The Electric Power System

- Austria –

version 10th July 2018

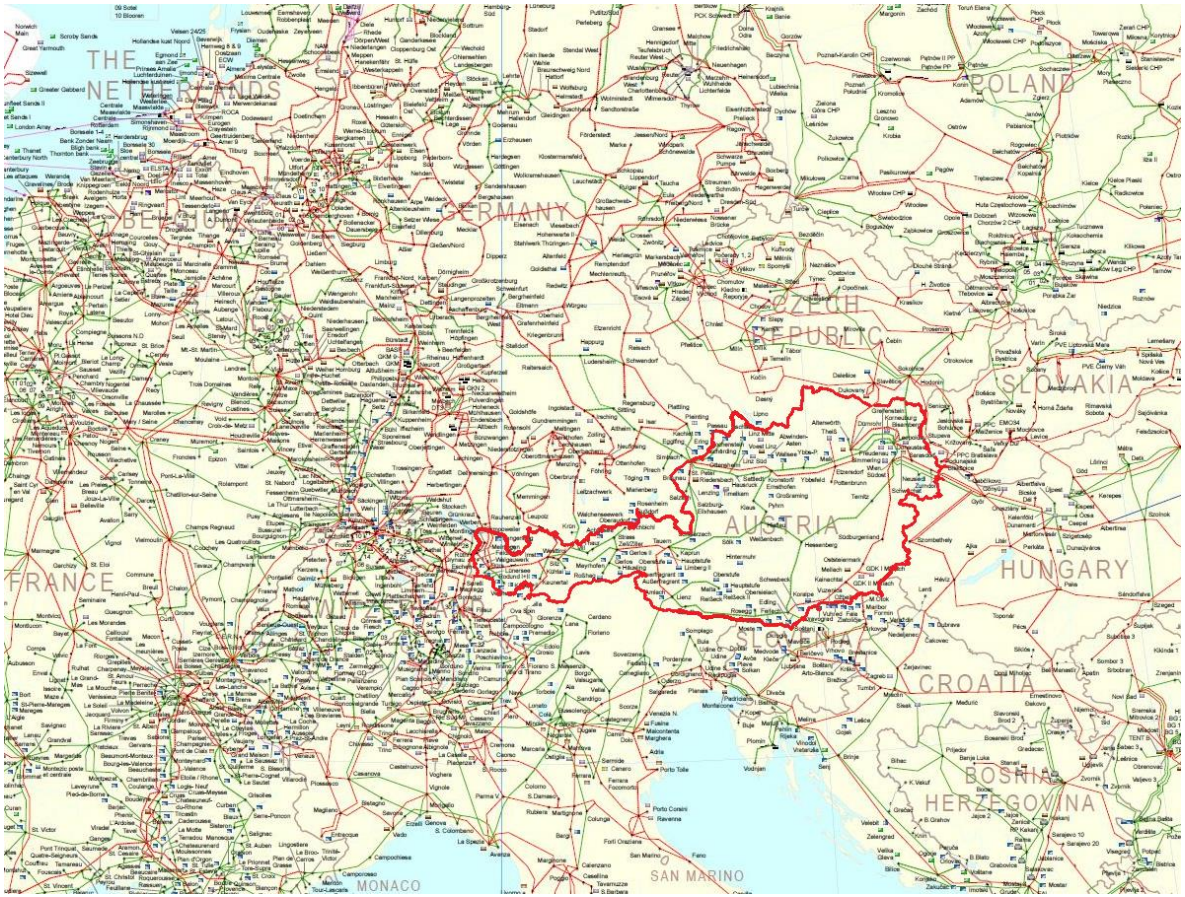
Basic facts Austria

- Area: 83,850 km^2
- Population: 8,8 Mio
- Number of TSOs: 2
- Number of DSOs: 122
- Peak load: 10,4 GW

Global map of the grid and of its interconnections

Interconnectors with:

- Germany
- Czech Republic
- Hungary
- Slovenia
- Italy
- Switzerland



Grid facts and characteristics

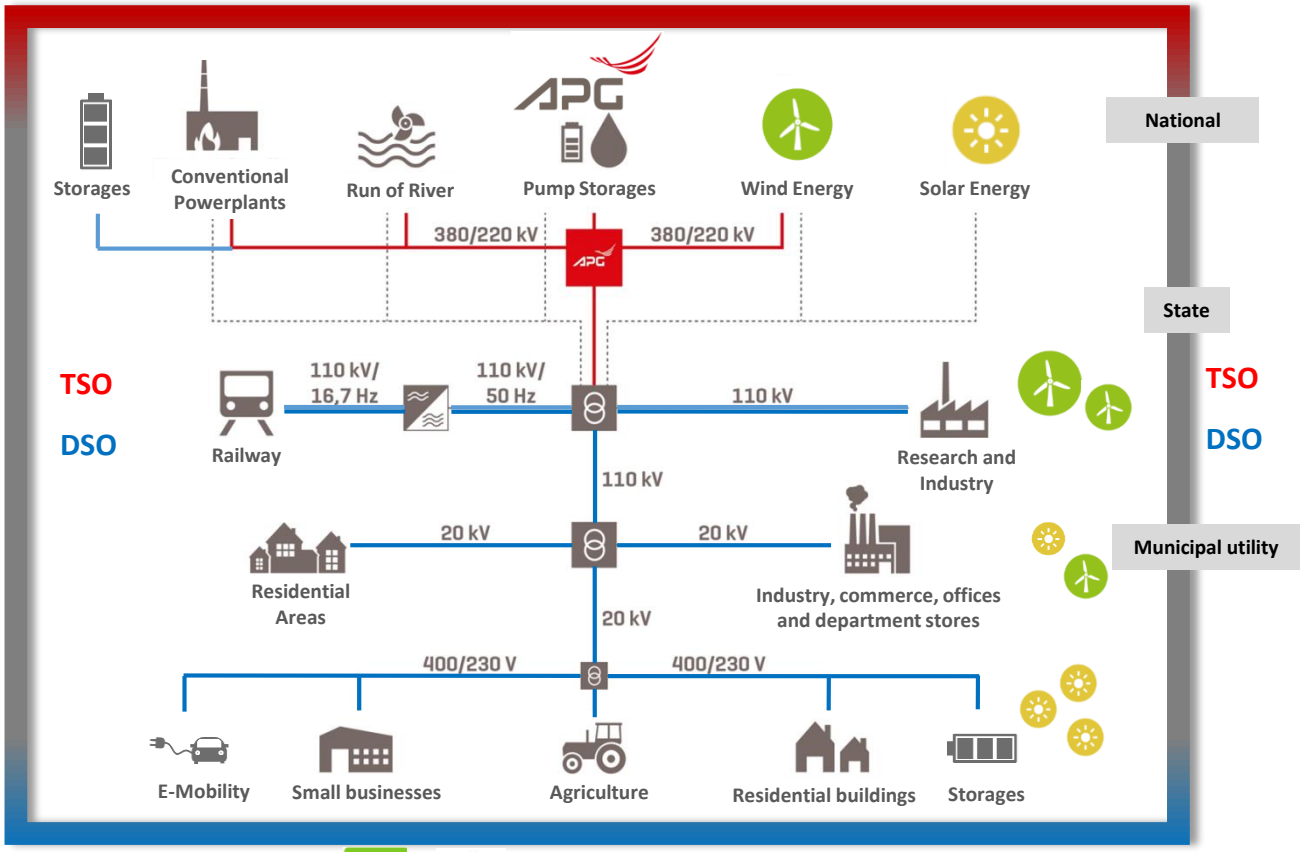
The high voltage electricity grid in Austria consists of the voltage levels 380 kV, 220 kV, 110 kV and medium voltage

Voltage Level	Total length (system length in km)
380 kV	3.051
220 kV	3.714
110 kV	11.435
1 kV to 110 kV	69.062
1 kV and below	173.369

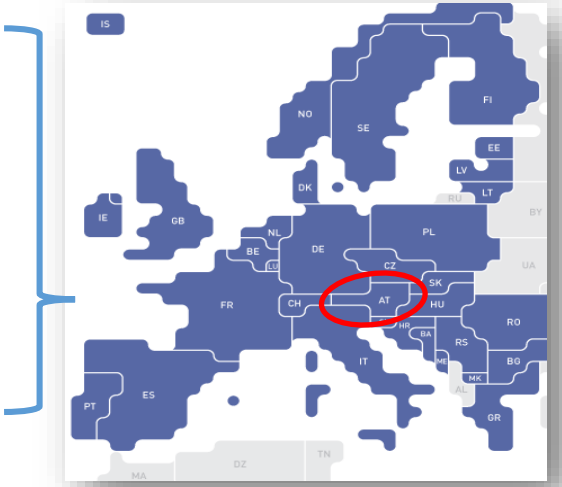
as of 31.12.2016

Structure of electrical power system

Vertical - national

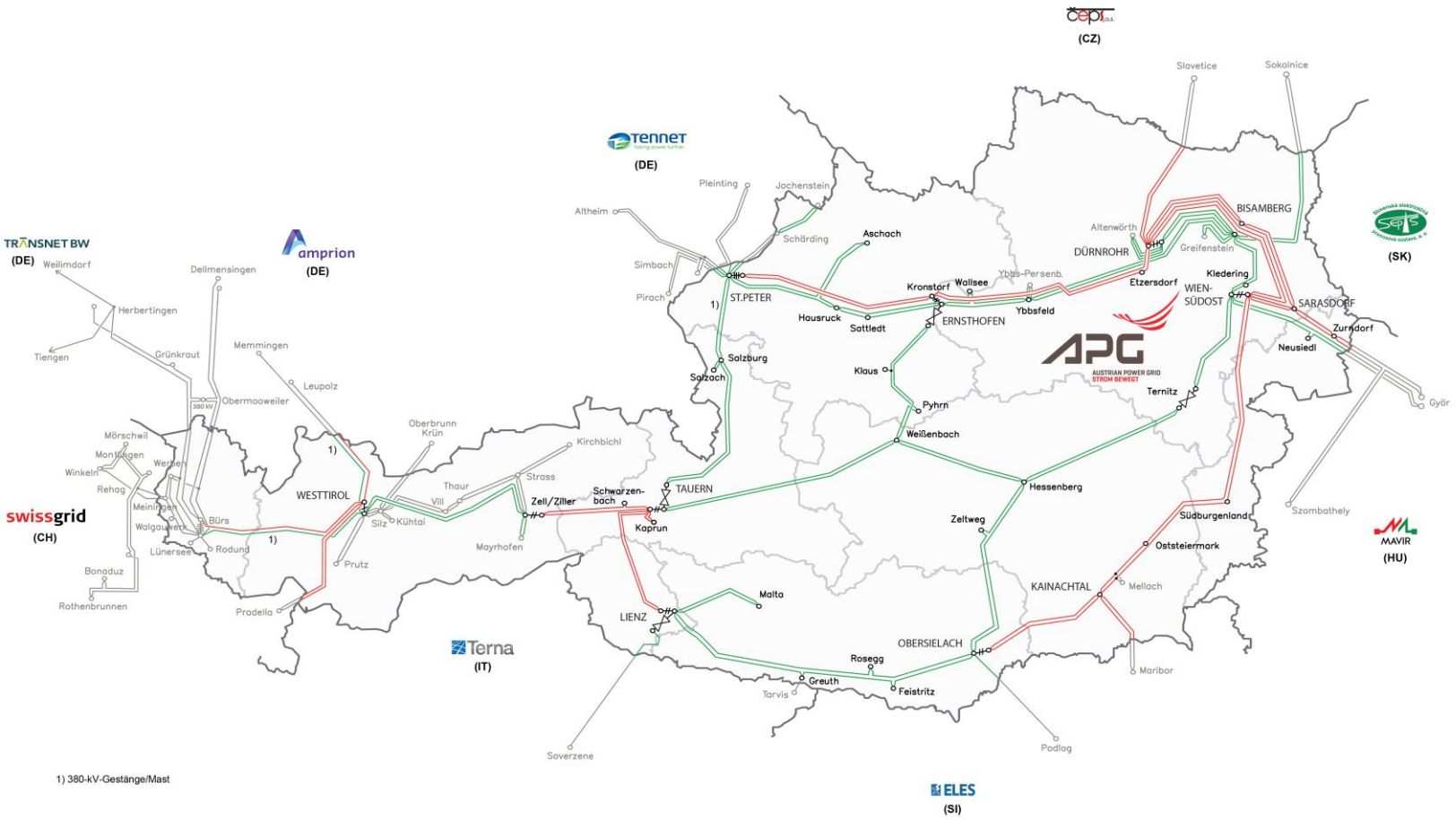


Horizontal - international



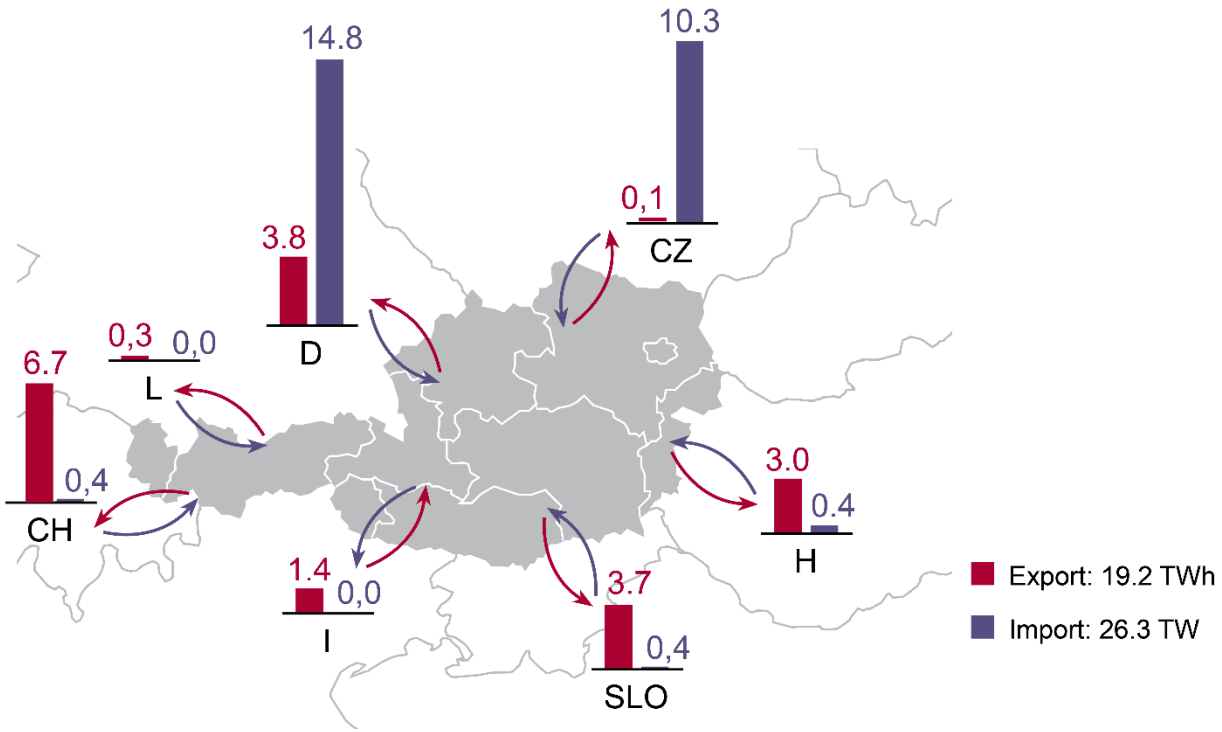
WIENER NETZE · Kärnten Netz · Energie Netze Steiermark · NÖ Netz EVN Gruppe · NETZOO · TINETZ · Vorarlberg Netz · netz BURGENLAND · SALZBURGNETZ

The Austrian transmission grid, located centrally within ENTSO-E's grid and Europe



(physical) exchange with neighbouring countries

Physical energy exchange between Austria and its neighbouring countries in 2016 in TWh



Source: E-Control 2017, adapted presentation

Austrian Power Grid AG, Key Facts and duties

APG is a regulated enterprise:

- Sales revenues*: € 777 million
- Total Assets*: € 1.578 million
- Yearly Investments: € ~250 million

APG is solely responsible for

- secure and reliable system operation
- grid enforcement and development
- market facilitation and integration
- forecast and balancing the Renewable Energy Production

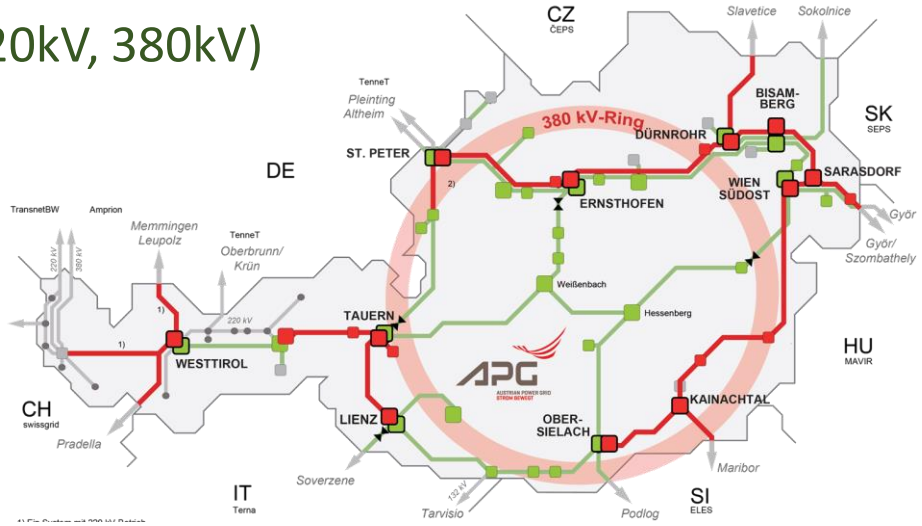
APG is a full and active member of ENTSO-E, the European Network of Transmission System Operators for Electricity.

* Figures from 2017 Annual Report.

Austrian Power Grid AG (APG)

- Austrian Transmission System Operator
- unbundled & regulated enterprise
  - ✓ secure and reliable system operation
  - ✓ grid enforcement & development
  - ✓ market facilitation & integration
  - ✓ forecast & integration of Renewable Energy production

- 3.500 km length of lines (110kV, 220kV, 380kV)
- 473 employees
- € 1.578 Mio. Assets
- € 250 Mio. investments per year
- 100% owned by Verbund, Austrian Electricity law § 28, ITO
- Member of ENTSO-E



Cooperation of TSO and DSOs

- In Austria TSO and DSOs have a very good historical basis and close cooperation (grid restoration, grid planning…)
- New challenges for TSOs and DSOs
  - Renewable integration
  - Congestion management
  - Neutral market facilitator
- Requirement for enhancement of cooperation
  - Data exchange
  - Knowledge sharing

Power structure of the country

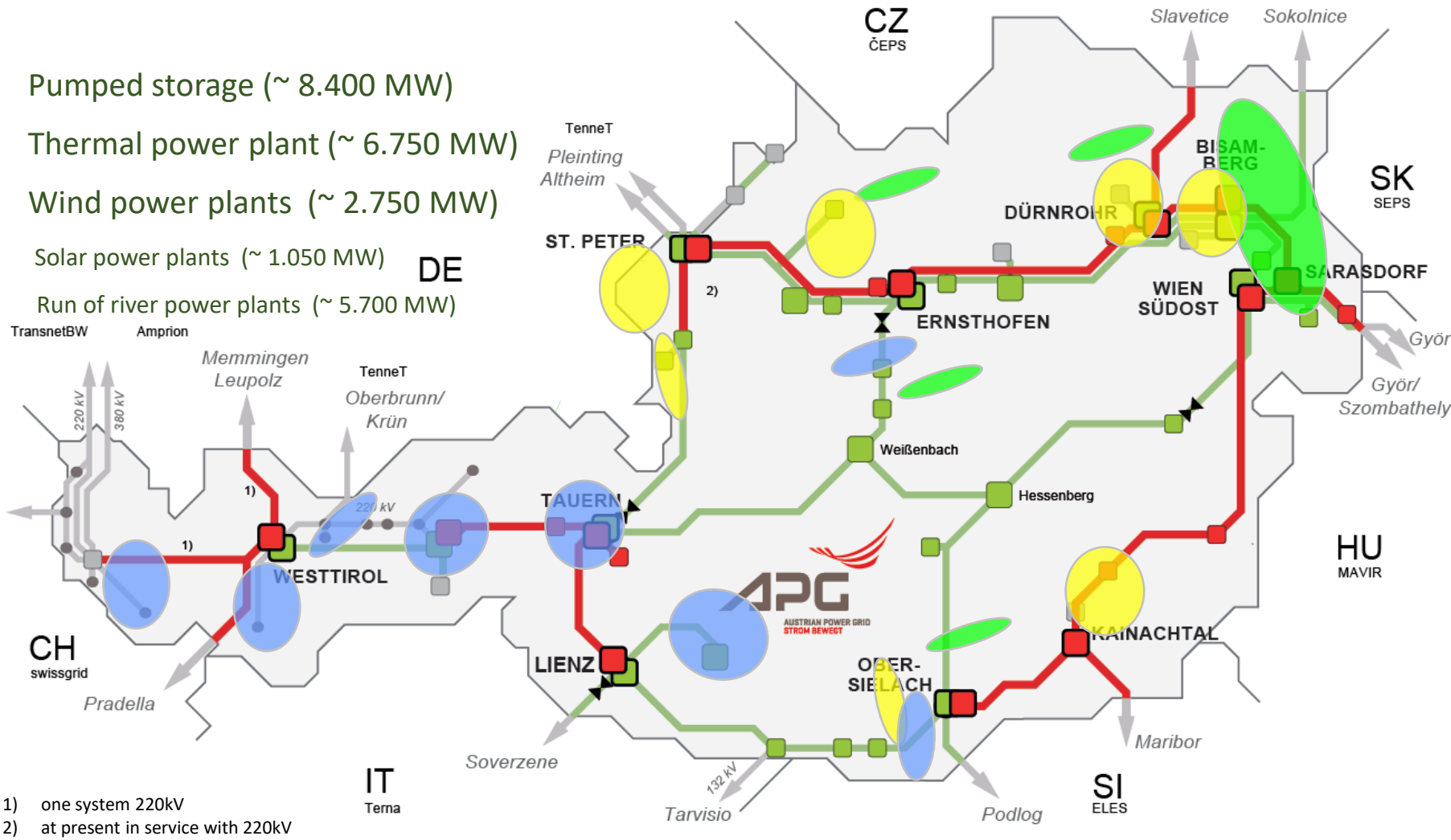
Pumped storage (~ 8.400 MW)

Thermal power plant (~ 6.750 MW)

Wind power plants (~ 2.750 MW)

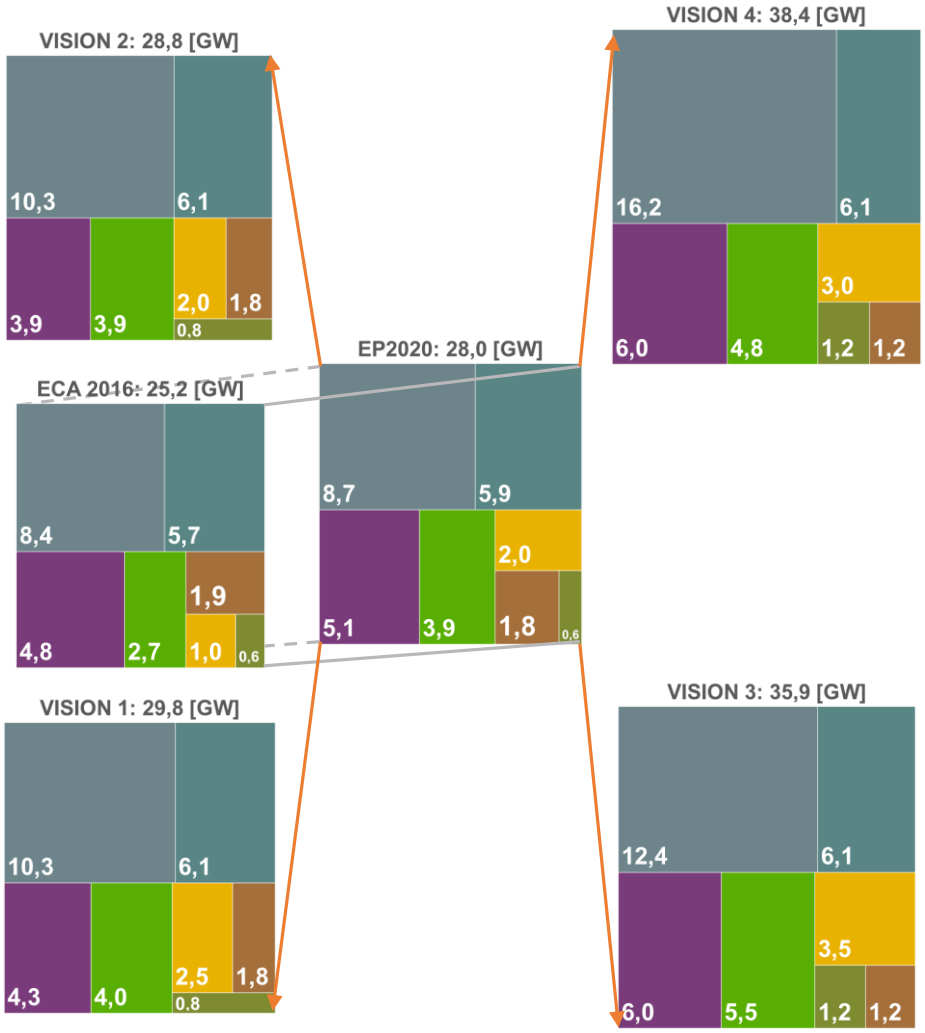
Solar power plants (~ 1.050 MW)

Run of river power plants (~ 5.700 MW)



1) one system 220kV
2) at present in service with 220kV

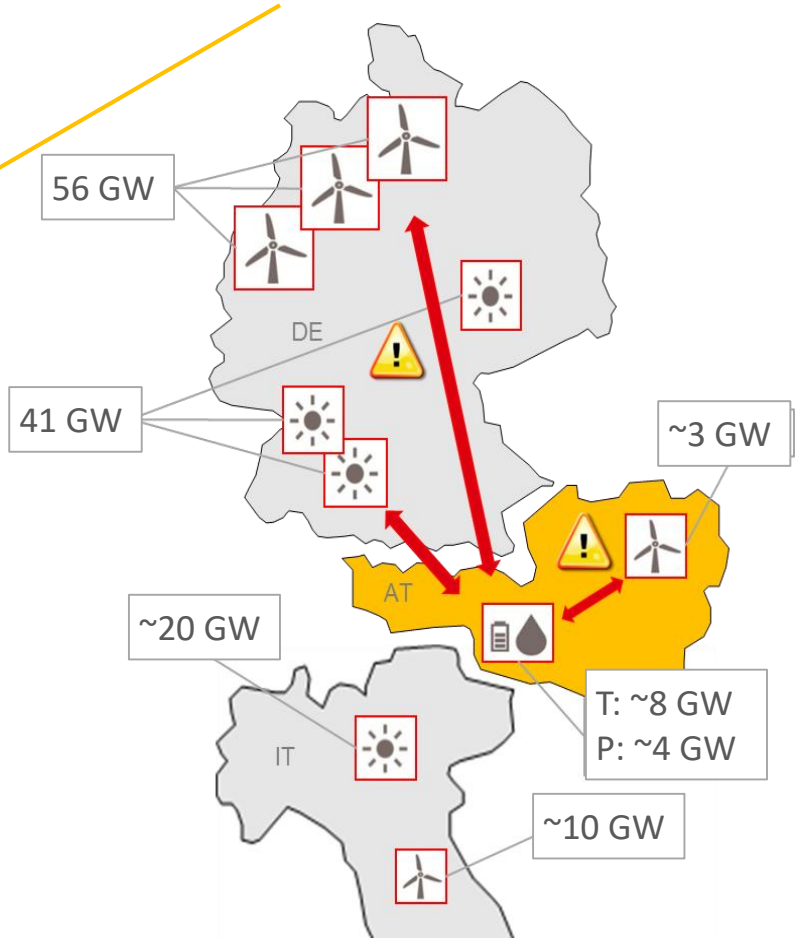
Installed capacity in Austria in 2016 and in visions of TYNDP 2016



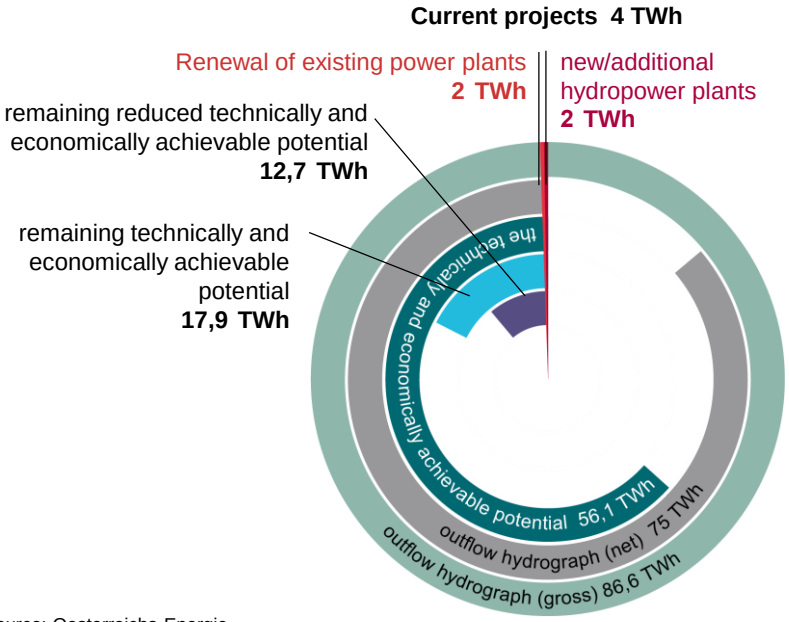
- Wind Power Plants
- Run of River Power Plants
- Pump Storage
- Other Renewables
- Solar PV
- Coal and conventional Power Plants
- Gas Power Plants

Renewables – current status (end of 2017)

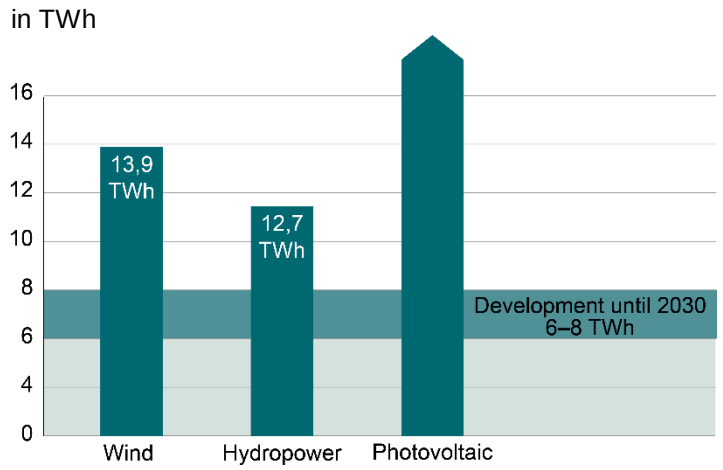
outlook Austria by end of 2020 app:
2 GW PV
4 GW Wind



Expansion Potentials for Renewable Energies in Austria to 2020

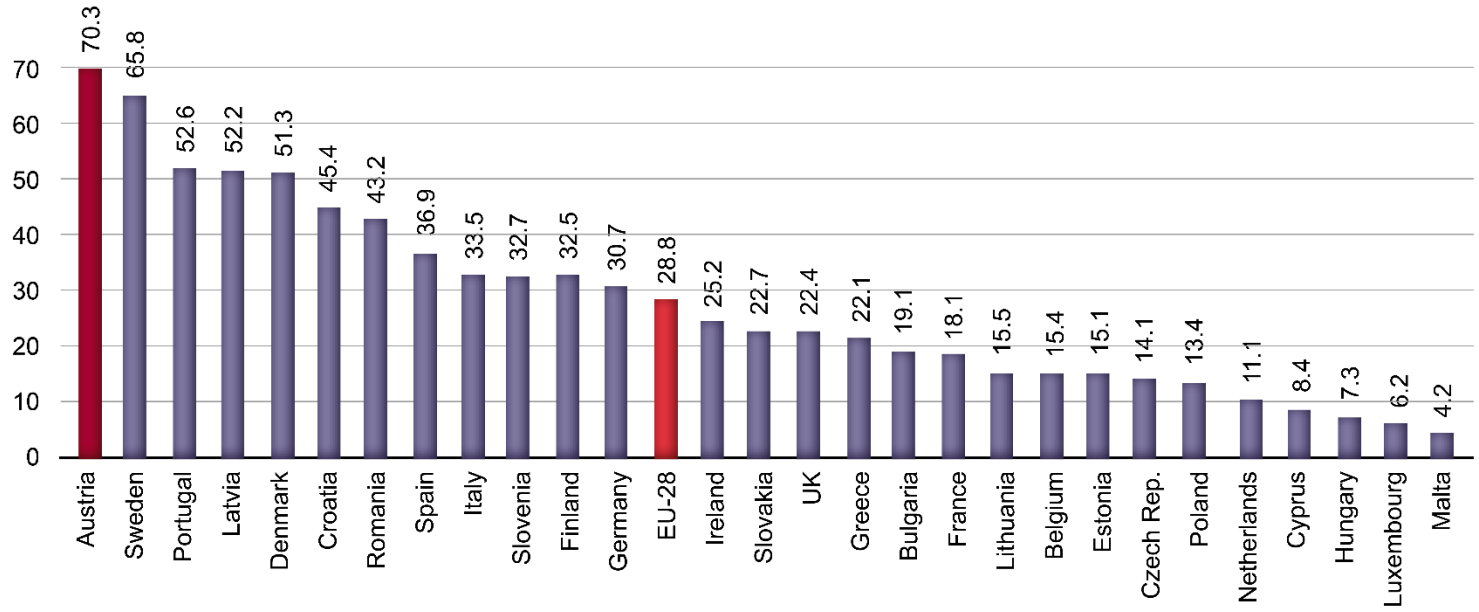


Source: Oesterreichs Energie



Biomass: Potential primarily used for heating

Share of Renewables in Electricity Generation



Source: Eurostat

CO2 Emissions in Power Generation

Specific CO_2 emissions 2013
Data in g/kWh

	Greece	869	intensive Ø 700 g/kWh
	Netherlands	550	
	Germany	468	high Ø 400 g/kWh
	Denmark	464	
	UK	443	
	Italy	404	
	Portugal	325	
	Spain	258	moderate Ø 200 g/kWh
	Belgium	200	
	Finland	190	
	Austria	**167**	
	France	50	low < 50 g/kWh
	Sweden	16	

Remark: Countries with a high share of CHP might have higher specific CO_2-emissions. This is due to the fact that the emissions for heat produciton are included in the figures.
Source: Eurelectric, Power Statistics 2013; Technik: Well-to-Wheel, Umweltbundesamt GmbH

Development of specific CO_2 emissions (EU, Austria)

The European power sector continues it‘s trajectory in reducing CO_2-emissions:

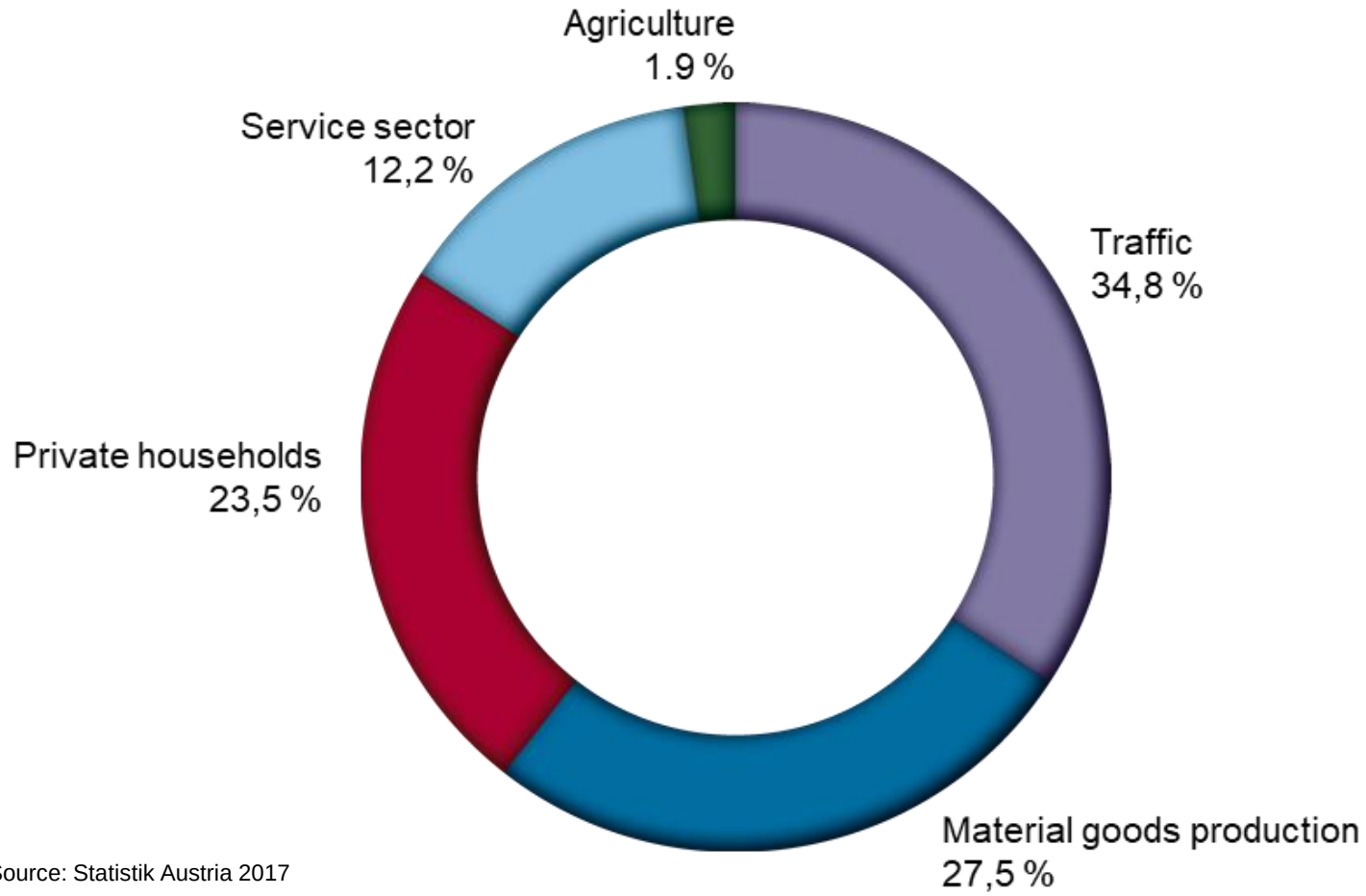
- 1990: 500 gCO_2/kWh
- 2014: 331gCO_2/kWh [- 33,8%]

Austria belongs to the frontrunners, regarding the trajectory in reducing CO_2-emissions in the production of electricity (incl. CHP)

- 1990: ~ 170 gCO_2/kWh
- 2015: ~ 105 gCO_2/kWh [-41,1%]

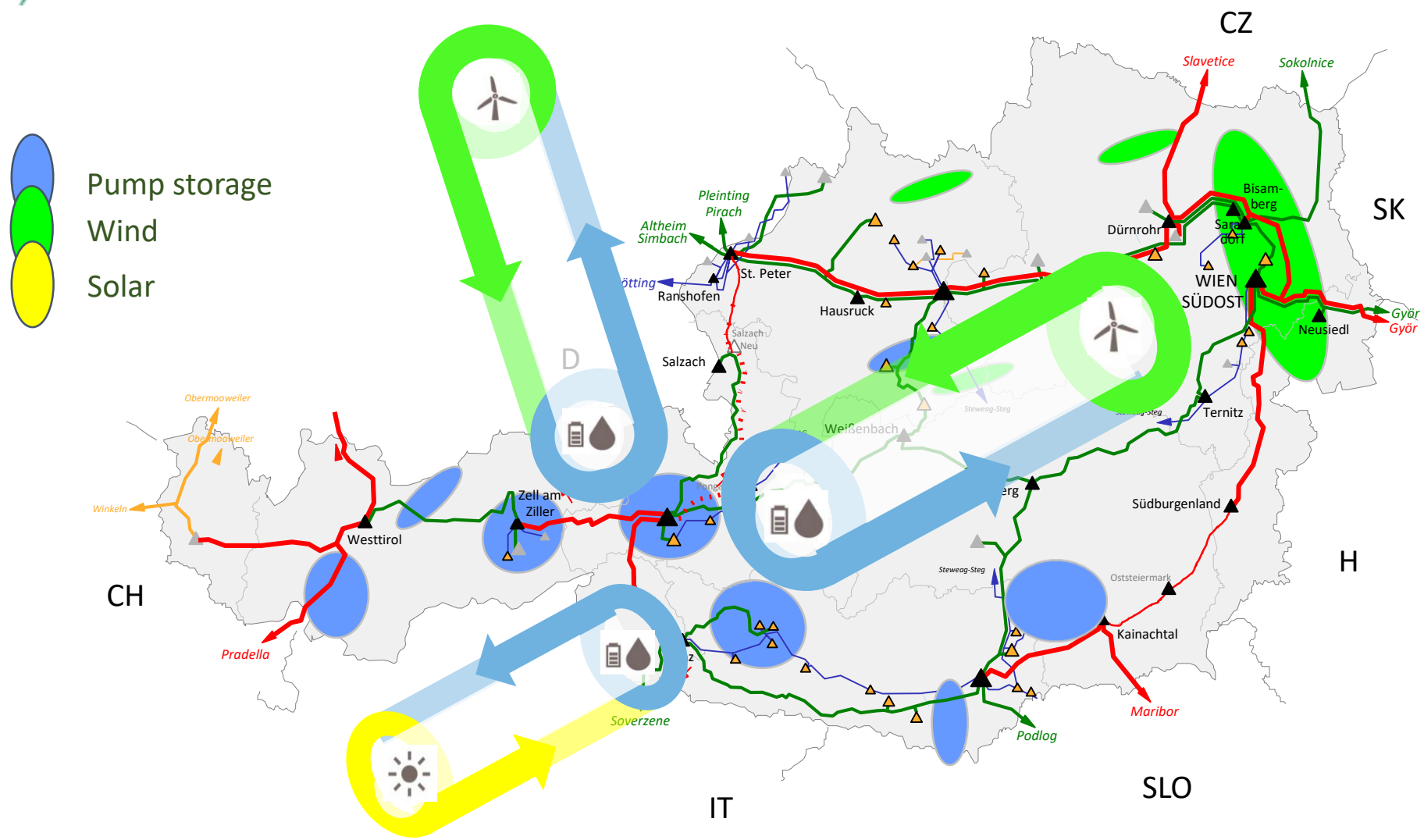
Source: Eurelectric „Power Facts 2016“, Umweltbundesamt „Klimaschutzbericht 2017“, own calculations

Comsumption per customer groups



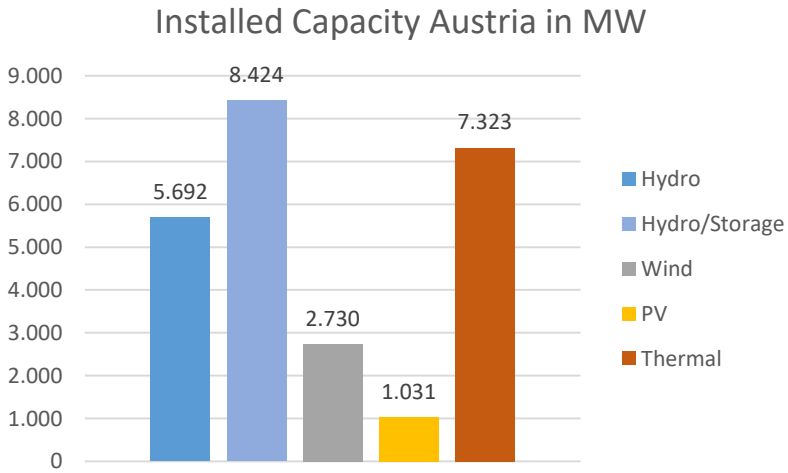
Source: Statistik Austria 2017

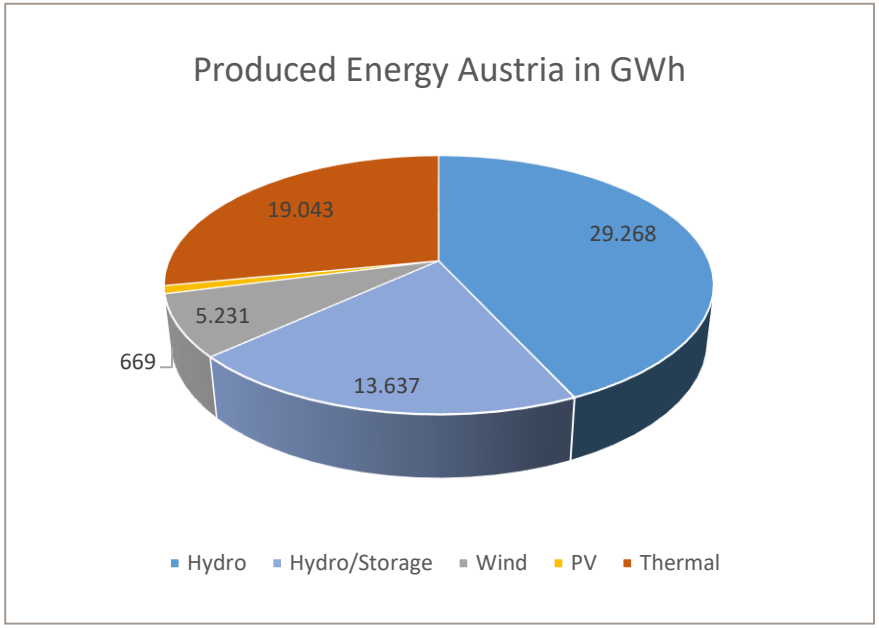
Austria as an electricity hub



Installed capacity and production in 2016

installed capacity:	~ 25,2 GW
maximal load:	~ 10,4 GW

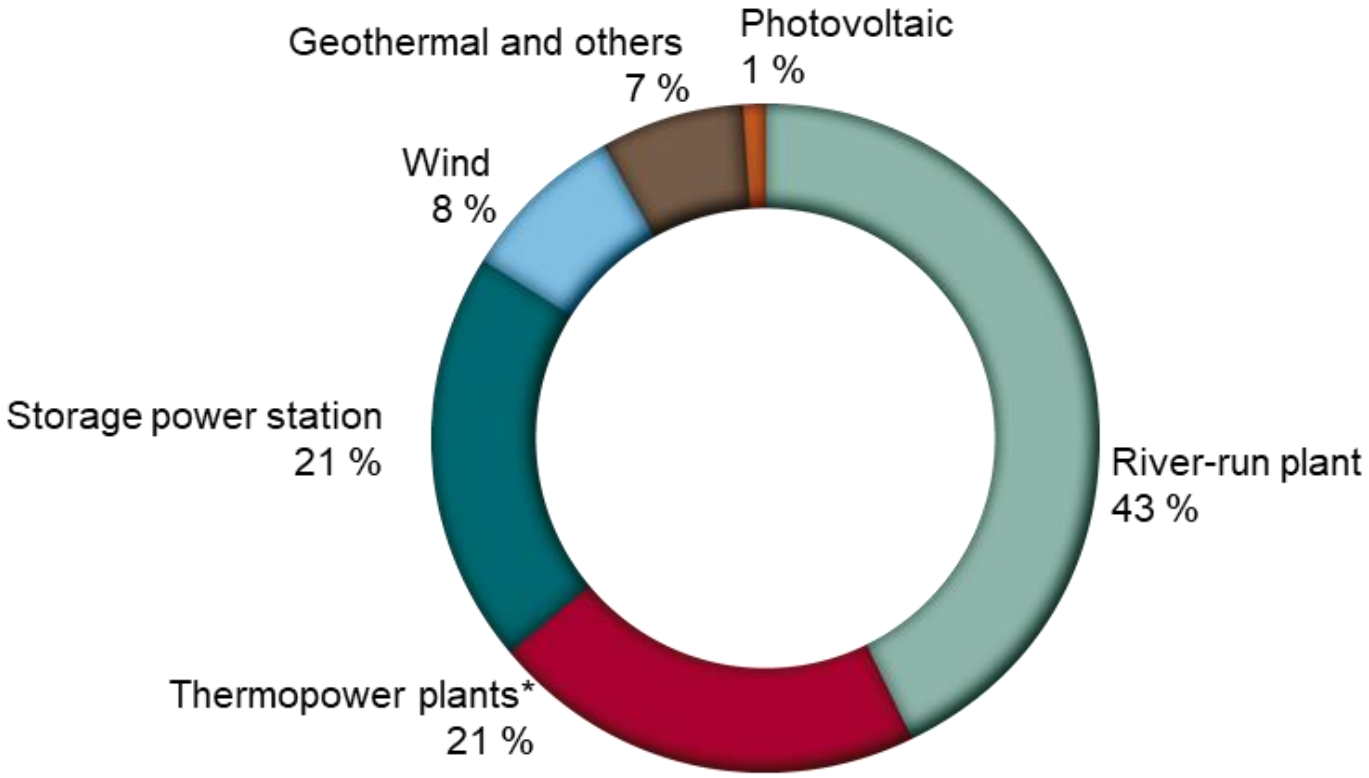




source: E-Control

Power production structure

Domestic production: 67.881 GWh



Source: Oesterreichs Energie, E-Control 2017
* Thermal power plants including biogenic fuels

Power balance in 2016

- Generation (TWh) → 67,9 TWh
- Consumption (TWh) → 61,8 TWh
- Imports (TWh) → 26,3 TWh
- Exports (TWh) → 19 TWh
- Losses (TWh) → 3,2 TWh

source: E-Control