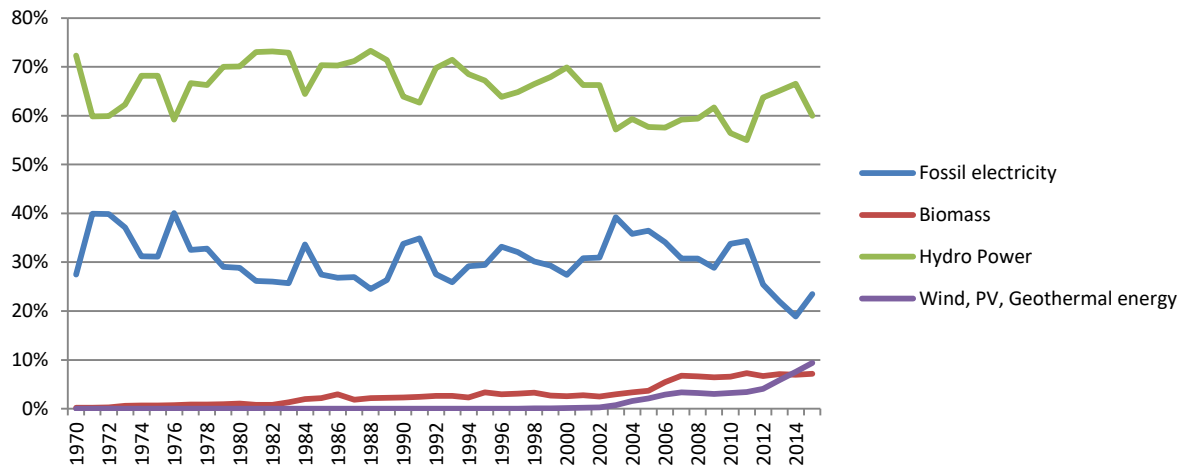

Figure 2 Austrian electricity production by share of energy source, 1970 – 2015

Source: Statistik Austria (2016a)

The take-off of other renewables in the early 2000s coincides with the introduction of the "Ökostromgesetz" (2002),which introduced financial mechanisms to support the development of renewable electricity production. Accompanied by a decree introducing feed-in tariffs, the new law lead to a stark increase in new renewable power plants.

The law covers the generation of renewable electricity and verification of its origin, its mandatory use and the obligation to pay remuneration. The subsidy scheme includes the generation of electricity from all renewable resources, except the following: hydro power with more than 10 MW maximum capacity, carcass meal, waste liquor, sewage sludge, and waste with a low biogenic share. Furthermore, the operation or modernisation of combined heat and power (CHP) plants for district heating is subsidised.

The original goal of the law was to raise the share of renewables in the electricity mix to 78.1% by 2010. The renewable share of electricity generation was 69.1% in 2002 (66.3% hydro power, 2.5% biomass, 0.3% others) and 66.2% in 2010 (56.5% hydro power, 6.6% biomass, 3.2% others) (Statistik Austria, 2016a). The amendment of 2006 set the goal of generating 10% of total Austrian electricity production from subsidised sources. This target was met with 10.6% (E-Control, 2011). In the law from 2012, a target of 15% from renewable sources in 2015 was set, which was also reached. In 2015, 15.94% of the electricity supply were generated by subsidised producers. For a more detailed discussion of electricity sources and their development, see section 2.1.1.

Renewable electricity has to be accepted into the grid. For electricity from PV this obligation is only valid up to 15 MW nationwide. The price payed for renewable electricity (feed-in tariff) is set in a separate decree and is adapted every year. The subsidy rate should reflect cost efficient production costs for each of the different technologies and should enforce additional installations; subsidy rates granted for each individual project have to be granted fixed for at least ten years for the specific project.

The subsidies are financed by end-consumers (via both annually fixed rates and charges by kWh electricity), as well as market prices payed by electricity traders (these prices include the charges collected for certificates of origin). The level of the payments per kWh by consumers is also adjusted yearly. Furthermore, the law covers payments to the provincial governments to compensate for subsidies.

The amendment in 2006 added investment subsidies for small- and medium-scale hydro power, but at the same time set a maximum (cap) to the total payment of feed-in tariffs. The additional payments (not including the compensation by taxing end consumers) for the years 2007 – 2011 should not exceed 17 million €. 30% of the subsidies were allocated each to solid biomass, biogas, and wind, and the remaining 10% are reserved for PV and other renewable electricity sources. The new limit to subsidies slowed the growth of installed capacities remarkably.

In the revised version of the "Ökostromgesetz" in 2012, the additional payments were drastically increased to 50 million € per year (declining by 1 million for every year following for the next ten years). This again sparked the development of renewable electricity.

2.1.1. Feed-in tariffs

Feed-in tariffs were introduced in Austria in 2002 in the "Ökostromgesetz" and its decree for feed-in tariffs. Feed-in tariffs are granted to all producers of renewable electricity (except large-scale hydro power), and can therefore be categorized as production-based financial mechanisms. They support renewable electricity production by paying producers above market price to reflect the higher production costs. They are adjusted every year, and were guaranteed for the next 12 years. The level of the payment depends on the year the facility is built. Feed-in tariffs are regularly adjusted to reflect technological progress and hence changing production costs.

The feed-in tariffs greatly stimulated investment in renewable electricity. With new installations emerging, also the total volume of generated electricity grew, as can be seen in Figure 3. Because of the limit to the total volume of subsidies established in the amendment of 2006, this growth almost came to a halt. With the amendment of 2012, which again doubled available subsidies and granted funds to process the already existing waiting list, the volume of subsidised electricity expanded again.

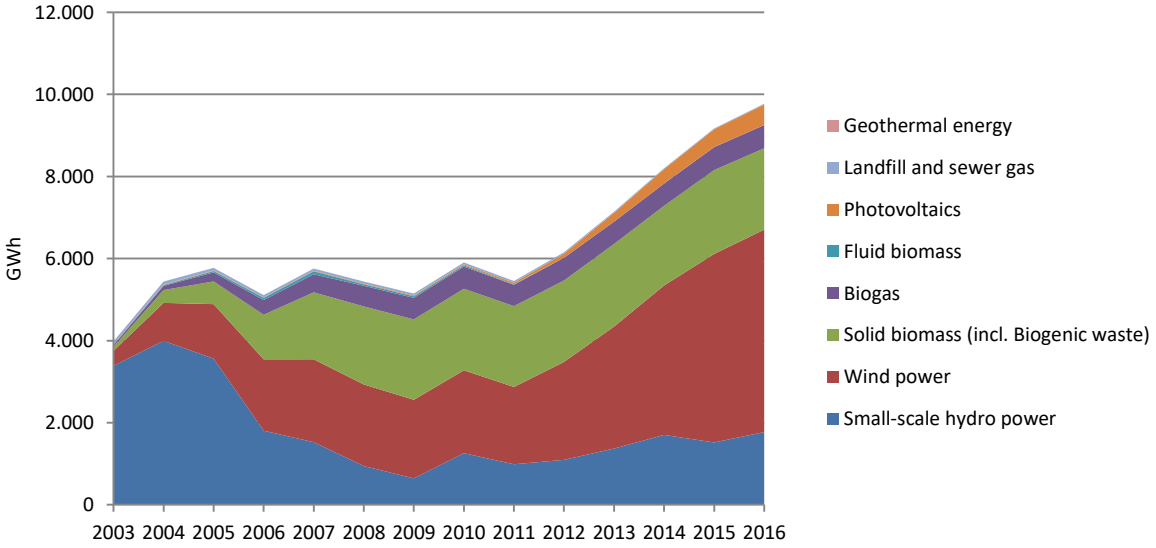

Figure 3 Total subsidised electricity production in GWh, Austria, 2003-2016
Source: Data for 2003-2005 E-Control (2017), data for 2007 – 2016 OeMag (2017)

Figure 3 shows the increase of total renewable production, while the development of the individual technologies is better illustrated in Figure 4. While hydro power production decreased in the last decade, the other technologies increased, especially after the first introduction of feed-in tariffs. The

figure also enhances the break-down of growth following the 2006 amendment. In the following years, the production practically stagnated for all energy sources. After 2011, the production increased again. Wind power has by far the highest increase in production, growing by roughly 150% between 2011 and 2016.

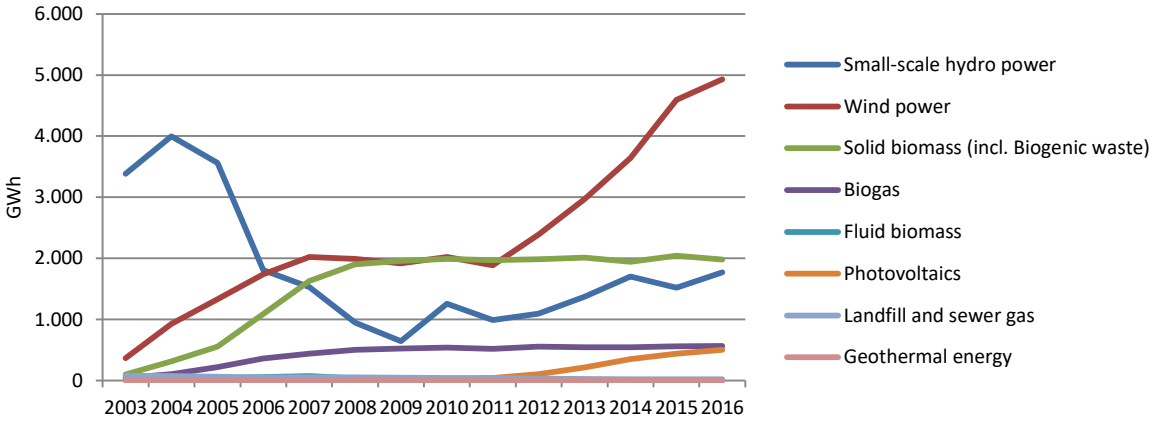

Figure 4 Subsidised electricity production by source in GWh, Austria, 2003-2016
Source: Data for 2003-2005 E-Control (2017), data for 2007 – 2016 OeMag (2017)

The adjustments of the level of feed-in tariffs take place yearly, only affect new installations, and for each of them then stay constant for the following 13 years. Hence, the price a producer gets depends on the year of the installation, and feed-in tariffs are paid on various levels. The newly granted feed-in tariffs have been declining over the years, and so have the average paid feed-in tariffs, as shown in Figure 5.

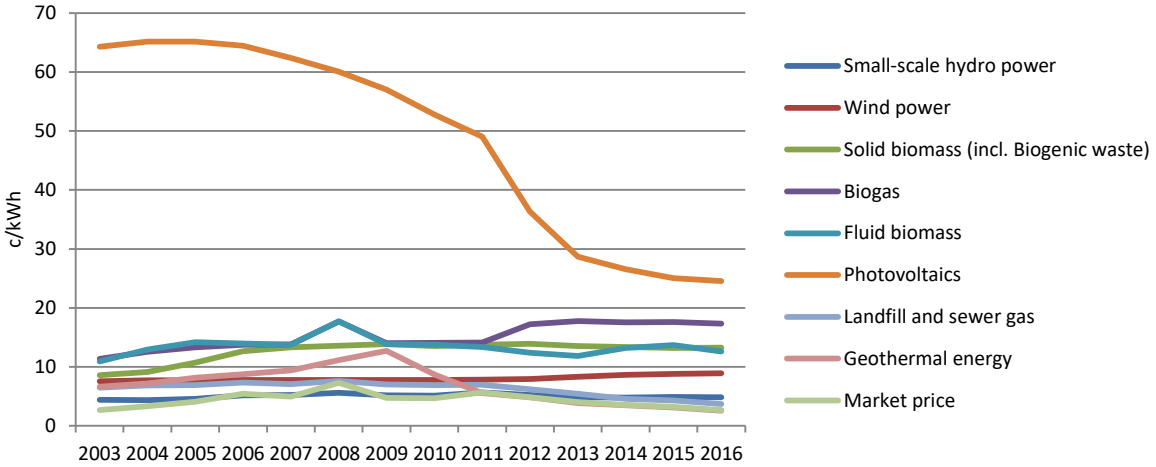

Figure 5 Yearly average feed-in tariff and market price in c/kWh, Austria, 2003 – 2016
Source: Data for 2003-2005 E-Control (2017), data for 2007 – 2016 OeMag (2017)

The tariffs for new installations in the years 2003 – 2017 are given in more detail in the Appendix. The feed-in tariffs are set not only for technology, but also for the size (installed capacity) or the

electricity production of a plant. These size categorisations have changed over the years. The level of the actual feed-in tariffs granted for new installations every year are reflected in Figure 5. For some technologies, tariffs have grown slightly, e.g. solid biomass and biogas, while others have fallen (fluid biomass), or only show a peak around 2009 (wind power). As indicated in Figure 5, the tariffs for PV have undergone the most drastic change: From up to 60 c/kWh in 2003, tariffs have fallen to 7.91 c/kWh in 2017, and are only given to installations integrated in buildings. Free standing installations are not available for feed-in tariffs since 2016.

Despite the falling feed-in tariffs, the total cost of the subsidies has reached roughly 1 billion € in 2016, mostly driven by the fast growing wind power and PV. Expenditures for other technologies have remained quite stable over the years. Figure 6 shows the development of the total compensation costs from 2003 to 2016. Another reason for the growing payments in spite of sinking feed-in tariffs is the falling market price, yielding a larger difference to the feed-in tariffs and hence a higher payment of subsidies.

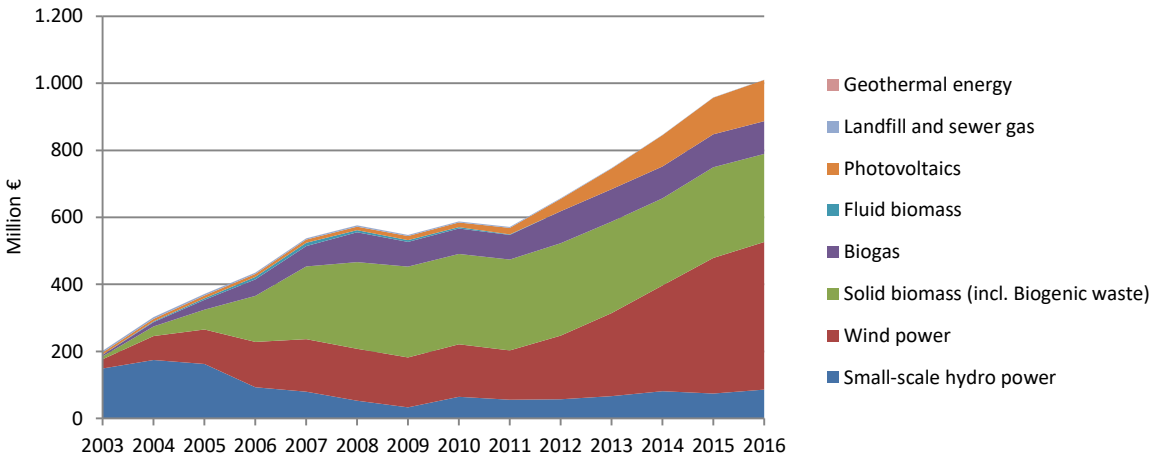

Figure 6 Total compensation for feed-in tariff electricity in million €, Austria, 2003 – 2016
Source: Data for 2003-2005 E-Control (2017), data for 2007 – 2016 OeMag (2017)

Figure 7 shows the share of subsidised renewable electricity in the final electricity demand in Austria between 3002 and 2016. It also illustrates the fast growth of wind power and PV, especially, while other technologies have produced rather constant shares of the electricity mix. Hydro power is the only technology with a significant decline in production in this time frame.

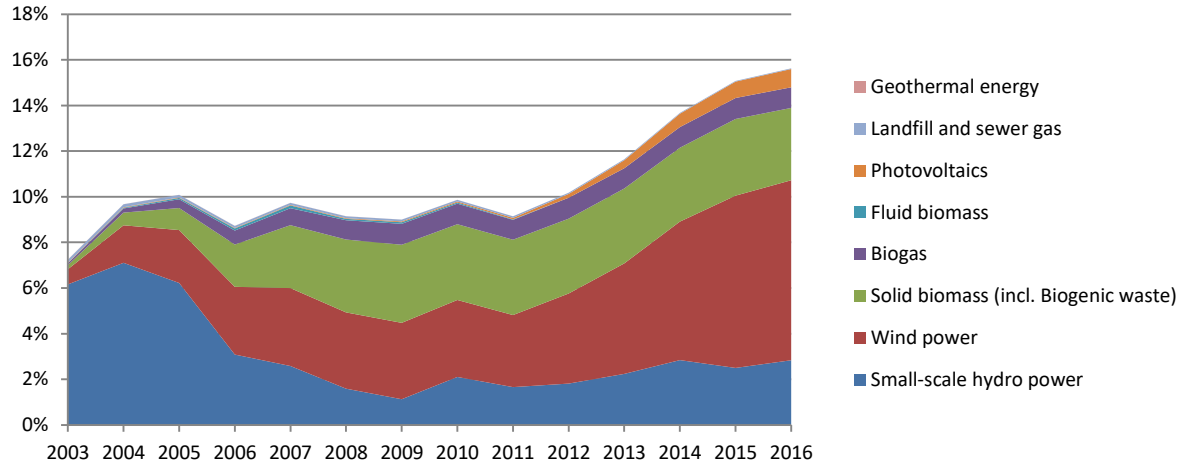

Figure 7 Share of state-aided electricity in electricity final demand, based on (E-Control, 2016, p. 13)

2.1.2. Investment subsidies

Additionally to feed-in tariffs, the "Ökostromgesetz" includes investment subsidies for small and medium scale hydro power plants, as well as CHP plants utilising waste liquor from paper and pulp industry. Operators of other renewable electricity power plants can seek other programs (also on provincial state level) to support investment (E-Control, 2016). Investment subsidies are part of the financial mechanisms, and are also production-based, encouraging the generation of renewable electricity. Within the "Ökostromgesetz", 284 new small scale hydro power plants have received a total of 160.69 million € in investment subsidies since the law came into effect in 2002, up to mid-2016). A further 8 million € was spent on revitalising projects of existing plants. The government spending on medium scale hydro power was at 47.8 million € for 9 new plants and 1.94 million € for two plants. CHP plants received 43.73 million € in investment subsidies in the same time frame (E-Control, 2016).

The Austrian climate and energy fund offers a wide range of subsidies, including investment subsidies for PV installations. The subsidy is available for up to 5 kWp for private households and companies. There is no boundary for the size of the installation, but subsidies are only granted for the first 5 kWp. The total budget for 2017 is 8 million €. Detached or roof-top PV installations qualify for a subsidy of a maximum of 275 €/kW, and installations integrated into a building can expect a subsidy of up to 375 €/kW. Communal installations are given lower subsidies, with 200 €/kW for detached/roof-top installations and 300 €/kW for integrated installations. Subsidies might be lower for installations with low investment costs, since only up to 35% of total investment costs can be subsidised. The climate and energy fund offers further investment subsidies for PV installations in agriculture, which are available for installations between 5 and 50 kWp. All installations subsidised

by the climate and energy fund are not eligible for other subsidies (including feed-in tariffs) (Klima- und Energiefonds, 2017d).

2.1.3. Financing of subsidies by household electricity price surcharges

Based on the "Ökostromgesetz 2012", a part of the subsidies are paid by the end consumers. There are two mechanisms to compensate the costs: A lump-sum payment ("Ökostrompauschale") by end consumers, and payments ("Ökostromförderbeitrag") calculated as a share of the grid compensation fee, the grid loss fee and the charge for certificates of origin. This share has grown from 15.4% in 2012 to 37.11% in 2016 (E-Control, 2016).

Table 1 shows the cost development for representative consumers. For private households, the flexible payments are now 2.5 times as high as they were in 2012, while the flat rate/lump sum has tripled. Combining those two, the cost for private households has increased by over 160% in the last four years. The total cost burden for industrial firms has increased by 132%. In comparison, the total cost of the subsidies has grown by 50% in the same time frame (see Figure 6).

Table 1 RES-electricity cost as surcharges, for representative end consumers, Austria, 2012-2016, based on (E-Control, 2016)

	2012		2013		2014		2015		2016	
	€/a	c/kWh	€/a	c/kWh	€/a	c/kWh	€/a	c/kWh	€/a	c/kWh
Representative private household (with a consumption of 3,500 kWh)										
Payments as a share of the grid compensation (Ökostromförderbeitrag)	26.5	-	42.5	-	57.0	-	52.7	-	66.9	-
Lump-sum payments (Ökostrompauschale)	11	-	11	-	11	-	33	-	33	-
Charge for certificates of origin	0.5	-	0.5	-	0.4	-	0.4	-	0.25	-
Sum eco-subsidies (excl. VAT)	38	1.09	54	1.54	68	1.96	86	2.46	100	2.86
Sum eco-subsidies (incl. VAT)	46	1.30	65	1.85	82	2.35	103	2.95	120	3.43
Representative company at grid level 3 (with a consumption of 55,000 MWh and a capacity of 12 MW)										
Payments as a share of the grid compensation (Ökostromförderbeitrag)	114,274	-	206,156	-	224,650	-	166,384	-	257,766	-
Lump-sum payments (Ökostrompauschale)	35,000	-	35,000	-	35,000	-	104,444	-	104,444	-
Charge for certificates of origin	8,250	-	8,250	-	5,500	-	6,600	-	3,850	-
Sum eco-subsidies (excl. VAT)	157,524	0.29	249,406	0.45	265,150	0.48	277,428	0.50	366,060	0.67

2.2 Inducing heat production to shift to renewables

There's a wide variety of common heating sources in Austria, both fossil and renewable, the most used energy sources being natural gas and solid biomass, e.g. wood logs, wood chips, pellets and wood briquettes. Figure 8 shows the development of heating energy sources since 2013, given by the number of principal residences using a specific energy source. The numbers include heating units for single residences, as well as central heating systems. "District heating" is here defined as central heating without specified energy sources.

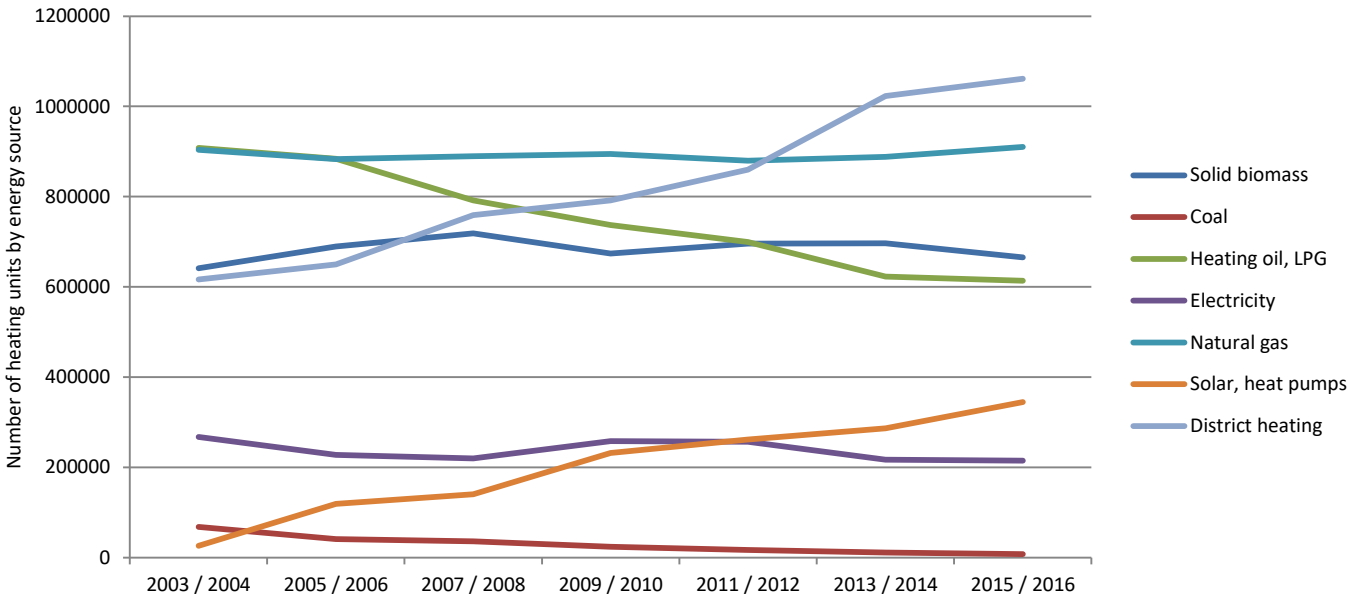

Figure 8 Number of heating units by energy source
Data source: Statistik Austria (2017a)

From Figure 8 we can see that most energy sources have been used at rather constant shares, with a few exceptions. Fossil heat sources (except natural gas) have been declining over the years, while renewable sources, like biomass, solar heating and heat pumps have gained importance. In 2015/2016, 26% of Austrian residences used biomass, solar energy or heat pumps for heating, while 40% still use heating oil, liquid gas, natural gas, or coal. The last 14 years have shown a trend in favour of renewables, but there is still a lot of potential.

To further raise the use of renewable energy sources for heating, there is a variety of financial mechanisms in the form of investment subsidies on heating systems, most of them managed by the climate and energy fund. The fund subsidises the investment costs of new solid biomass heating units, as well as solar thermal energy.

Biomass heating subsidies apply to units in private households fuelled by pellets or wood chips, including central heating systems and automatic pellet fuelled wood-burning stoves and excluding classic split logs and manually fuelled heating devices. The new units have to comply with emission standards when operating on full load, and may not exceed a capacity of 50 kW. Furthermore, the degree of efficiency has to be at least 85%. Subsidies are only granted for new heating systems replacing fossil fuelled ones, or replacing an at least 15 year old wood fuelled heating system, provided the efficiency grade is significantly higher (Klima- und Energiefonds, 2017b).

Central heating systems based on pellets or wood chips which comply with the before mentioned criteria, can apply for a one-time subsidy of 2000 €. Pellet fuelled stoves are eligible for a subsidy of

800 €. The subsidy may not exceed 35% of investment cost. The total subsidy volume provided by the Climate and Energy fund is 6 million €. Heating systems subsidised by the Climate and Energy fund are still eligible for subsidies on provincial or community level, but cannot receive further federal subsidies (Klima- und Energiefonds, 2017b).

Austrian installed thermal solar energy panels per inhabitant have the second highest value in the EU (after Cyprus)(Klima- und Energiefonds, 2017e), and is steadily growing. The Climate and Energy fund also supports the installation of solar thermal energy panels, distinguishing between private households and large-scale installations.

A private household solar collector has to cover at least 4 m² to be eligible for a subsidy, have a private use and be operated for the next ten years. The investment subsidy amounts to a one-time payment of 700 €, not exceeding 35% of the actual investment costs. The total volume of available subsidies is 1 million € for 2017. Subsidised instalments are not eligible for further state level subsidies, but can qualify for sub-state level subsidies (Klima- und Energiefonds, 2017e).

The investment subsidy program for large-scale solar installations by the Climate and Energy fund was founded in 2010, and has supported 253 projects up to 2017. Collector areas from 100 m² to 10,000 m² are accepted in the program. The program is divided into four topics: solar process heat in producing industries, solar energy feeding into district heating grids, high solar cover ratio in service and commercial operations (at least 20% of total heat demand), and new technologies and innovative approaches. The available subsidies are limited to 200,000 € for new and innovative technologies, and 750,000 € for the other three topics together (Klima- und Energiefonds, 2017f).

The Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW) also offers investment subsidies to various renewable heating systems. Subsidies include solid biomass heating with up to 400 kW capacity, solar thermal energy up to 100 m² collector area, and connections to (biomass fuelled) district heating (KPC, 2017d). The ministry also offers subsidies on biomass heating for companies, with a minimum capacity of 400 kW (KPC, 2017f). These are also state-level subsidies and are not compatible with the subsidies of the Climate and Energy fund described above.[1]

[1] For further state level subsidies, see www.umweltfoerderung.at/alle-foerderungen.html

3. Instruments to foster energy efficiency

3.1 Energy taxes

To account for externalities of the use of fossil fuels, there is a variety of taxes on different energy sources, given in Table 2. These carbon taxes apply to industries and end-consumers and aim to reduce the use of fossil fuels while generating revenues. The numbers shown in Table 2 are for the year 2015, as they are the latest available data from Statistik Austria. For fossil fuels, these energy taxes are nearly at the same level as the net price is, while their ratio to the net price is significantly lower for heating energy.

Table 2 Average prices and taxes on energy sources in 2015,
Source: Statistik Austria (2017b), CO_2-emission data from BGBl. II Nr. 339/2007 and Umweltbundesamt (2016)

in €	Net price	Energy taxes	VAT	Total taxes	Gross price	CO_2-emission factor			Energy taxes
						factor	unit	source	€ / t CO_2
Fuel oil heavy (industry)/t	332.34	67.70	0.00	67.70	400.04	3.14	t CO_2/t	BGBl. II Nr. 339/2007	21.54
Fuel oil heavy (power plants)/t	331.06	7.70	0.00	7.70	338.76	3.22	t CO_2/t	BGBl. II Nr. 339/2007	2.39
Gasoil (industry)/1000 l	477.28	109.18	0.00	109.18	586.46	2.69	t CO_2/1000 l	Umweltbundesamt (2016)	40.57
Gasoil (households)/1000 l	485.54	109.18	148.64	257.82	743.36	2.69	t CO_2/1000 l	Umweltbundesamt (2016)	40.57
Diesel (comm. use)/l	0.49	0.41	0.00	0.41	0.89	2.42	kg CO_2/l	Umweltbundesamt (2016)	169.02
Diesel (private use)/l	0.52	0.41	0.19	0.60	1.12	2.42	kg CO_2/l	Umweltbundesamt (2016)	169.02
Premium gasoline 98 Octan (comm. use)/l	0.63	0.49	0.00	0.49	1.12	2.11	kg CO_2/l	Umweltbundesamt (2016)	233.93
Premium gasoline 98 Octan (private use)/l	0.63	0.49	0.22	0.72	1.34	2.11	kg CO_2/l	Umweltbundesamt (2016)	233.93
Premium gasoline 95 Octan (comm. use)/l	0.51	0.49	0.00	0.49	1.00	2.11	kg CO_2/l	Umweltbundesamt (2016)	233.93
Premium gasoline 95 Octan (private use)/l	0.51	0.49	0.20	0.69	1.20	2.11	kg CO_2/l	Umweltbundesamt (2016)	233.93
Regular gasoline (comm. use)/l	0.50	0.49	0.00	0.49	1.00	2.11	kg CO_2/l	Umweltbundesamt (2016)	233.93
Regular gasoline (private use)/l	0.50	0.49	0.20	0.69	1.20	2.11	kg CO_2/l	Umweltbundesamt (2016)	233.93
Black coal (industry)/t	103.07	50.00	0.00	50.00	153.07	2.68	t CO_2/t	BGBl. II Nr. 339/2007	18.66
Black coal (power plants)/t	83.21	0.00	0.00	0.00	83.21	2.71	t CO_2/t	BGBl. II Nr. 339/2007	0.00
Natural gas (industry)/kWh	0.03	0.01	0.00	0.01	0.04	0.20	kg CO_2/kWh	BGBl. II Nr. 339/2007, Umweltbundesamt (2016)	45.79
Natural gas (households)/kWh	0.06	0.01	0.01	0.02	0.08	0.20	kg CO_2/kWh	BGBl. II Nr. 339/2007, Umweltbundesamt (2016)	38.71
Electricity (industry)/kWh	0.07	0.03	0.00	0.03	0.10				
Electricity (households)/kWh	0.13	0.04	0.03	0.07	0.20				

Energy tax rates have varied in the past years, as Figure 9 illustrates. Except for a peak in 2009, they have gradually decreased for a decade, and only increased again since 2013.

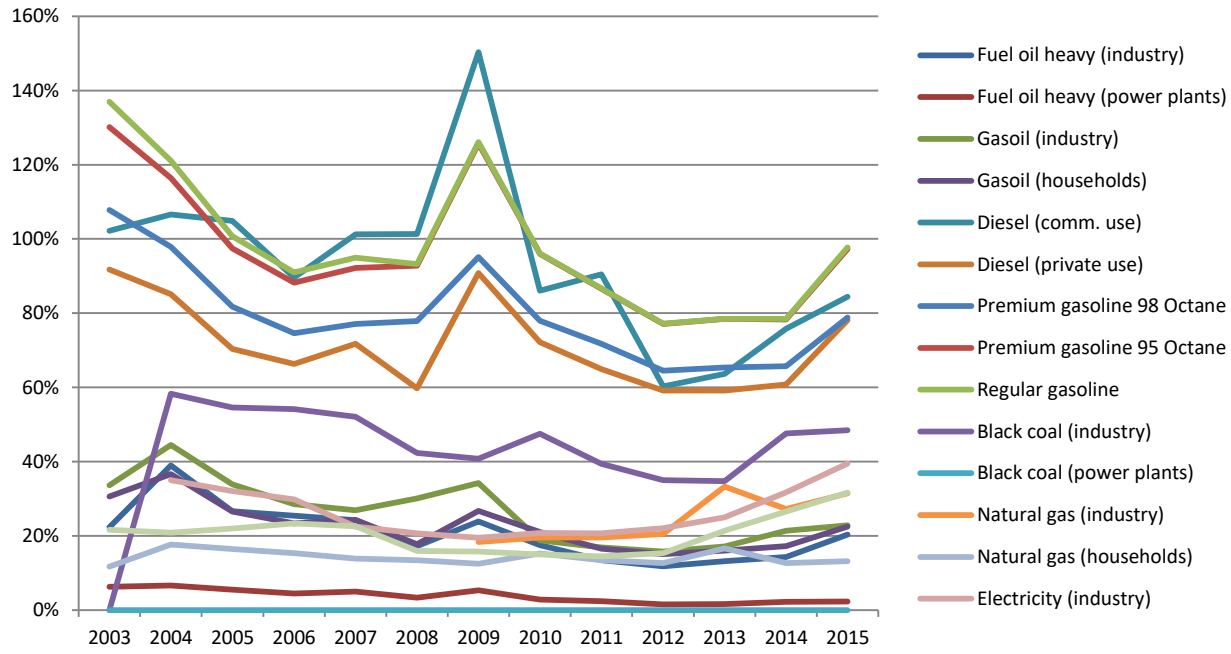

Figure 9 Energy tax rates, Austria, 2003 – 2015
Source: Statistik Austria (2017d)

The Austrian taxes on coal and natural gas include the supply and the use of coal or gas. If the taxed coal or gas is used for electricity production or the production of fuels, the taxes are refunded. This refunding of taxes can be seen as a hidden subsidy on electricity from fossil fuels.

Apart from energy taxes, there are also other environmental taxes: transport taxes, resource taxes, and environmental pollution taxes. The tax income from these four tax groups is illustrated in Figure 10, given for the years 1995 – 2015. The total collected taxes have grown steadily, mainly driven by transport and energy taxes.

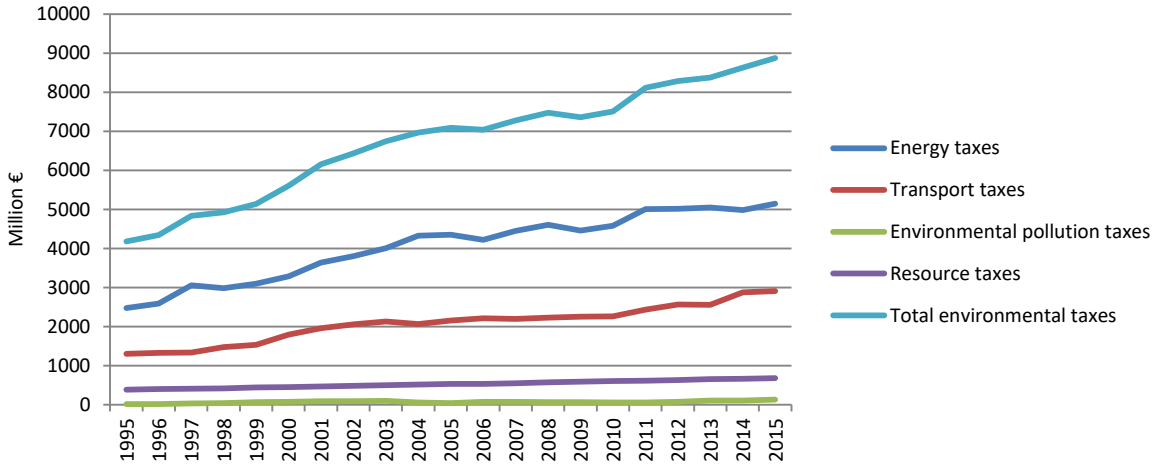

Figure 10 Environmental tax revenue (in million €), Austria, 1995 – 2015
Source: (Statistik Austria, 2017c)

3.2 Specific sector aspects: electricity

Reducing the demand for electricity is an important step on the way to reduce emissions. Especially for businesses, there is a range of subsidies for electricity efficiency improvements, especially regarding lighting and cooling.

Air-conditioning instalments in buildings fuelled by renewable energies or waste heat, as well as "free-cooling" systems utilising ground or river water can apply for investment subsidies. Furthermore, new or optimised process cooling systems using alternative cooling agents or cooling agents with a GWP lower than 150, as well as the replacements or optimisation of process cooling systems with cooling agents with a GWP between 150 and 1,500 can apply for a subsidy. Investment costs have to exceed 10,000 € to be eligible, and the projects are required to reduce CO_2-emissions by at least 4 t/y. The height of the subsidies ranges from 20 % to 35 % of the environmental investment costs. Additional 5 % are possible for EMAS-certified businesses (KPC, 2017g).

Certain cooling and freezing devices with investment costs of at least 2,000 € can also receive investment subsidies. The subsidies vary between 100 € and 1,200 €, following a list of possible devices and their subsidies (KPC, 2017c).

Businesses implementing new exterior lighting or street lighting can receive subsidies per lighting point, with a minimum investment in 20 lighting points (KPC, 2017b). Investments in indoor LED-lighting are eligible for another subsidy, if the newly installed LEDs have a total capacity of 500 kW or more. In that case, the investor gets a lump-sum subsidy of 600 €/kW, with the possibility of another 100 €/kW for the instalment of light regulation (KPC, 2017h).

3.3 Specific sector aspects: heating

Guiding the production of heating energy towards renewables is an important step for reducing GHG emissions. Equally important, however, is the thermal insulation of new and especially existing buildings, which lowers the heating energy demand significantly. Thus, new renewable heating systems can operate more efficiently. Insulation is also important for older buildings with mostly fossil fuel based heating. Often, the demand can be drastically reduced, and the same room temperature can be achieved with a considerably smaller amount of fuels, and hence emissions. Therefore, there are several subsidy programs in Austria to provide additional incentive for thermal insulations. In some cases, the subsidies are linked to standards, e.g. the low-energy house standards.

Private persons can apply for a subsidy for thermal insulations of buildings older than 20 years. For an insulation project to be eligible, it has to meet several criteria, the most important being that the heat demand is reduced by at least 40%. Subsidies may apply to the restoration and insulation of external walls, the highest floor slab and the roof, the lowest floor slab or the cellar floor, or the replacement of windows and external doors. The subsidies range from 3,000 to 8,000 € depending on the extent of the restoration and can be increased by additional 1,000 € if renewable materials are used during the reconstruction (KPC, 2017i).

Similar subsidies are also available for companies reconstructing their buildings. Additionally to the former mentioned restoration of walls, floors, roofs, and windows, companies can also apply for subsidies for installing heat recovery in ventilation systems as well as constructing a sun protection system to decrease cooling demand (KPC, 2017j).

Another way to make heating more efficient is to use waste heat generated by industrial or commercial operations. Putting the generated heat to use reduces the need for heat production from other sources. Firms which generate waste heat and plan to make it available through feeding it into a new or existing heating grid can apply for an investment subsidy. The subsidised costs also include pipes and heat exchangers and heat pumps to raise the temperature in the grid (KPC, 2017a).

4. Specific Instruments for Mobility

To achieve significant emissions reductions in Austria, the transport sector has to be taken into account. As illustrated in Figure 11, the transport sector takes up the biggest part of energy consumption in Austria since 1998. The steep rise of energy consumption in transport stopped in 2006, but transport energy consumption was still 35% of total energy consumption in 2015. Considering that energy used in transport is traditionally fossil energy, it is even more important to induce a change.

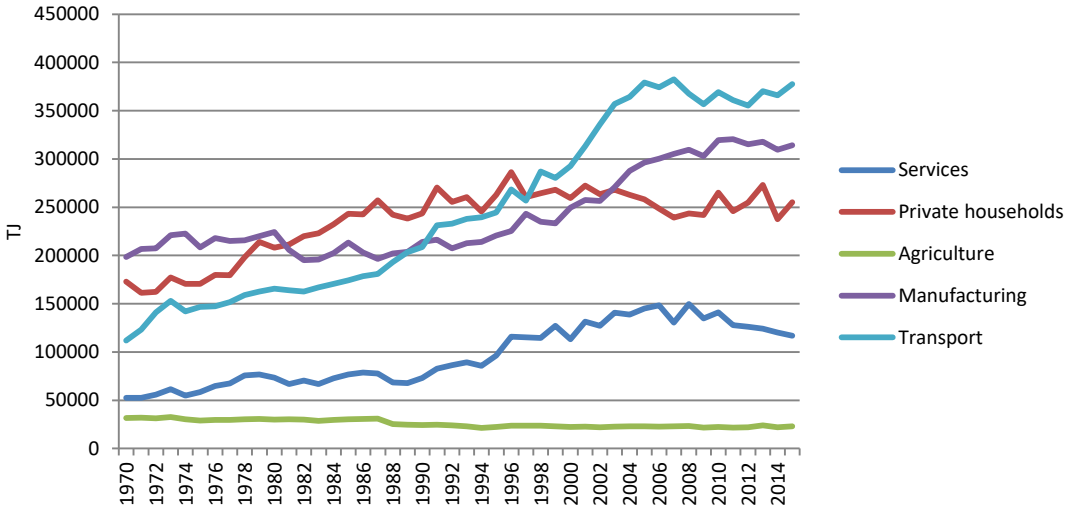

Figure 11 Austrian final consumption of energy in TJ by sectors, 1970 – 2010

Source: (Statistik Austria, 2016b)

The most promising technology to reduce emissions in the transport sector is the shift to electricity replacing fossil fuels like gasoline and diesel. For an effective reduction of emissions, the electricity used has to be generated from renewable sources. As discussed in section 2.1, the trend in Austria goes into the right direction to achieve this. The share of electric cars is also increasing, although their number is still small. Figure 12 shows the registration of new electric cars from 2000 to 2016. After a slow start, the number grew almost exponentially, with more than double new electric cars in 2016 compared to 2015. The total number of new car registrations has stayed quite constant in the same time frame, with an average of 432,456 new cars per year. Despite the fast growth of electric cars, their share in new car registrations in 2016 was only 1.25% (Statistik Austria, 2017e).

There is a lot of potential for e-mobility in Austria, which is also seen by politics. Initiated by the BMLFUW and the Austrian Ministry for Transport, Innovation and Technology (bmvit), there are several subsidy programs, including private persons, companies, and municipalities. Private persons can seek subsidies to the costs of purchase of a fully electric vehicle, hybrid car, or an electric motorcycle or scooter (Klima- und Energiefonds, 2017a). The subsidies for companies buying electric cars is slightly lower (KPC, 2017e). In addition to these programs, car importers have agreed to cooperate on subsidies with the BMLFUW and bmvit, and pay additional subsidies from March 2017. The total subsidy volume for all programs is about 72 million €, equally divided between the two ministries and the car importers (BMLFUW, 2017). Drivers of electric vehicles enjoy other advantages as well, and can park for free in many municipalities (ÖAMTC, 2017).

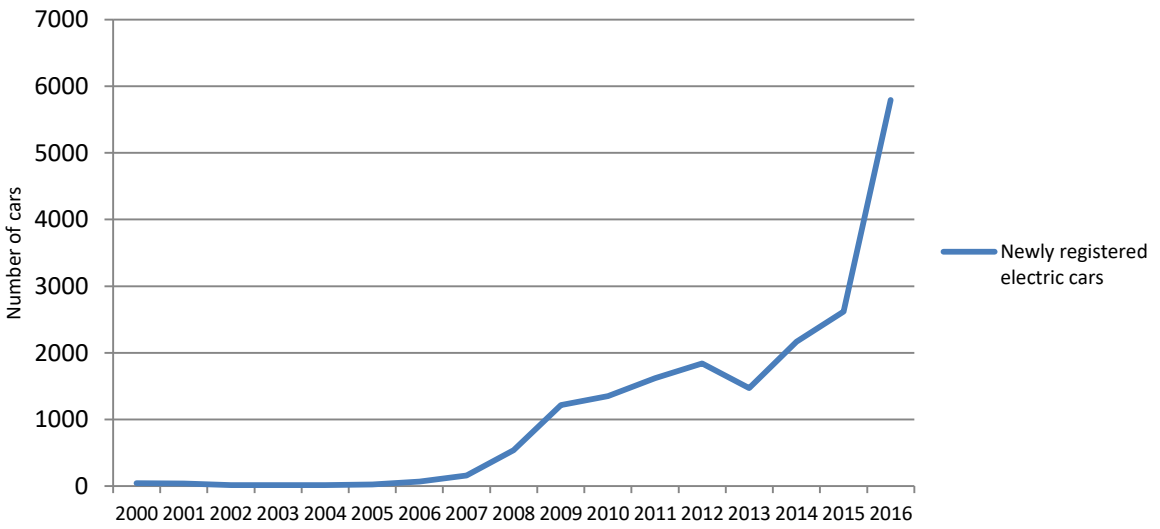

Figure 12 Registration of new electric cars in Austria, 2000 – 2016
Source: Statistik Austria (2017e)

Apart from subsidies for more renewable vehicles, there is an energy tax (see section 3.1) on gasoline (79% - 98% of net price) and diesel (78% of net price), which should also give an incentive to use less fossil fuels. Contrary to these incentives is the Austrian "Pendlerpauschale", subsidising commuting expenses for employed people. The level of the allowance depends on the availability of public transport and the distance between the employee's home and workplace (BMF, 2017). This system is often considered counterproductive to the intention of reducing individual motor car traffic.

5. Comprehensive programs

3.4 Climate and Energy Model Regions

The Climate and Energy Model Regions is a program initiated by the Austrian Climate and Energy fund. It is a bottom-up program, which supports municipalities all across Austria to pursue environmental and climate targets along with regional development. At least two municipalities can form a climate and energy model (CEM) region, and set targets according to their regional potentials. These targets can include the regional production of renewable energy, along with the reduction of energy demand, and other often awareness raising projects.

Since the start of the programme in 2009, 91 CEM regions have been established with the goal to implement regional climate measures. These CEMs are spread across Austria, include a total of 811 municipalities and have 2.3 million inhabitants. Together, they have put into practice around 3,000 projects to help mitigate climate change, through renewable energies, energy efficiency, mobility projects, and raising awareness of these issues in the population. The success of a CEM region depends on a CEM region manager who is responsible for implementing projects. New CEM regions

are required to develop an implementation concept, describing the region and identifying its specific strengths, weaknesses, and potentials, as well as future targets and ways to implement them.

The CEM regions are supported by the Climate and Energy Fund mainly through the funding of a CEM manager and investment subsidies for climate friendly technologies (Klima- und Energiefonds, 2017c).

3.5 Klima:aktiv

Klimaaktiv is a climate protection initiative set up by the BMLFUW in 2004, which supports the transition to a low-carbon economy. It operates in many different fields, including renewable energy, mobility, energy efficiency, and building and renovation. Klimaaktiv serves as a network and connects governance with society. It sets quality standards, provides knowledge and consulting, develops concepts for increased energy efficiency, and offers training, advice and support.

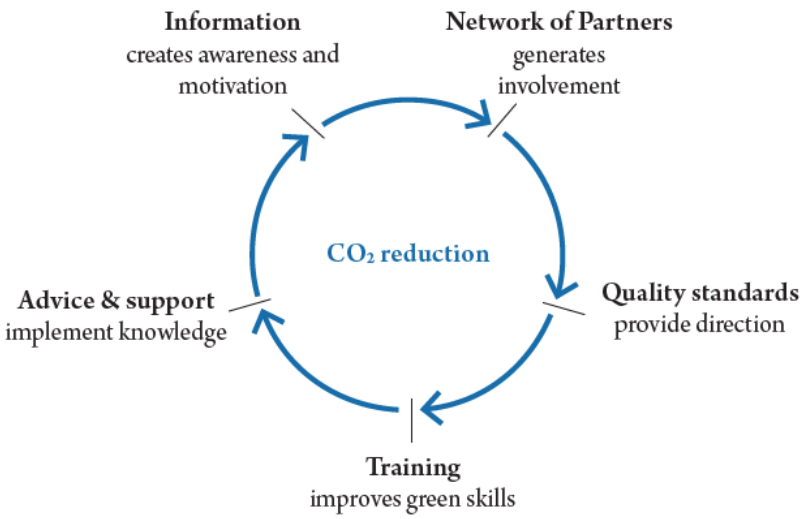

Figure 13 klimaaktiv transistion cycle
Source: BMLFUW (2015, p. 4)

Figure 13 highlights the different approaches of klimaaktiv to move CO_2 reductions forward in Austria. By setting quality standards it sets a direction for markets, and thus helps to stabilise them. Training and education supports green jobs in renewables, mobility and energy efficiency and spreads knowledge of environmental standards. Klimaaktiv quality standards are well connected with state subsidy programs, often even serving as a requirement for a subsidy. Klimaaktiv also provides information as well as advice and support to the public, but also municipalities, companies and administration. Furthermore, the initiative aims to connect stakeholders and business partners. Through this broad approach, klimaaktiv has a wide reach within Austria's movement to a low-carbon economy (BMLFUW, 2015).

3.6 E5

The e5 programme was founded in Vorarlberg in the 1990s, following a Swiss model. The program was adopted in several other provinces and formed a national office in collaboration with klimaaktiv in 2004 to further spread it across Austria. The e5 program requires the participating municipalities to address a number of issues, including municipal buildings and facilities, development strategies, mobility, supply and demand of energy, water and waste, internal organisation, and raising awareness (BMLFUW, 2015). Considering these topics, municipalities develop implementation targets. The e5 program awards the municipalities with up to five "e"s (the "e" standing for energy), depending on the implementation level. The implementation level is determined through standardised audits and certification processes. Austrian e5-municipalities are automatically part of the "European Energy Awards", which was created after the Swiss and Austrian example. Within the European Energy Awards, Austrian e5-municipalities are successful front-runners (BMLFUW, 2015).

3.7 Klimabündnis

Klimabündnis is an international initiative to protect the climate and was founded in Frankfurt in 1990. 1700 municipalities across 26 European countries collaborate within the Klimabündnis programme to support indigenous people in South America. Klimabündnis is active in all Austrian provinces, supporting municipalities, companies, and educational institutions. The initiative's goal is to protect the climate by implementing environmentally and climate friendly technologies to reduce GHG emissions locally and protecting the rain forests of South America. In Austria, these goals are mainly pursued through awareness raising and providing information. Klimabündnis also organises workshops and events to various topics, such as energy, climate justice, international development, agriculture, adaptation, or mobility (Klimabündnis, 2017).

6. Conclusions

We here give an overview across the financial instruments covered, by stating budgetary relevance.

There is one agency processing all federal environmental financial support programs, the Kommunalkredit Public Consulting (KPC). Table 3 states its total funding volume and investment projects triggered by category for the most recent year available, 2016. Of special interest in this table are Austrian domestic environmental subsidies ("Umweltförderung im Inland"), and the subsidies by the Climate and Energy Fund (Klima- und Energiefonds), as they reflect the subsidy programs discussed in this paper. In 2016, KPC assessed 3,041 projects in the category "Umweltförderung im Inland", 2,893 had a final settlement. For total investments of 432.1 million €,

subsidies of 66 million € were granted. 67.2 million € of subsidies were actually paid in 2016, implying that projects from the previous year were paid out in 2016.

The majority of projects assessed for the Climate and Energy Fund were PV installations, followed by wood-fired heating and thermal solar energy. The highest subsidy volume, however, was granted to work programs and mobility management.

Table 3 Abwicklungszahlen KPC 2016 / transaction data KPC 2016 (KPC, 2017k)

Values in million €	Evaluations	Investment	Subsidies	Final settlements	Payments
State environmental subsidies	**17,988**	**1,615.2**	**325**	**16,596**	**578**
Water management	1,948	541.7	110.3	1,703	346.3
Domestic environmental subsidies	3,041	432.1	66	2,893	67.2
Counselling	2,063	4.2	1.1	0	1.1
Modernising insulation of commercial buildings	406	86.9	15.3	362	11.6
Modernising insulation of private buildings	9,714	310.8	33.5	11,060	40.3
Environmental remediation	16	20.4	15.2	15	19.6
Protective water management	588	121.1	60.3	432	89.9
klimaaktiv mobil	115	6.7	0.7	117	0.7
International climate financing	13	4.7	4.7	4	1.3
EU-co-financing UFG	84	86.5	17.7	10	0
Climate- and Energy Fund	**15,878**	**304,2**	**49,1**	**15,273**	**48,4**
Photovoltaics	7,505	90,4	9,6	7,396	9,3
Biomass and solar heating	5,758	77	7,1	5,758	7,1
Mobility Management	1,636	70,5	8,5	1,474	15,5
Working programs	369	43,6	21,2	227	16,5
EU-co-financing	610	22,8	2,8	418	0
Other programs	**37,211**	**246.2**	**33.4**	**37,114**	**17.2**
Renewable electricity - hydro power	19	107.5	16.4	68	0
Craftsmen bonus	36,727	105.9	15.4	36,727	15.4
Initiative for waste prevention	0	0	0	2	0
KLUP Salzburg	166	14.2	0.8	209	1.2
Follow-up funds Tirol	257	16.2	0.7	77	0.5
Follow-up funds Vorarlberg	17	2	0.1	7	0
PV Wien	25	0.4	0	24	0
SUM	**71,077**	**2,165.60**	**407.5**	**68,983**	**643.6**

Table 4 shows only “Umweltförderung im Inland” and breaks it down to subcategories, again for 2016. It does not only show the number of projects and the subsidy volumes, but also the investments’ estimated environmental effects in terms of energy savings and CO_2 reduction. Subsidy programs to foster renewable energy sources have induced the production of additional 387 GWh/a. Programs to promote energy efficiency have triggered energy savings of 384 GWh/a. Furthermore, mobility schemes have led to energy savings of 11.9 GWh/a, through the support of the more efficient electric vehicles.

Table 4 Austrian domestic environmental subsidies by category, 2016

	Number	Environmentally relevant investment volume	Present value of subsidies	CO_2-reduction in tonnes per year	CO_2-reduction in tonnes based on useful life	Energy from renewable sources in MWh/a	Energy savings in MWh/a
Renewable energy sources	**581**	**131,421,138**	**18,117,527**	**120,753**	**2,890,696**	**387,029**	**7,858**
Biomass individual equipment	283	12,860,599	2,643,793	22,910	458,204	68,401	0
Biomass micro grid	36	5,907,044	1,466,502	7,346	146,928	21,308	0
Biomass local heat	52	36,918,334	4,849,894	26,390	527,791	90,430	0
Boiler change	6	3,588,934	445,565	0	0	0	0
Heat distribution	73	52,006,595	4,658,141	52,272	1,568,151	153,694	0
Grid densification	12	162,626	32,494	261	7,824	847	0
Optimisation of local heating plants	8	2,717,633	331,972	976	19,513	0	7,459
Solar plants	88	1,641,431	318,866	660	13,195	1,516	0
Electricity plants	21	1,244,523	425,677	122	1,832	112	399
Energy from biogenic waste	2	14,373,419	2,944,623	9,817	147,258	50,722	0
Efficient energy use	**1,286**	**194,741,252**	**24,014,257**	**118,123**	**1,400,792**	**13,706**	**384,022**
Natural gas CHP	1	76,879	9,610	1	15	0	74
Connection to district heating	122	2,952,409	543,841	9,636	144,546	13,706	13,804
Heat pumps	67	2,783,973	443,257	1,894	22,137	0	5,684
Operational energy saving	372	100,025,260	16,530,156	85,531	855,311	0	299,752
Change to LED-systems	618	13,385,506	2,378,613	7,926	79,263	0	23,622
Construction of low-energy houses	18	43,835,357	573,157	525	15,750	0	1,583
Modernising insulation of buildings	64	22,884,109	2,346,390	7,884	236,511	0	26,215
Air-conditioning and cooling	24	8,797,759	1,189,233	4,726	47,259	0	13,287
Mobility schemes	**1,123**	**41,403,687**	**3,825,036**	**4,001**	**31,804**	**765**	**11,860**
Electric passenger cars	1,046	40,976,433	3,732,615	3,180	31,804	765	9,431
E-mobility charging infrastructure	77	427,254	92,421	820	0	0	2,429
Climate relevant gases	1	125,706	37,712	1,200	12,000	0	0
Resource efficiency	10	17,972,077	3,351,252	451	0	0	0
Air quality improvement measures	15	15,043,413	2,520,884	0	0	0	0
Hazardous waste	4	5,896,376	1,502,902	0	0	0	0
Research and demonstration plants	7	16,302,600	3,456,629	13,871	0	0	0
Sum climate relevant subsidies	**2,991**	**367,691,783**	**45,994,532**	**244,077**	**4,335,292**	**401,501**	**403,739**
Sum investment subsidies	3,027	422,906,249	56,826,199	258,399	4,335,292	401,501	403,739
Consultation subsidies (regional programs)	2,063	4,202,222	1,127,735	0	0	0	0
Sum domestic environmental subsidies	**5,090**	**427,108,471**	**57,953,934**	**258,399**	**4,335,292**	**401,501**	**403,739**

Table 5 gives the aggregate values of Austrian domestic environmental subsidies ("Umweltförderung im Inland") for the time period 1993 - 2016. In this time frame, 32,424 climate relevant projects received state subsidies, the majority of which promote renewable energy sources. Renewable energies were also granted the highest total subsidy volume of 657.7 million €. Including all other subsidies covered by the domestic environmental subsidies, 1,199 million € subsidies triggered an environmental investment volume of 7,242 million €.

Table 5 Austrian domestic environmental subsidies by category, in €, 1993 - 2016

	Number of projects	Environmentally relevant investment volume	Present value of subsidies
Climate relevant subsidies	**32,424**	**6,222,329,486**	**986,031,292**
Renewable energy sources	18,637	3,648,875,092	657,675,004
Efficient energy use	12,424	2,205,988,458	284,723,741
Mobility schemes	1,275	138,772,524	14,343,041
Climate relevant gases	88	228,693,412	29,289,506
Other subsidies	**1,242**	**1,003,113,192**	**206,578,030**
Air quality improvement measures	718	660,069,821	129,721,427
Waste prevention	110	184,639,055	41,350,012
Noise abatement measures	25	15,535,560	1,915,704
Resource efficiency	38	47,517,366	8,675,091
Research and demonstration plants	50	70,424,775	17,412,590
Eco-audits and studies	301	24,926,615	7,503,206
Sum domestic subsidies	**33,666**	**7,225,442,678**	**1,192,609,322**
Consultation subsidies (regional programs)	10,805	16,260,805	6,677,412
Sum domestic environmental subsidies	**44,471**	**7,241,703,483**	**1,199,286,734**

Austria's various subsidy schemes help to reduce emissions both in energy supply and demand, especially through the production of renewable energy, reducing the demand for fossil fuels. This is particularly true for electricity production, where a parallel development of subsidies, mainly feed-in tariffs, and increased production is clearly visible. For investment subsidies it is more difficult to get a comprehensive overview across the many agencies involved in their initiation and processing. Hence, documentation of subsidies payed and their effect on energy supply and demand is more difficult to find. Further research is also needed to assess subsidies on sub-state level, mainly from provincial governments. Regarding mobility, Austria has a long way to go. Road transport is almost exclusively based on fossil fuels, with only 1.25% of new cars in 2016 having an electric engine. Overall, Austria's energy sector is moving away from fossil energy, but the current instruments to achieve this have to be extended and adapted – for Austria to become a low-carbon society by 2050.

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Appendix

Table 6 Yearly feed-in tariffs on renewable electricity, Austria 2003-2017

Einspeisetarife für Ökostromanlagen		ab 2003	2006	2007	2008	2009	2010/2011	2012	2013	2016	2017
		Tarif in c/kWh gemäß BGBl II Nr 508/2002	Tarif in c/kWh gemäß BGBl II Nr 401/2006 und BGBl II Nr 59/2008				Tarif in c/kWh gemäß BGBl II Nr 42/2010 und BGBl II Nr 25/2011	Tarif in c/kWh gemäß BGBl II Nr 307/2012		Tarif in c/kWh gemäß BGBl II Nr 459/2015 und BGBl II Nr 397/2016	
Geltungsdauer		13 Jahre	10 plus 2 (reduzierte) Jahre				13 Jahre, für feste Biomasse und Biogas 15 Jahre	13 Jahre, für feste Biomasse und Biogas 15 Jahre		13 Jahre, für feste Biomasse und Biogas 15 Jahre	
Windenergie		7,8	7,65	7,55	7,54	7,53	9,7	9,5	9,45	9,04	8,95
Feste Biomasse (wie Waldhackgut, Stroh)	hocheffizient bis 500							20	19,9	22,22	22
	bis 500 kW	16	15,7	15,65	15,64	15,63	14,98	18	17,91	18,8	18,61
	500 kW bis 1 MW						13,54	15,8	15,72	16,32	16,15
	1 bis 1,5 MW						13,1	15,5	15,42	14,97	14,82
	1,5 bis 2 MW						12,97	15	14,92	14,47	14,33
	2 bis 5 MW	15	15	14,95	14,94	14,93	12,26	14,37	14,3	13,88	13,74
	5 bis 10 MW	13	13,4	13,3	13,29	13,28	12,06	13,88	13,81	13,39	13,26
	über 10 MW	10,2	11,3	11,1	11,09	11,08	10	11	10,94	10,61	10,5
Abfall mit hohem biogenen Anteil	SN 17, Tab. 2, Bsp. Rinde, Sägespäne	minus 20%	minus 25%								
	SN 17, Tab. 1, Bsp. Spanplattenabfälle	minus 35%	minus 40 %								
	Andere 5-stellige SN in Tab. 1 und 2 ÖkoStrG	2,7	5	4,9	4,89	4,88	5	5	4,95	4,8	4,75
Mischfeuerungen		anteilig									
Zufeuerungen in kalorischen Kraftwerken	Feste Biomasse (Waldhackgut, Stroh)	6,5	6,4	6,3	6,29	6,28	6,12	6,12	6,06	5,88	5,82
	SN 17, Tab. 2, Bsp. Rinde, Sägespäne	5	minus 25%				minus 20 %				
	SN 17, Tab. 1, Bsp. Spanplattenabfälle	4	minus 40 %								
	Andere 5-stellige SN in Tab. 1 und 2 ÖkoStrG	3	minus 50 %				minus 30 %				
Mischfeuerungen		anteilig									

Flüssige Biomasse	Pflanzenöle, kaltgepresste biogene Öle, RME bis 300 kW	13	(bis 200 kW)	13	12,5	12,49	12,48	5,8		5,8	5,74	5,57	5,51
	Pflanzenöle, kaltgepresste biogene Öle, RME über 300 kW	10	(über 200 kW)	10	9,5	9,49	9,48						
	andere flüssige Brennstoffe			6,5	6	5,99	5,98						
	Zuschlag für Erzeugung in effizienter KWK							2					
Biogas aus landwirtschaftlichen Produkten (wie Mais, Gülle)	bis 100 kW		16,5	17	16,95	16,94	16,93	18,5		19,6	19,5	18,67	18,48
	100 bis 250 kW		14,5	15,2	15,15	15,14	15,13						
	250 bis 500 kW		14,5	14,1	14	13,99	13,98	16,5		17,02	16,93	16,15	15,99
	500 bis 1000 kW (ab 2012: 500 bis 750 kW)		12,5	12,6	12,4	12,39	12,38	13		13,41	13,34	12,97	12,84
	über 1000 kW (ab 2012: über 750 kW)		10,3	11,5	11,3	11,29	11,28			13	12,93	12,51	12,38
Biogas bei Kofermentation von Abfallstoffen			minus 25%	minus 30 %				minus 20 %					
Zuschlag für Erzeugung in effizienter KWK								2					
Zuschlag bei Aufbereitung auf Erdgasqualität								2					
	bis 500 kW									17,02	16,93	16,15	15,99
	500 bis 750 kW									13,41	13,34	12,97	12,84
	über 750 kW									13	12,93	12,51	12,38
Mischfeuerungen								anteilig					
Deponie- und Klärgas	Klärgas	3	(bis 1 MW)	6	5,95	5,94	5,93	6		6	5,94	5,76	5,71
	Deponiegas	6	(über 1 MW)	4,1	4,05	4,04	4,03	5		5	4,95	4,8	4,75
Geothermie			7	7,4	7,3	7,29	7,28	7,5		7,5	7,43	7,43	7,36
Photovoltaik	bis 5 kWp	60	(bis 20 kWp)	49	46	45,99	45,98	Investitionszuschuss					
	5 kWp bis 10 kWp	47	(über 20 kWp)	42	40	39,99	39,98	38 geb.int 35 frei	(5 bis 20 kWp)	19,7 geb.int. 18,43 frei	18,12 geb.int. 16,59 frei	8,24 geb.int	7,91 geb.int
	über 10 kWp			32	30	29,99	29,98						
	über 20 kWp							33 geb.int. 25 frei					
Kleinwasserkraft													
a) bestehende Altanlagen	erste 1,000,000 kWh		5,68										
	nächste 4,000,000 kWh		4,36										
	nächste 10,000,000 kWh		3,63										
	nächste 10,000,000 kWh		3,28										
	über 25,000,000 kWh		3,15										

b) nach Investitionen mit mindestens 15 % Stromertragssteigerung	erste 500,000 kWh	5,96		5,95	5,94		8,3	8,26	8,1	8,02
	nächste 500,000 kWh						6,06	6,03	5,91	5,85
	nächste 1,500,000 kWh	4,58		4,57	4,56		5,25	5,22	5,12	5,07
	nächste 2,500,000 kWh						3,83	3,81	3,73	3,69
	nächste 2,500,000 kWh	3,81		3,8	3,79		3,54	3,52	3,45	3,42
	nächste/über 7,500,000 kWh						3,25	3,23	3,17	3,14
	nächste 10,000,000 kWh	3,44		3,43	3,42					
	über 25,000,000 kWh	3,31		3,3	3,29					
c) Neubau bzw. mindestens 50% Stromertragssteigerung	erste 500,000 kWh	6,25		6,24	6,23		10,6	10,55	10,35	10,25
	nächste 500,000 kWh						7,63	7,59	7,43	7,36
	nächste 1,500,000 kWh	5,01		5	4,99		6,66	6,63	6,49	6,43
	nächste 2,500,000 kWh						5,56	5,53	5,42	5,37
	nächste 2,500,000 kWh	4,17		4,16	4,15		5,25	5,22	5,12	5,07
	nächste/über 7,500,000 kWh						5	4,97	4,87	4,82
	nächste 10,000,000 kWh	3,94		3,93	3,92					
	über 25,000,000 kWh	3,78		3,77	3,76					
	für Strombojen für die ersten 500 000 kWh								13,32	
	für Strombojen über 500 000 kWh hinaus								12,32	