IEA INTERNATIONAL ENERGY AGENCY

FH University of Applied Sciences TECHNIKUM WIEN

National Survey Report of Photovoltaic Applications in Austria 2017

PVPS

PHOTOVOLTAIC POWER SYSTEMS PROGRAMME

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Foreword

The International Energy Agency (IEA), founded in November 1974, is an autonomous body within the framework of the Organisation for Economic Co-operation and Development (OECD) which carries out a comprehensive programme of energy co-operation among its member countries

The IEA Photovoltaic Power Systems Technology Collaboration Programme (IEA-PVPS) is one of the collaborative R & D agreements established within the IEA and, since 1993, its participants have been conducting a variety of joint projects in the applications of photovoltaic conversion of solar energy into electricity.

The participating countries and organisations can be found on the www.iea-pvps.org website.

The overall programme is headed by an Executive Committee composed of one representative from each participating country or organization, while the management of individual Tasks (research projects / activity areas) is the responsibility of Operating Agents. Information about the active and completed tasks can be found on the IEA-PVPS website www.iea-pvps.org

Introduction

The objective of Task 1 of the IEA Photovoltaic Power Systems Programme is to promote and facilitate the exchange and dissemination of information on the technical, economic, environmental and social aspects of PV power systems. Task 1 activities support the broader PVPS objectives: to contribute to cost reduction of PV power applications, to increase awareness of the potential and value of PV power systems, to foster the removal of both technical and non-technical barriers and to enhance technology co-operation. An important deliverable of Task 1 is the annual "*Trends in photovoltaic applications*" report. In parallel, National Survey Reports are produced annually by each Task 1 participant. This document is the country National Survey Report for the year 2017. Information from this document will be used as input to the annual Trends in photovoltaic applications report.

The PVPS website www.iea-pvps.org also plays an important role in disseminating information arising from the programme, including national information.

1 INSTALLATION DATA

The PV power systems market is defined as the market of all nationally installed (terrestrial) PV applications with a PV capacity of 40 W or more. A PV system consists of modules, inverters, batteries and all installation and control components for modules, inverters and batteries. Other applications such as small mobile devices are not considered in this report.

For the purposes of this report, **PV installations are included in the 2017 statistics if the PV modules were installed and connected to the grid between 1 January and 31 December 2017, although commissioning may have taken place at a later date**.

1.1 Applications for Photovoltaics

Grid-connected plants with a total capacity of 172,479 kWp were installed. Thereof 2,069 kWp are roof-integrated and 3,104 kWp façade integrated. As during the previous years, the off-grid sector plays a minor role in the Austrian PV market (off-grid PV-capacity installed in 2016: 154,802 kWp). Data about market segments (residential, commercial) is not available.

1.2 Total photovoltaic power installed

In 2017, for the first time since three years, a moderate increase in newly installed PV in Austria was recorded. Off-grid and grid connected PV systems with a total PV power of 172,955 kWp have been installed, which represents an 11.04 % increase of the domestic market compared to the year before. This led to a cumulated total installed capacity of 1,269.0 MWp at the end of 2017. On a 10 years basis, an average market growth of 48.83 % per year for all PV installations can be reported. As a consequence the estimated renewable electricity produced by PV amounted to 1,269.0 GWh in 2017 (~ 2.16 % of the total electricity consumption in Austria) and lead to a reduction in CO_2 emissions by 837,902 tons (emission coefficient 2017: 660.3 gCO_2-equ/kWh).

Table 1: PV power installed during calendar year 2017

			MW installed in 2017 (mandatory)	**MW installed in 2017**	**AC or DC**
Grid-connected	BAPV	Residential	167.31	n.a.	DC
		Commercial		n.a.	
		Industrial		n.a.	
	BIPV (if a specific legislation exists)	Residential	5.17	n.a.	DC
		Commercial		n.a.	
		Industrial		n.a.	
	Utility-scale	Ground-mounted	N.A	n.a.	DC
		Floating		n.a.	
		Agricultural		n.a.	
Off-grid		Residential (SHS)	0.476		DC
		Other		n.a.	
		Hybrid systems		n.a.	
		Total	172.96		DC

Table 2: Data collection process:

If data are reported in AC, please mention a conversion coefficient to estimate DC installations.	DC data
Is the collection process done by an official body or a private company/Association ?	Institute of Renewable Energy at the University of Applied Sciences Technikum Wien on behalf of the Austrian federal ministry of Transport, Innovation and Technology
Link to official statistics (if this exists)	PV Market Study 2017: https://nachhaltigwirtschaften.at/resources/iea_pdf/reports/marktstatistik-2017-endbericht.pdf
	Data provided by federal (Austrian Climate and Energy Fund, OeMAG Abwicklungsstelle für Ökostrom AG) and regional funding bodies

Table 3: PV power and the broader national energy market.

MW-GW for capacities and GWh-TWh for energy	2017 numbers	2016 numbers
Total power generation capacities (all technologies)	21,5896 GW	20,8147 GW
Total power generation capacities (renewables including hydropower)	16,3485 GW (including 0,144 GW waste)	15,405 GW (including 0,144 GW waste)
Total electricity demand (= consumption)	Not yet available	~ 65,34 TWh / 75 TWh (including grid losses, pump storage and own requirements) [1]
Total energy demand (= final consumption)	Not yet available	1,121 PJ (2016 value)
New power generation capacities installed during the year (all technologies)	30 MW Pump storage installed 6 MW run of river power installed 172,5 MW PV power installed 196 MW Windpower installed (168 MW Coal decommissioned)	Not available
New power generation capacities installed during the year (renewables including hydropower)	172,5 MW PV 196 MW Wind	155 MW PV 228 MW Wind
Total PV electricity production in GWh-TWh	~1,269.0 GWh	~1,096.1 GWh
Total PV electricity production as a % of total electricity consumption	~ 2.16 %	~ 1.88 %

[1] https://www.e-control.at/statistik/strom/betriebsstatistik/betriebsstatistik2016

Table 4: Other informations

	2017 Numbers
Number of PV systems in operation in your country (a split per market segment is interesting)	< 5kWp: 77.216 PV systems (new in 2017: 67,918 MWp) > 5kWp: 22.571 PV systems (new in 2017: 94,979 MWp) For the rest of the new systems in 2017 (10,058 MWp) no information is available.
Capacity of decommissioned PV systems during the year in MW	No reports about decommissioned systems
Total capacity connected to the low voltage distribution grid in MW	No data available
Total capacity connected to the medium voltage distribution grid in MW	No data available
Total capacity connected to the high voltage transmission grid in MW	No systems connected to the HV transmission grid

Table 5: The cumulative installed PV power in 4 sub-markets (MWp).

Year	Off-grid (including large hybrids)	Grid-connected distributed (BAPV, BIPV)	Grid-connected centralized (Ground, floating, agricultural…)	Other uses (VIPV, wearables…)	Total
Until 2004	2.645	17.262	1.153	N/A	**21.060**
2005	2.895	19.973	1.153	N/A	**24.021**
2006	3.169	21.263	1.153	N/A	**25.585**
2007	3.224	23.721	1.756	N/A	**27.701**
2008	3.357	27.274	1.756	N/A	**32.387**
2009	3.605	48.991	N/A	N/A	**52.596**
2010	3.812	91.686	N/A	N/A	**95.498**
2011	4.502	182.670	N/A	N/A	**187.172**
2012	4.722	258.163	N/A	N/A	**362.885**
2013	5.190	620.784	N/A	N/A	**625.974**
2014	5.498	779.757	N/A	N/A	**785.250**
2015	5.535	931.563	N/A	N/A	**937.098**
2016	6.487	1,089.529	N/A	N/A	**1,096.016**
2017	6.963	1,262.008	N/A	N/A	**1,268.971**

1.3 Key enablers of PV development

Table 6: information on key enablers

	Description	Annual Volume (Units)	Total Volume (Units)	Source
Decentralized storage systems				
Residential Heat Pumps		36.446	280.000	https://nachhaltigwirtschaften.at/resources/iea_pdf/reports/marktstatistik-2017-endbericht.pdf
Electric cars (and light weight)	End of 2017	5400 electric+1700 plug in hybrid	14600 electric+4000 Plug in hybrid	https://www.bmvit.gv.at/verkehr/elektromobilitaet/downloads/oesterreich2018_de_2qua.pdf
Electric buses/trucks		Single projects		
Other				

2 COMPETITIVENESS OF PV ELECTRICITY

2.1 Module prices

Table 7 indicates the typical module prices for the year 2017 as quoted by the Austrian manufacturers and installation companies. Compared to the previous years, module sales price of Austrian manufacturers dropped again in 2016. The average wholesale price of Austrian manufacturers in 2017 was 0.49 EUR/W. The average wholesale-price of Austrian planners was 0.46 EUR/W in the year 2017 (2016: 0.59 EUR/W).

Table 7: Typical module prices for a number of years

Year	2011	2012	2013	2014	2015	2016	2017
Standard module crystalline silicon price(s): Typical	1.45 1.40	0.94 0.85	0.75 0.64	0.67 0.60	0.60 0.56	0.61 0.59	0.51 0.48
Lowest prices	0.95	0.63	0.54	0.52	0.47	0.46	0.38
Highest prices	3.6	1.25	0.90	1,05	0.70	0.70	0.63

2.2 System prices

A summary of typical system prices is provided in the following tables.

Table 8: **Turnkey Prices of Typical Applications – local currency**

Category/Size	Typical applications and brief details	Current prices per W
OFF-GRID Up to 1 kW (SHS)	Prices for off-grid systems vary widely (from 3 to 6.5 EUR/W) depending on the application (DC appliances or AC island grid) and the mounting-site.	~ 5 EUR
OFF-GRID > MW scale		
Grid-connected Rooftop up to 5-10 kW (residential BAPV)	For a 5 kWp System per kWp	1,621 EUR
Grid-connected Rooftop from 10 to 250 kW (commercial BAPV)	For a system > 10 kWp per kWp	< 1,193 EUR
Grid-connected Rooftop above 250kW (industrial BAPV)	No data available	
Grid-connected Ground-mounted above 10 MW	No data available	
Other category (hybrid diesel-PV, hybrid with battery…)	No data available	
Floating PV	No systems	
Agricultural PV	No systems	
Residential BIPV (tiles, or complete roof).	No data available	
Industrial BIPV	No data available	

Table 9: National trends in system prices (current) for different applications – local currency

Price/Wp	2010	2011	2012	2013	2014	2015	2016	2017
Residential PV systems < 5-10 KW	3.680	2.970	2.216	1.934	1.752	1.658	1.645	1.621
Commercial and industrial BAPV	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ground-mounted > 10 MW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

2.3 Cost breakdown of PV installations

2.3.1 Residential PV System < 5-10 kW

Table 10: Cost breakdown for a residential PV system – local currency

Cost category	Average (local currency/W)	Low (local currency/W)	High (local currency/W)
Hardware			
Module	0.623 EUR/W		
Inverter	0.355 EUR/W		
Other (racking, wiring…)	0.346 EUR/W		
Soft costs			
Installation	0.297 EUR/W		
Customer Acquisition	N/A		
Profit	N/A		
Other (permitting, contracting, financing…)	N/A		
Subtotal Hardware	1.324		
Subtotal Soft costs	0.297		
Total	1.621 EUR/W	1250 EUR/W	2.000 EUR/W

2.3.2 Utility-scale PV systems > 10 MW

No systems > 4 MW installed in Austria

Table 11: Cost breakdown for an utility-scale PV system – local currency

Cost Category	Average (local currency/W)	Low (local currency/W)	High (local currency/W)
Hardware			
Module			
Inverter			
Other (racking, wiring, etc.)			
Soft cost			
Installation Labor			
Customer acquisition			
Profit			
Other (contracting, permitting, financing etc.)			
Subtotal Hardware			
Subtotal - Soft cost			
Total Installed Cost	N/A	N/A	N/A

2.4 Financial Parameters and specific financing programs

In 2012 Wien Energie, one of Austria's biggest electric supply companies, started a public participation model for PV in Vienna and Lower Austria, which became very popular especially in urban areas. Private persons have the possibility to buy single PV modules (950 EUR / module) of a solar power plant. After selling all modules successfully, the solar power plant is built and operated by Wien Energie and the private investors will get a 1.75 % revenue every year for leasing their modules to Wien Energie. The minimum contract term is 5 years. At the end of the lifespan of the solar power plant Wien Energie will rebuy the PV modules and the complete amount of the investment will be refunded to the private investors. So far, Wienenergie has built 26 solar PV-"citizen-power plants", with a capacity between 80kWp and 2,7 MWp each.

A similar public participation model is offered by Energie AG Oberösterreich Fair Energy GmbH in Upper Austria. Private investors will receive an annual remuneration of 3.3 % of their investment. So far, the Energie AG built 20 solar power plants with a total power of 5 MWp. But also other electric supply companies are offering such public participation models.

Table 12: PV financing scheme

Average rate of loans – residential installations	n.a.
Average rate of loans – commercial installations	1.75 % - 3.3 %
Average cost of capital – industrial and ground-mounted installations	n.a.

2.5 Specific investments programs

Some utilities offer PV financing programmes. Mostly contracting schemes or leasing models ("sale and lease back"). They often take over all steps from planning to installation, maintenance, monitoring, and financing.

Table 13: Specific investment programs

Third Party Ownership (no investment)	X
Renting	
Leasing	X
Financing through utilities	X
Investment in PV plants against free electricity	
Crowdfunding (investment in PV plants)	X Example: https://www.gemeinwohlprojekte.at/projekte-unterstuetzen/details/projekt/73/
Community solar	X
Other (please specify)	

2.6 Additional Country information

Table 14: Country information

Retail Electricity Prices for an household (range)	0.203 EUR (2017)[2]
Retail Electricity Prices for a commercial company (range)	0.127 EUR (2017)
Retail Electricity Prices for an industrial company (range)	0.127 EUR (2017)
Population at the end of 2017 (or latest known)	8.8 Mill (1.1.2018)[3]
Country size (km^2)	83,879
Average PV yield (according to the current PV development in the country) in kWh/kWp	950 kWh/kWp to 1.100 kWh/kWp [4]
Name and market share of major electric utilities.	More than 140 electricity provider

[2] Österreichs Energie, Eurostat (choosen countries), data status 1. halfyear 2017

[3] http://www.statistik.at/web_de/statistiken/menschen_und_gesellschaft/bevoelkerung/bevoelkerungsstand_und_veraenderung/bevoelkerung_zu_jahres-_quartalsanfang/index.html

[4] Authors estimation

3 POLICY FRAMEWORK

This chapter describes the support policies aiming directly or indirectly to drive the development of PV. Direct support policies have a direct influence on PV development by incentivizing or simplifying or defining adequate policies. Indirect support policies change the regulatory environment in a way that can push PV development.

3.1 Direct support policies for PV installations

3.1.1 New, existing or phased out measures in 2017

3.1.1.1 Climate change Commitments

Austria as member of the European Union, follows the European climate targets. Current National target is 100% electricity from renewables by 2030 (currently: 74%, based on a ~60% share of hydropower). In all scenarios, PV is seen as the source which can be increased most. Studies show a potential of up to 15 GW until 2030 (2017: 1.2 GW) and 30 GW until 2050.

3.1.1.2 Description of support measures (excluding BIPV, VIPV and rural electrification)

Most powerful measures are still the direct support schemes for the installation of PV systems. Feed-in tariffs for systems > 5kWp, invest support for smaller systems as well as for systems in the agriculture sector up to 30 kWp. The current government is also aiming for a 100.000 PV-roof programme, which might at least double the current installations numbers. However, no specific timeframe and investment conditions are given so far.

3.1.1.3 BIPV development measures

Building integrated PV systems up to 5 kWp are supported by the Austrian Climate and Energy Fund, which provides an additional investment subsidy of 100 EUR/kWp (375 EUR/kWp for BIPV instead of 275 EUR/kWp). Some provinces offer higher subsidies from the "Wohnbauförderung" (subsidized housing scheme) if a PV system is installed.

The Austrian PV Technologyplatform (www.tppv.at) and other stakeholders see BIPV as the most important development in the national PV sector, due to acceptance and possibilities to integrate high shares of PV into the existing building stock. The European directive on buildings (EUDirective 2010/31) aiming at nearly zero energy buildings should boost this development, however the national regulations laid down in the OIB guideline seems to weaken this efforts. However, a revision of this national guideline is foreseen which opens the room for a more ambitious PV development in buildings.

3.1.1.4 Utility-scale measures including floating and agricultural PV

No such systems installed in Austria so far

3.1.1.5 Rural electrification measures

The Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management supports renewable energy systems (e.g. PV, wind power, storages, etc.) in areas not connected to the grid with an investment subsidy up to a maximum of 35 % of the eligible costs.

3.1.1.6 Support for electricity storage and demand response measures

Since January 2014 decentralized electricity storages in combination with PV systems are supported in some province. Styria has a subsidy of 200 to 600 EUR/kWh depending of the storage technology for storage up to 7.5 kWh. Upper Austria supported again the decentralized electricity storages in the second half year of 2015. Since June 2015 in Vienna a limited incentive of 500 EUR/kWh is granted depending on the storage capacity. Burgenland has a non-refundable rebate of 275 EUR/kWh for storages up to 5 kWh.

3.1.1.7 Support for electric vehicles (and VIPV)

EV's are supported since March 2017 by 4.000 €, two regions (lower Austria and Styria) provide additional support up to 1.000 €. This support is only given, if the user can prove its electricity to be 100% renewable, either form own systems (PV) or by any electricity provider which is certified as 100% renewable only.

https://www.umweltfoerderung.at/privatpersonen/foerderungsaktion-e-mobilitaet-fuer-private.html

Table 15: PV support measures (summary table)

	On-going measures residential	Measures that commenced during 2017 - residential	On-going measures Commercial + industrial	Measures that commenced during 2017 – commercial + industrial	On-going measures Ground-mounted, including floating	Measures that commenced during 2017 – ground mounted, including floating
Feed-in tariffs	Yes	No	Yes	No	Yes	Yes
Feed-in premium (above market price)						
Capital subsidies	*No*	*No*	*No*	*No*	*No*	*No*
Green certificates						
Renewable portfolio standards (RPS) with/without PV requirements	*No*	*No*	*No*	*No*	*No*	*No*
Income tax credits	*No*	*No*	*No*	*No*	*No*	*No*
Self-consumption	Yes	*No*	Yes	*No*	Yes	*No*
Net-metering	No	No	No	No	No	No
Net-billing	No	No	No	No	No	No
Collective self-consumption and	No	No	No	No	No	No

	On-going measures residential	Measures that commenced during 2017 - residential	On-going measures Commercial + industrial	Measures that commenced during 2017 – commercial + industrial	On-going measures Ground-mounted, including floating	Measures that commenced during 2017 – ground mounted, including floating
virtual net-metering						
Commercial bank activities e.g. green mortgages promoting PV	No	No	No	No	No	No
Activities of electricity utility businesses	No	No	No	No	No	No
Sustainable building requirements	Yes	Yes	Yes	Yes	Yes	Yes
BIPV incentives	Yes	Yes	Yes	Yes	Yes	Yes
Other	No	No	No	No	No	No

3.2 Self-consumption measures

Table 16: Self-Consumption Schemes

PV self-consumption	1	Right to self-consume	Self-consumption is legally permitted, but a fee for self-consumption exceeding 25.000 kWh/a has to be paid. (for every kWh if you exceed the 25.000kWh limit)
	2	Revenues from self-consumed PV	None
	3	Charges to finance Transmission & Distribution grids	None for Systems producing less than 25.000 kWh
Excess PV electricity	4	Revenues from excess PV electricity injected into the grid	Payment through traditional support schemes such as feed-in tariff (FiT) or green certificates (GC): PV electricity gets a value defined by regulation.
	5	Maximum timeframe for compensation of fluxes	None
	6	Geographical compensation	None
Other characteristics	7	Regulatory scheme duration	13 years
	8	Third party ownership accepted	yes
	9	Grid codes and/or additional taxes/fees impacting the revenues of the prosumer	self-consumption fee (> 25.000kWh)
	10	Regulations on enablers of self-consumption (storage, DSM…)	storage bonus, demand side management
	11	PV system size limitations	None
	12	Electricity system limitations	Distributors' License
	13	Additional features	Self-consumption tax

3.3 Collective self-consumption, community solar and similar measures

In 2017, the national regulation concerning interconnection to the low voltage was changed in order to enable the distribution of PV electricity in multifamily houses. (ELWOG-Law). Since then, a lot of models were discussed, and first demo sites are realised. However, a really convincing business model could not be developed so far, due to the retail price of electricity (18-20 €Cents/kWh) and other legal and regulatory frame conditions. Many research projects investigated possible business models; the Austrian PV Association PVAustria provides support and guidelines as well.

3.4 Tenders, auctions & similar schemes

No tenders for PV were issued so far.

3.5 Financing and cost of support measures

Until today public support schemes for PV in Austria have shown some discontinuity. The public support schemes are more or less continuously under discussion and experience a yearly change, which allows private users and investors only short time planning. The total available budget for supporting PV systems, especially for PV systems above 5 kWp, generally addresses only a small amount of the huge number of prospective buyers of PV systems in Austria. Because of the fact that no public body finances the feed-in tariff system, all electricity consumers have to come up with coverage.

Austria has mainly three levels of supporting PV systems:

Systems up to 5 kWp are supported by the also limited sources of the governmental Austrian Climate and Energy Fund, which provided a limited incentive in form of a non-refundable rebate for new installations for private households up to 5 kWp. This support scheme provides additional financial benefits to building integrated systems (BIPV). This public initiative launched once a year, was opened for the first time in August 2008 by one tender with a total budget of about 8 MEUR. In 2009, the budget was more than doubled to 18 MEUR. In 2010 the support per kWp installation was reduced significantly according to the lower PV prices. For the year 2011 the budget remained the same as in 2010 (35 MEUR) and for 2012 the budget has been reduced to 25.5 MEUR. In 2013 36 MEUR were provided. In 2013 the investment subsidy of 800 EUR/kWp was reduced to 300 EUR/ kWp or to 400 kWp for Building integrated PV systems. For the first time more money was available in 2013, that was required from buyers of PV systems. In 2013 PV systems with a total capacity of 67,867 kWp have been installed under this funding scheme, more than ever before. In 2014 the budget has been reduced to 26.8 MEUR. Also the investment subsidy was reduced to 275 EUR/kWp or to 375 EUR/kWp for Building integrated PV systems. In 2014 PV systems with a total capacity of 46,197 kWp have been installed under this funding scheme. In 2015 the budget has been reduced to 17 MEUR. The investment subsidy was 275 EUR/kWp and 375 EUR/kWp for Building integrated PV systems. In 2015 PV systems with a total capacity of 63,974 kWp have been installed under this funding scheme. In 2016, the budget was reduced to 8,5MEUR. The investment subsidy was 275 EUR/kWp and 375 EUR/kWp for Building integrated PV systems. In 2016 PV systems with a total capacity of 74,882 kWp have been installed under this funding scheme.

In 2017, the budget was reduced to 8MEUR. The investment subsidy was 275 EUR/kWp and 375 EUR/kWp for Building integrated PV systems. In 2017 PV systems with a total capacity of 67,918 kWp have been installed under this funding scheme.

For PV systems above 5 kWp a Feed-in Tariff is provided via the national Green Electricity Act (GEA), first issued in 2002, and meanwhile revised several times. Even though the “new RES” are supported

by this act, mainly via up to 13 years guaranteed feed-in tariffs, the financial cap (current regulation: new PV-installations leading to another expenses of 8 MEUR per year) is low. The feed in tariffs are stated by the Federal Ministry for Economics and financed by a supplementary charge on the net price and a fixed price purchase obligation for electricity dealers. A significant change of the public support for PV installations (in order to match leading photovoltaic markets) as well as for other "new renewables" (Austria has about 60 % electricity from large hydro power plants) will also most probably not be achieved within the upcoming year. Photovoltaic-Feed-in-tariffs for new installations are defined on a yearly basis in a separate Feed-in Decree. In addition to the feed-in Tariff a unique investment subsidy of max. 200 EUR/kWp is granted for systems installed on buildings or noise protection walls. From 2015 on, systems on open landscape and systems > 200kWp are no more supported.
In 2015 the governmental Austrian Climate and Energy Fund supported PV systems for the Agriculture and Forestry between 5kW to 30kW. For 2017 the budget has been 8MEUR.

The total amount of feed-in tariffs paid for PV in 2016 was approximately 122.9 MEUR (2015: 109.3 MEUR), which represents a 14.6 % increase compared to the previous year. The average feed-in tariff paid for PV in 2016 was 24.56 Eurocent/kWh which represents a 1.9 % reduction compared to the previous year (2015: 25.03 Eurocent /kWh).

Feed-in tariffs from 2009 to 2017 according to the Feed-in Decree

	2010 (Cent / kWh)	2011 (Cent / kWh)	2012 (Cent / kWh)	2013 (Cent / kWh)	2014 (Cent / kWh)	2015 (Cent / kWh)	2016 (Cent / kWh)	2017 (Cent / kWh)
up to 5 kWp	-	-	-	-				
above 5 kWp up to 10 (20) kWp	35 – 38	35 – 38	23 – 27.6					
above 10 (20) kWp	25 – 33	25 – 33	19 – 25					
above 5 kWp up to 500 kWp				16.59 – 18.12				
above 5 kWp up to 350 kWp					10.00 (open landscape)- 12.50 (PV on buildings)			
above 5 kWpeak up to 200 kWpeak						11.50 - 18.00 No support for PV on open landscape	8.24 No support for PV on open landscape	8.24 No support for PV on open landscape

In addition to the federal incentives almost all provinces continued running their regional support in form of rebates on the costs of the PV system (investment subsidies) in 2017. Salzburg, Burgenland,

Carinthia and Vienna offer such a separate support scheme for PV. Other provinces (Lower Austria, Upper Austria, Styria and Vorarlberg) offer additional funding by the "Wohnbauförderung" (subsidized housing scheme). Although some subsidy schemes exclude each other, whereas others do not, this situation shows the complex nature of the incentives and the data provided. By this standard only a rough estimate for the total funds spent by the provinces can be provided.

3.6 Indirect policy issues

The promotion of electricity from renewable energy sources (RES) is a high European Union (EU) priority for several reasons, including the security and diversification of energy supply, environmental protection and social and economic cohesion.

The 20/20/20 climate and energy targets, set in 2007 by the European Union, have strong influence on Austria. Austria's targets are a total share of the national energy consumption produced from renewable resources to 34 %, a reduction in greenhouse gas emissions of 16 % below 2005 levels emissions in non-ETS sectors and an increase in energy efficiency by 20 % by 2020 as opposed to a business-as-usual scenario.

In the city of Vienna, the local building code foresees the need to install 1 kWp of PV per 100 m² gross floor area at all new industrial and commercial buildings.

In Austria the tax on new cars depends on CO_2 pollution-categories.

4 INDUSTRY

4.1 Production of feedstocks, ingots and wafers (crystalline silicon industry)

Table 17: Production information for the year for silicon feedstock, ingot and wafer producers

Manufacturers (or total national production)	Process & technology	Total Production	Product destination (if known)	Price (if known)
No Manufacturers	Silicon feedstock	tonnes		
No Manufacturers	sc-Si ingots.	tonnes		
No Manufacturers	mc-Si ingots	tonnes		
No Manufacturers	sc-Si wafers	MW		
No Manufacturers	mc-Si wafers	MW		

Describe briefly the overseas activities of any key companies also operating in other countries.

4.2 Production of photovoltaic cells and modules (including TF and CPV)

Module manufacturing is defined as the industry where the process of the production of PV modules (the encapsulation) is done. A company may also be involved in the production of ingots, wafers or the processing of cells, in addition to fabricating the modules with frames, junction boxes etc. The manufacturing of modules may only be counted to a country if the encapsulation takes place in that country.

Total PV cell and module manufacture together with production capacity information is summarised in Table below. Values for individual producers are not available.

Table 18: Production and production capacity information for 2017

Cell/Module manufacturer (or total national production)	**Technology** (sc-Si, mc-Si, a-Si, CdTe)	**Total Production (MW)**		**Maximum production capacity (MW/yr)**	
		Cell	Module	Cell	Module
Wafer-based PV manufactures					
1 Ertex-Solar	sc-Si, mc-Si				
2 Kioto	sc-Si, mc-Si				
3 DAS Energy	sc-Si, mc-Si				
4 MGT-esys	sc-Si, mc-Si				
5 Energetica	sc-Si, mc-Si				
Total			*100 MW*		
Thin film manufacturers					
1 no manufacturers					
2					
Cells for concentration					
1 no manufacturers					
TOTALS			**100 MW**		

Typical export rates are around 50%.

4.3 Manufacturers and suppliers of other components

Austria's capacity in PV inverter production is about 2 GW. The export rate is about 93%.
Further expertise of Austrian companies lies in the development of high performance concepts for the production of solar glass, solar storages, switches and other electrical equipment.
Some of these companies are working together in the Austrian Technology Platform Photovoltaics, which is a joint initiative for Austrian manufacturing operations in the photovoltaics sector and all the relevant Austrian research institutes. The aim is to optimise innovation and research activities to benefit the domestic photovoltaics sector and to help increase the share of the market held by Austrian PV-related technology and service providers. (www.tppv.at)

5 PV IN THE ECONOMY

This chapter aims to provide information on the benefits of PV for the economy.

5.1 Labour places

In total it can be estimated that at the end of 2017 approximately 2,813 full-time jobs (2016: 2,822 jobs) were directly linked to PV R&D, manufacturing and installation in Austria. In the various sectors the following figures (Table 17) represent an estimation of existing work places, based on information from the manufacturing companies and R&D institutions.

Table 19: Estimated PV-related labour places in 2017

Research and development (not including companies)	570
Manufacturing of products throughout the PV value chain from feedstock to systems, including company R&D	
Distributors of PV products	
System and installation companies	2243
Electricity utility businesses and government	N/A
Other	N/A
Total	2813

5.2 Business value

Table 20: Value of PV business

Sub-market	**Capacity installed *in 2017* (MW)**	**Price per W** *(from table 7)*	**Value**	**Totals**
Off-grid domestic				
Off-grid non-domestic	**0.476**	*~ 5.00 EUR/W*	*b*	*2,380,000.00 EUR*
Grid-connected distributed	**172.479**	1.621 *EUR/W*	*c*	*279,588,459.00 EUR*
Grid-connected centralized				
Export of PV products				
Change in stocks held				
Import of PV products				
Value of PV business				***281,968,459***

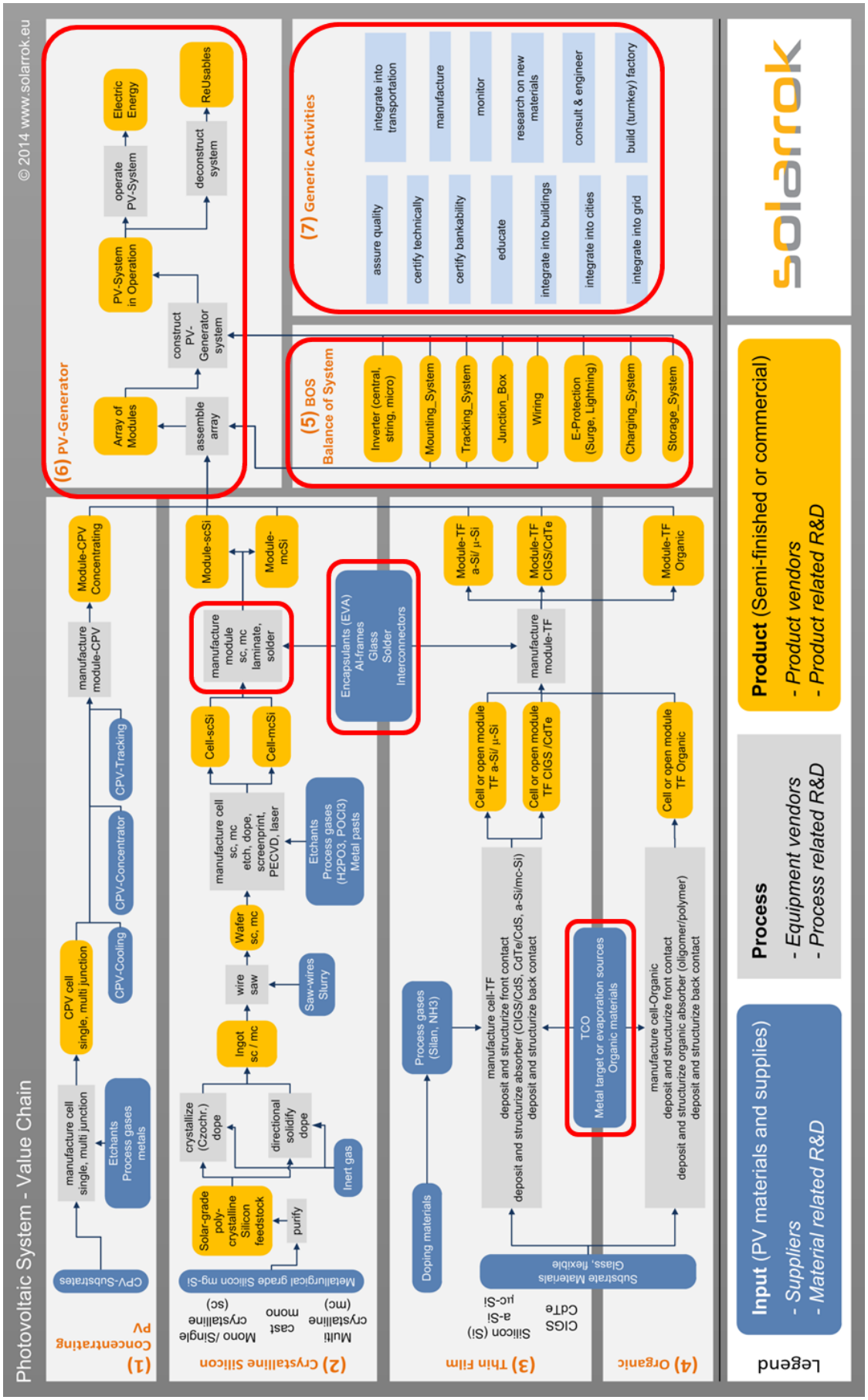
In 2017 about 36.4 % of the Austrian PV module production was exported, compared to almost 50.5 % in 2015. The export ratio of the Austrian inverter production (91 %) remains high, also the production volumes increases in 2016 from 1,350 MWp to 1,415 MWp in 2017. Due to the variety of PV related products manufactured by Austrian industry, no reliable estimation can be provided for the import/export and business value of these products.

Industry value chain:

The following PV value chain gives an overview of the PV industry in Austria (Figure 1). All inputs, products and processes produced or operated by Austrian companies are marked with a red border. Austrian producers can be found in the following areas:

- encapsulants (EVA), all-frames, glass, solders, interconnectors
  e.g. Isovoltaic AG, Ulbrich of Austria, Lisec Austria GmbH
- TCO, metal targets and evaporation sources, organic materials
  e. g. Plansee High Performance Materials
- manufacture module sc, mc, laminate, solder
  e. g. Energetica Energietechnik GmbH, Ertex Solartechnik GmbH, Kioto-Photovoltaic, PV Products GmbH, PVT-Austria, Sunplugged GmbH (startup), MGT-esys
- Balance of system
  e. g. Fronius International, Welser Profile, LEBAU Partnernetzwerk & Bau GmbH, Phoenix Contact, Gebauer & Griller Kabelwerke Gesellschaft m.b.H.

Figure 1: PV value chain for Austria; Data source: SOLARROK 2014



6 INTEREST FROM ELECTRICITY STAKEHOLDERS

6.1 Structure of the electricity system

Short description of the electricity industry landscape

Since the fully liberalization in 2001 the Austrian electricity market operates within a framework that consists of the relevant legislation at EU (Electricity Directive 2009/72/EC), Austrian (Electricity Act – ELWOG Elektrizitätswirtschafts- und organisationsgesetz) and provincial level (e.g. the Vienna Electricity Act - Wiener Elektrizitätswirtschaftsgesetz).

During the course of the liberalization, a number of great technical and organisational changes resulted for market participants. First of all, the operation of the grids was separated from competitive activities, such as generation, wholesale and retail, which means an unbundling of the vertically integrated electricity utilities in Austria.

Furthermore so-called balance groups were introduced to enable consumers, generators, suppliers and wholesalers to trade or conclude deals with each other. Whoever takes electricity off the grid, feeds in or trades must be member of a balance group.

The E-Control is the politically and financially independent regulator of the Austrian Electricity market. The main tasks are to strengthen competition and ensure that this does not compromise security of supply and sustainability.

At the end of 2014 about 140 distribution system operators (DSO) existed in Austria. These distribution system operators are responsible for secure grid operation, for metering and for handling and processing grid user.

6.2 Interest from electricity utility businesses

In 2014 and 2015 some Austrian DSOs announced that PV has reached a critical penetration in some network segments. This question of PV grid integration becomes an important national enabler for Smart Grids in Austria.
As already mentioned, some electricity utilities started public participation models for PV, others are selling PV systems. The electric cars development might further push PV, since many utilities offer EV services, install charging stations; the direct link to the use of electricity out of renewables is visible.

6.3 Interest from municipalities and local governments

From 2014 almost all provinces offered support in form of investment subsidies in addition to the federal incentives. Salzburg, Styria, Tyrol and Vienna offer a separate support scheme for PV. Other (Burgenland, Carinthia, Lower Austria, Upper Austria, Styria and Salzburg) offers additional funding by the subsidized housing scheme. Only in Vorarlberg and Lower Austria no regional support was available in 2015. Since 2014 decentralized electricity storages in combination with PV systems are supported in some provinces.

7 HIGHLIGHTS AND PROSPECTS

For the second year in a row the home market became more important for Austrian module manufacturer than the export market. Nevertheless the international PV market will remain the basis for growth and will help to strengthen the position of Austria as an important supplier of components for PV systems.

The annual National Photovoltaic Conference 2017 (a two-day event), organised by some of the main PV stakeholders and supported by the Ministry of Transport, Innovation and Technology, was once again a great success, with more than 200 experts participating. This conference is established as The annual come together of the Austrian PV stakeholders.

Almost all calculations on how Austria's climate targets can be achieved assume that photovoltaic technology will play a leading role in the transformation of the energy system. From currently 1.25 gigawatts (GW) (installed total capacity in Austria as of end of 2017), it is expected to increase to 12-15 GW by 2030, and to around 30 GW by 2050 for the final decarbonisation of the Austrian energy system.

Austrian PV Roadmap: (New version, 2016 & 2018)

A PV Roadmap, contracted by the Ministry of Transport innovation and Technology was issued in 2016 in its first part, which showed that the possibilities to reach 30 GW and more are technically and economically quite real and that an early decision for this path would open up significant opportunities for technology leadership in the photovoltaic environment. Part 2 of the Photovoltaic Technology Roadmap, to be published in 2018, examines the technology needs in the photovoltaic field in the sectors that are important for Austria: industry, mobility, agriculture and buildings / cities. Enormous potential exists in all sectors, which in total, sometimes even in individual sectors, far exceeds the required decarbonisation targets. There are already many solutions in all sectors, but in almost all cases either the cost-effectiveness, the practicality, the acceptance or simply the knowledge about the possibilities and potentials are not sufficiently given. Many other applications are at an early stage or at a very low TRL level. In all sectors discussed, there is therefore still a significant need for research and development in photovoltaic technological fields like cell and module research but also in systemic areas. Photovoltaic flexibility solutions in the industrial sector, sector coupling, agro-photovoltaics, or the role of PV in the digitized agriculture, PV integration in the automotive sector, but also in the transport infrastructure, building integrated photovoltaics as a standard in new construction and renovation opens opportunities for technology development. Demonstrators such as wide-range-test programs, lighthouse projects and the like, especially in this future topic, should accompany the research and technology development in Austria intensively. This can serve to significantly increase confidence in these applications through showcase projects. Accompanied by specialized training across the entire value chain, the potential of all the photovoltaic applications discussed could be raised in the medium term, but above all, industrial successes could be landed by demand for products and engineering of innovative components and system solutions from Austrian companies worldwide. Both in industry and in research, Austria has already for many years achieved an excellent starting position in some areas through world market leadership. This is to be strengthened by a coordinated interaction of research, industrial development and research administration as well as market launch initiatives as well as adapted education and training in an optimal way. In addition, a well-developed home market plays a key role for positioning as a technology location. Only if research and development go hand in hand with ambitious market launch concepts can the opportunity be used to position Austria as a model region for innovative photovoltaic applications.