

The Electric Power System

- Switzerland -

August 2018



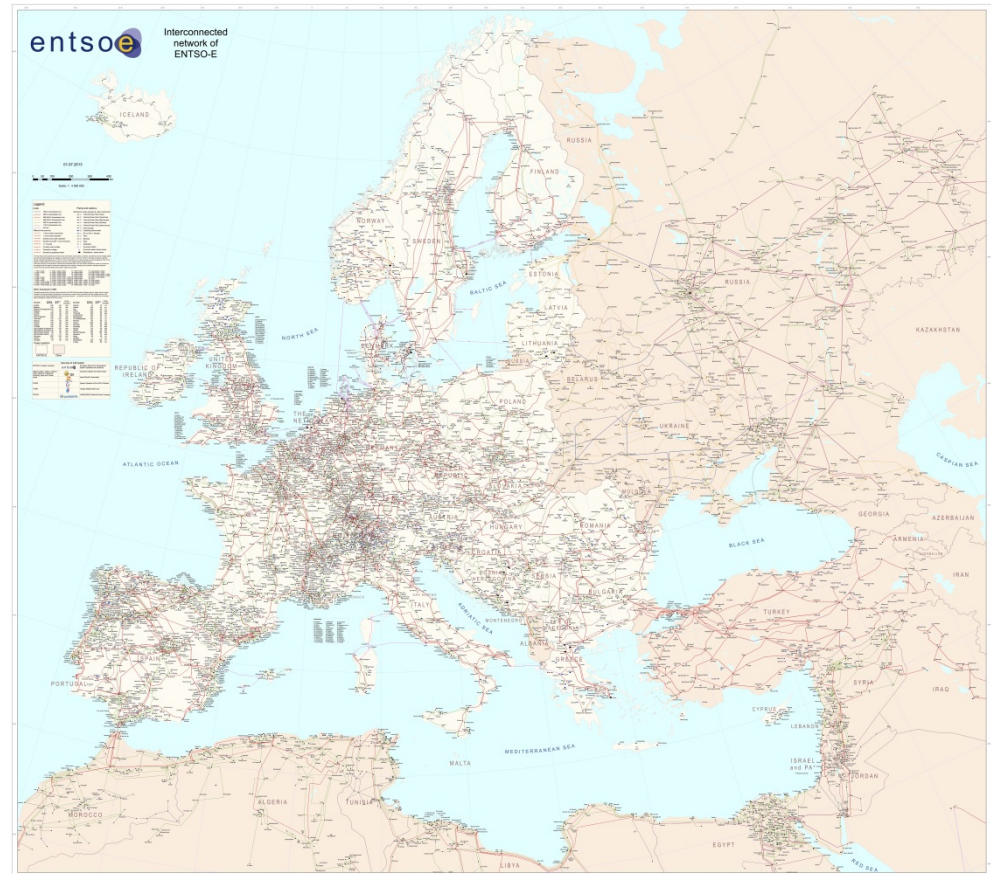
Basic facts

- ❑ Area: 41'285 km²
- ❑ Population: 8'419'550 (2016)
- ❑ approx. 4 mio consumers
- ❑ 1 TSO
- ❑ approx. 800 DSOs
- ❑ Peak load: max. 10.83 GW (max. of 2009 – 2015)
- ❑ Average interruption of electricity (2017): 20 min
(source: ElCom a; includes planned and unplanned interruptions)

Global map of the grid and of its interconnections

 41 Interconnectors
with:

- Austria;
- France;
- Germany;
- Italy.

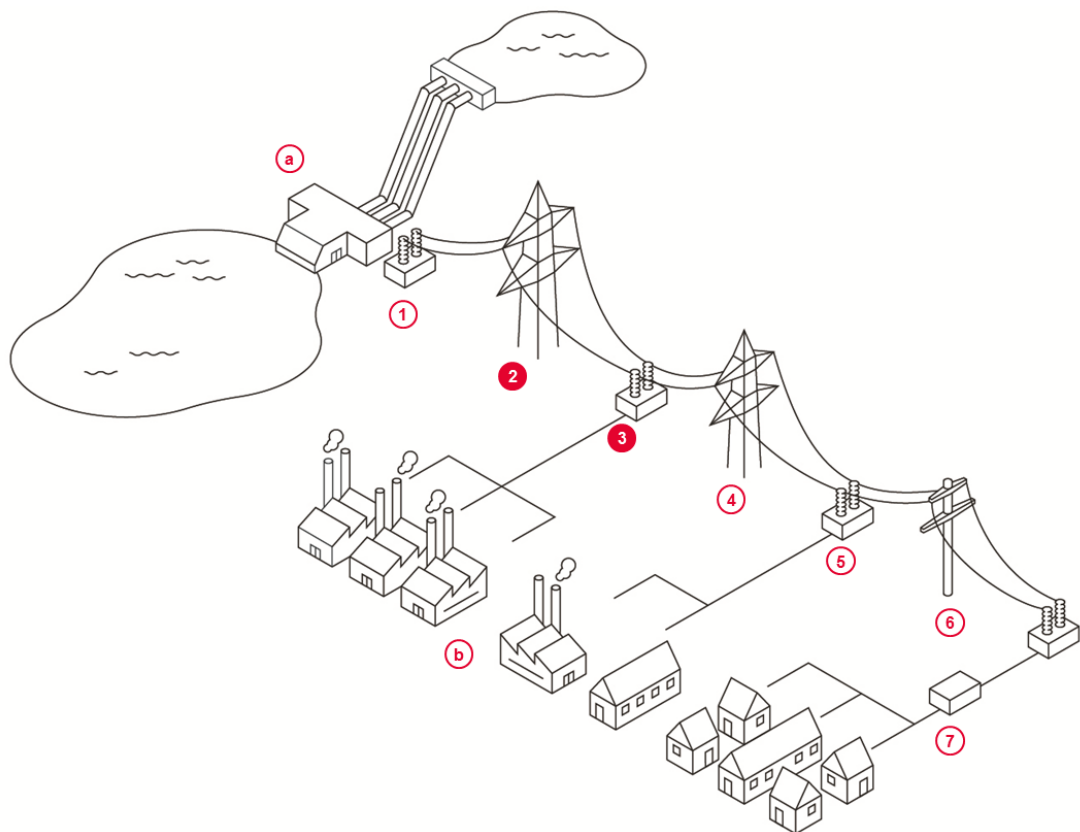


Grid facts and characteristics

- ❑ The electricity grid in Switzerland is sub-divided into transmission grids (maximum voltage) and distribution grids (high, medium and low voltage)

	Voltage Level	Total length (approx.)	Responsibility
Transmission Grid	380 kV	1800 km	TSO
Transmission Grid	220 kV	4800 km	TSO
High Voltage	50 – 150 kV	TSO 150 kV: 50 km	DSO
Medium Voltage	10 – 35 kV		DSO
Low Voltage	230 / 400 V		DSO

Structure of electrical power system



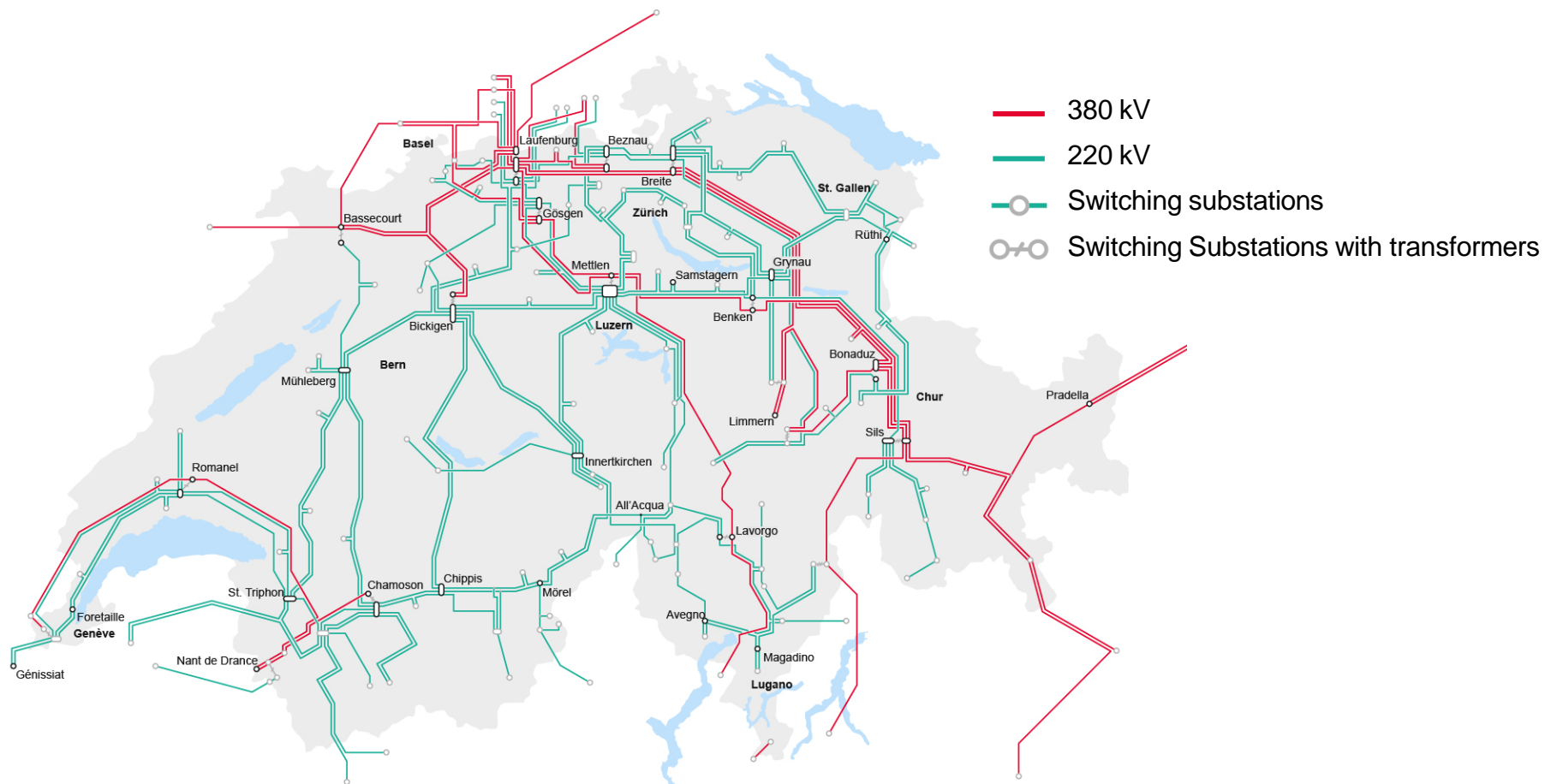
- (a) Generator
- (1) Transformer
- (2) Extra-high voltage in the 220/380 kV transmission grid
- (3) Transformer
- (4) High voltage in the 50 to 150 kV national distribution system
- (5) Transformer
- (6) Medium voltage in the 10 to 35 kV regional distribution system
- (7) Low voltage in the 400/230 V regional grid
- (b) Consumers

Source: Swissgrid





Map of the transmission grid



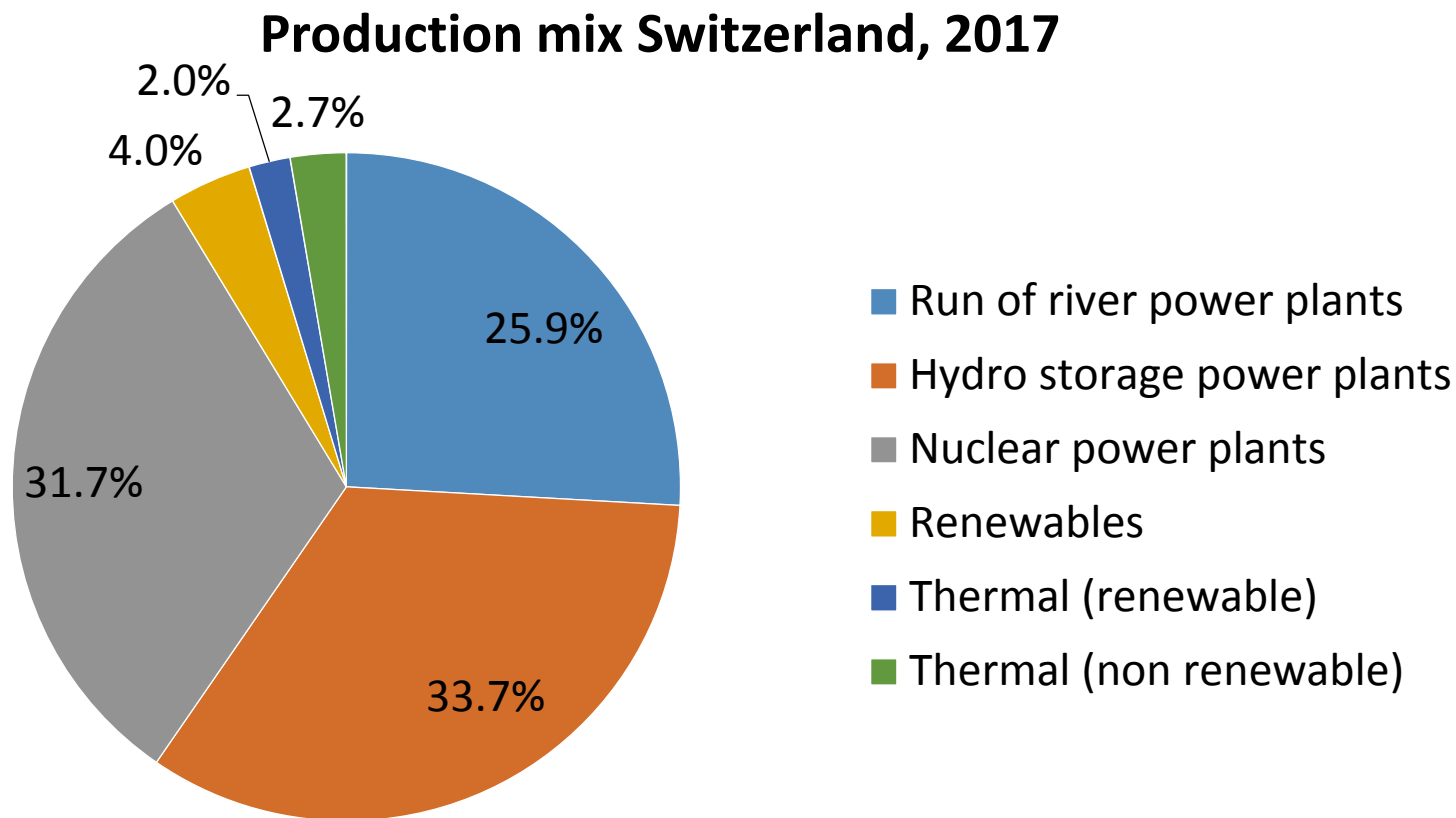
Source: Swissgrid



Information on TSO

- Name: Swissgrid
- 6700 km lines
- 21 transformers
- 12,000 pylons
- 125 substations
- 41 connections to other countries
- 450 employees
- www.swissgrid.ch

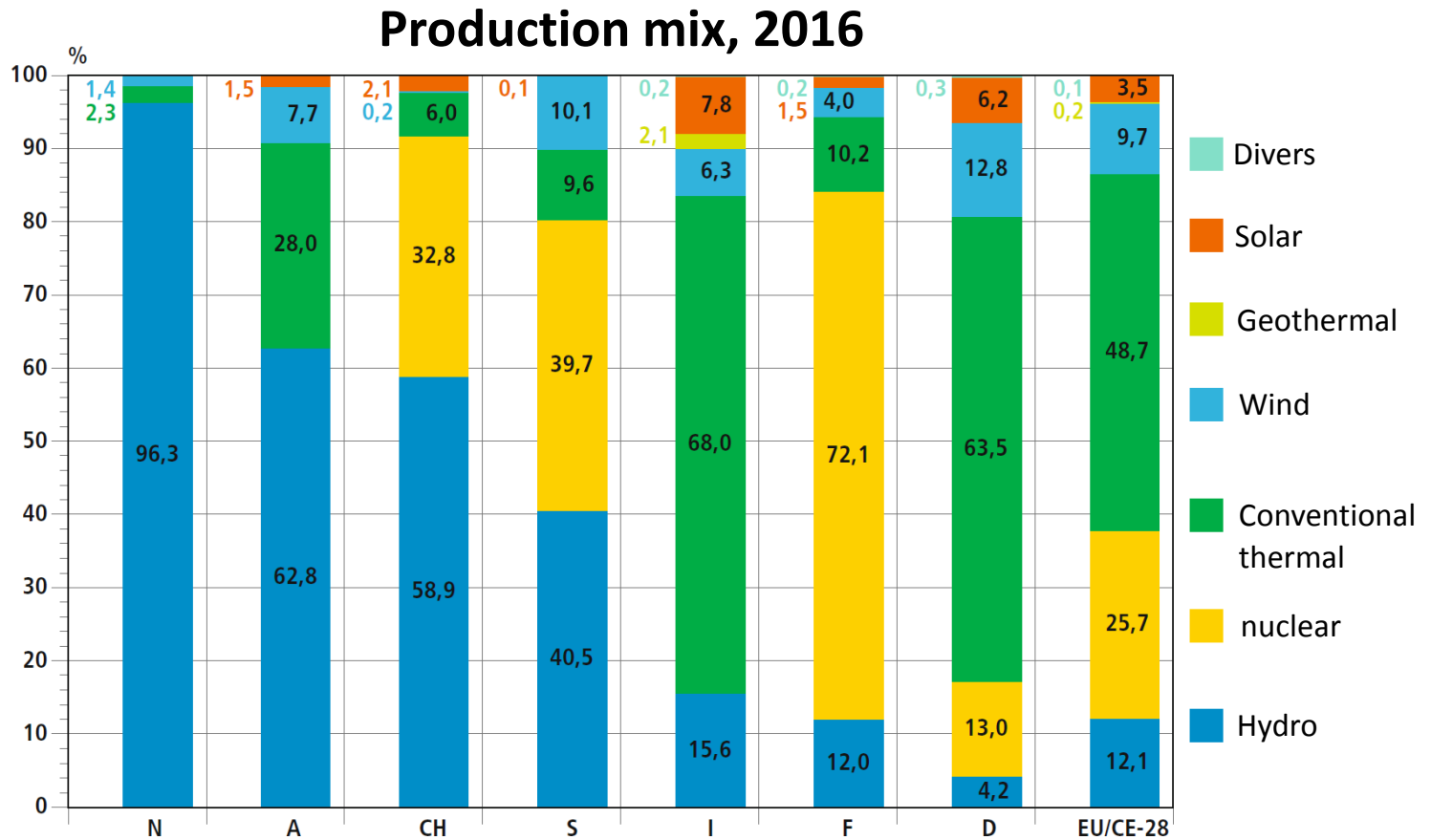
Power structure of the country



Source: SFOE a



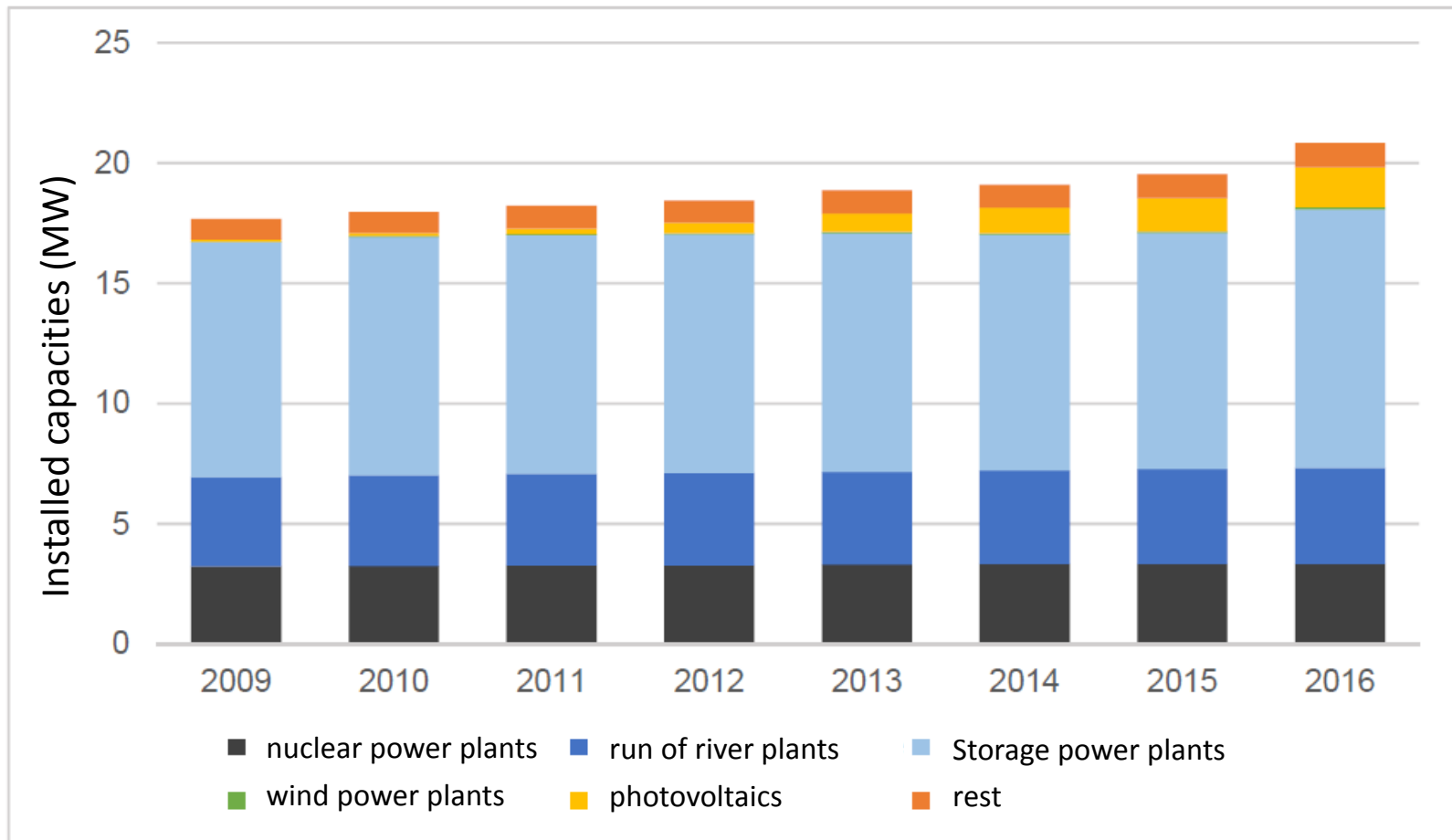
Power structure CH vs. Europe



Source: SFOE a

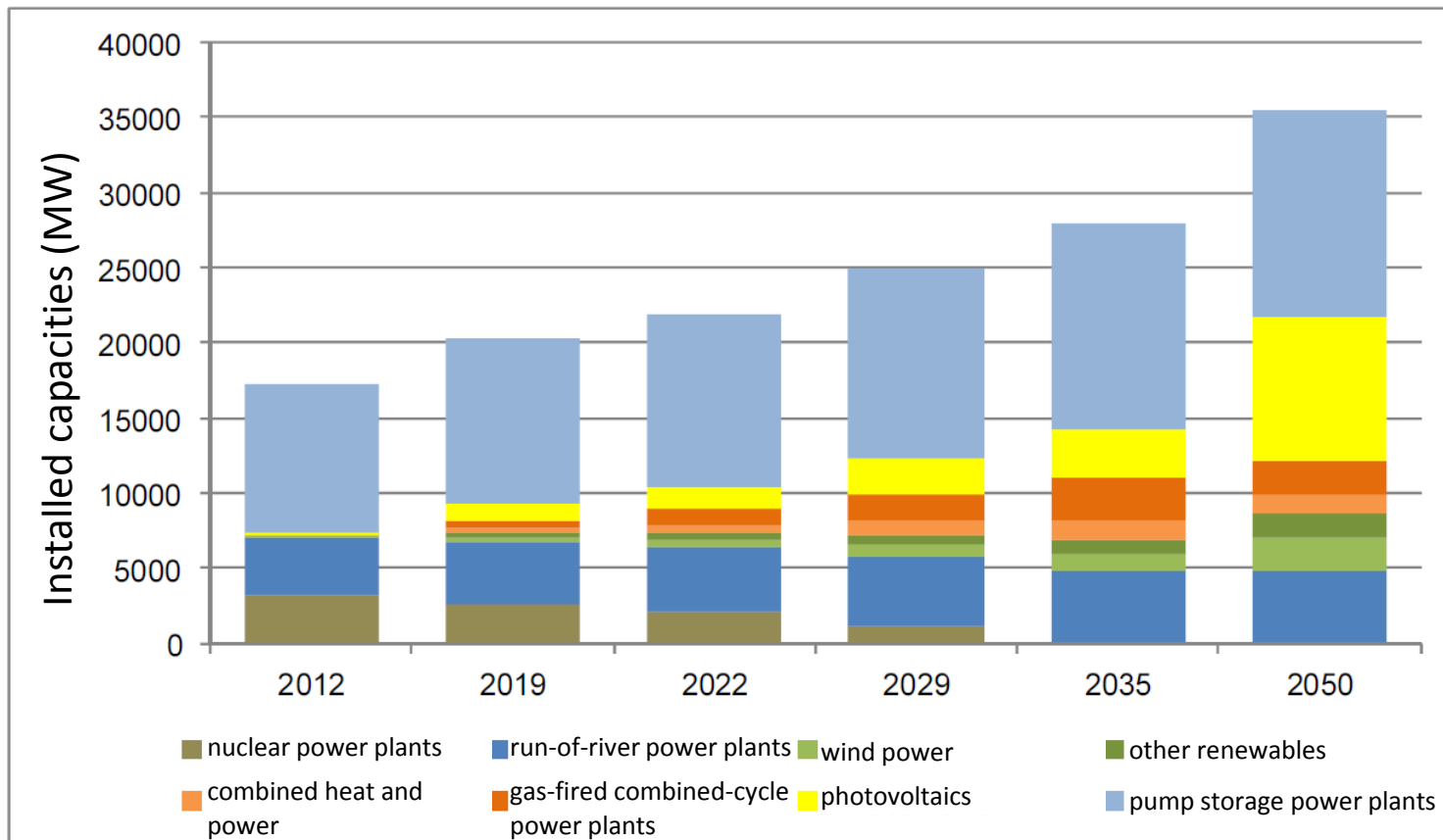


Development of generation capacity since 2009



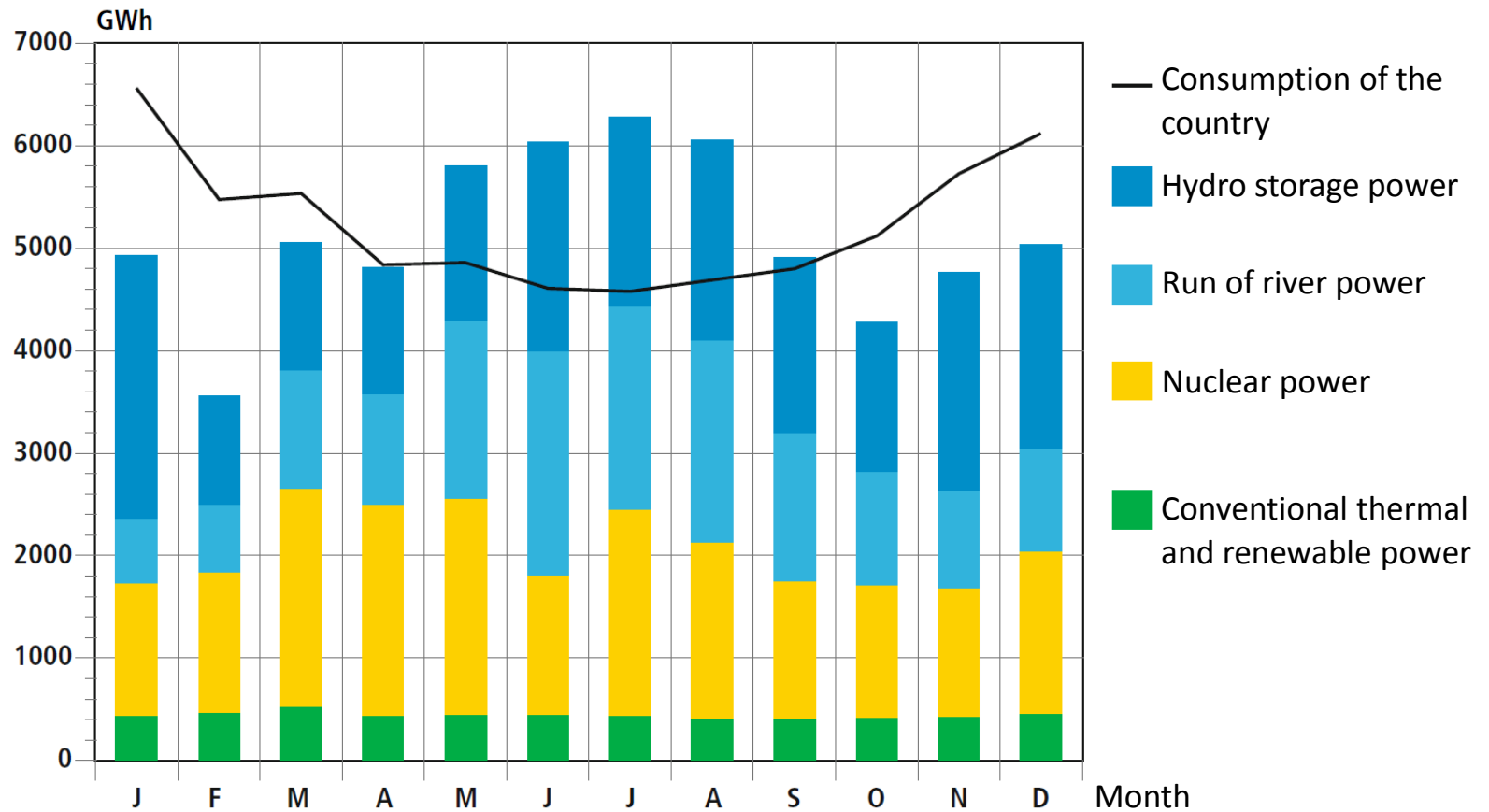
Source: ECom a

Future development of generation capacity



Source: ElCom a

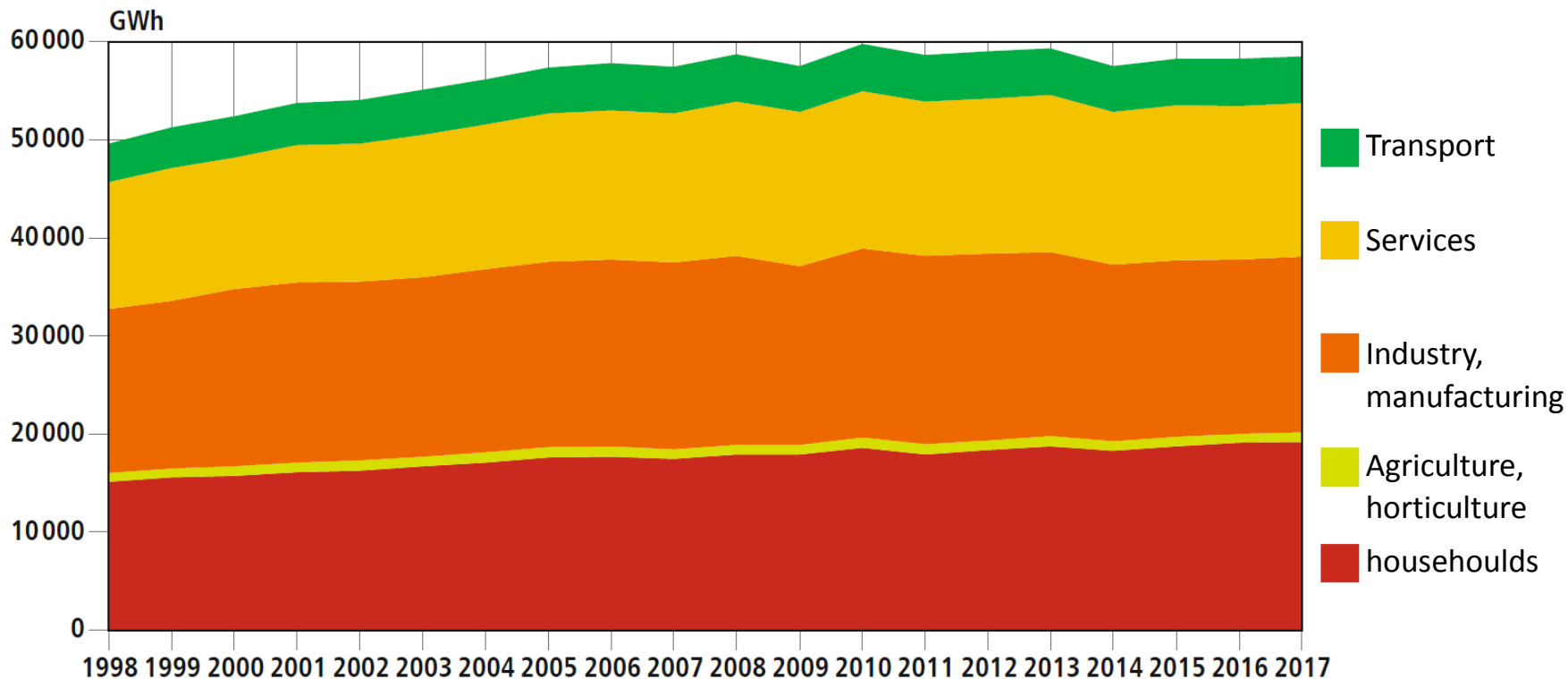
Electricity production 2017



Source: SFOE a



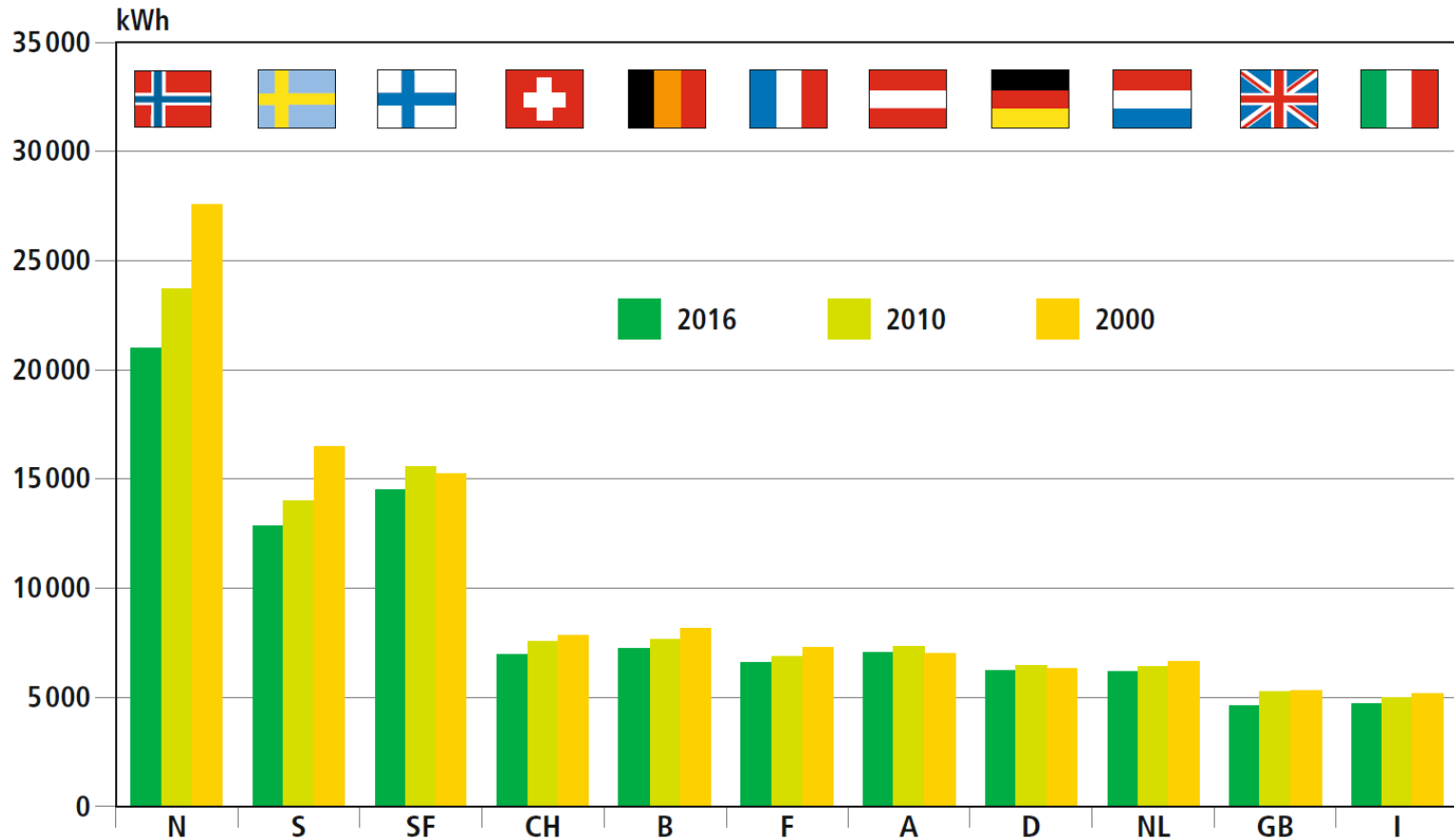
Electricity consumption per sector



Source: SFOE a



Electricity consumption per capita CH vs. Europe



Source: SFOE a

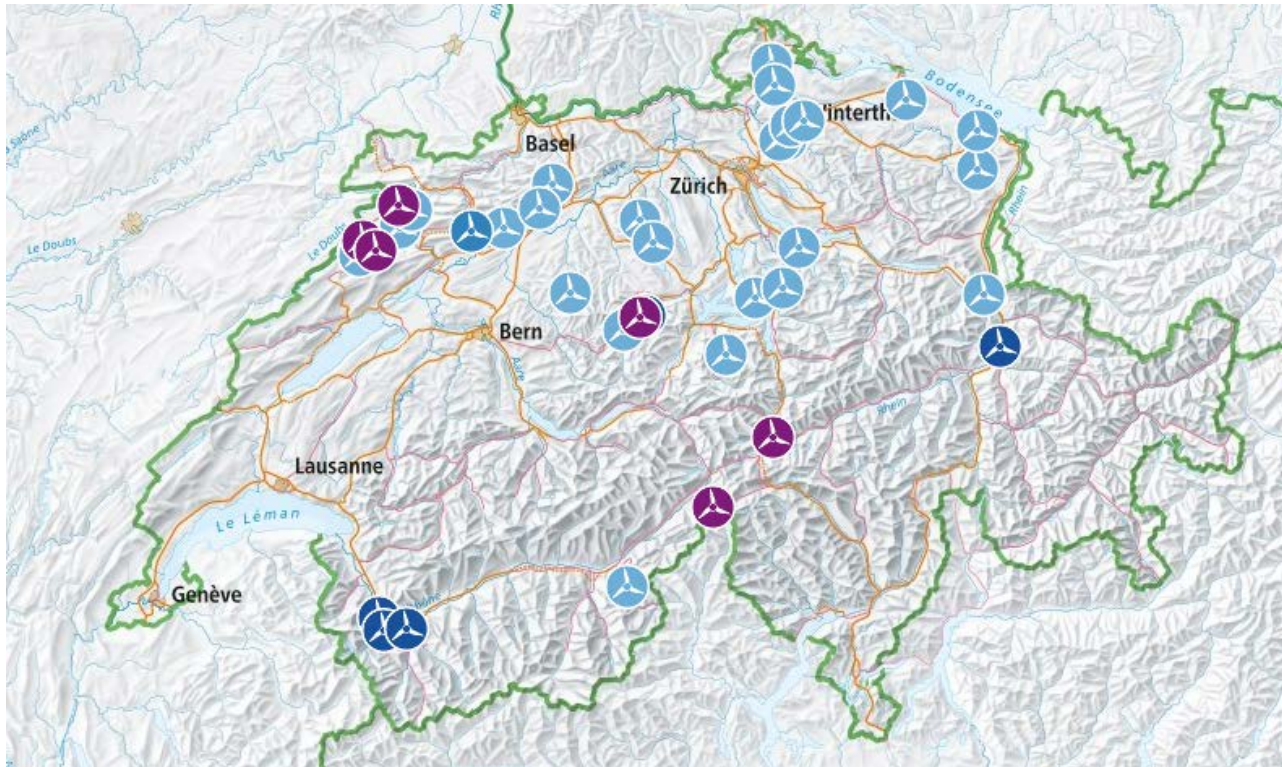




Renewables



Location of installed wind turbines in Switzerland



Legend:



Small single plant
Power < 100 kW



Medium single plant
Power ≥ 100 kW and < 1000 kW



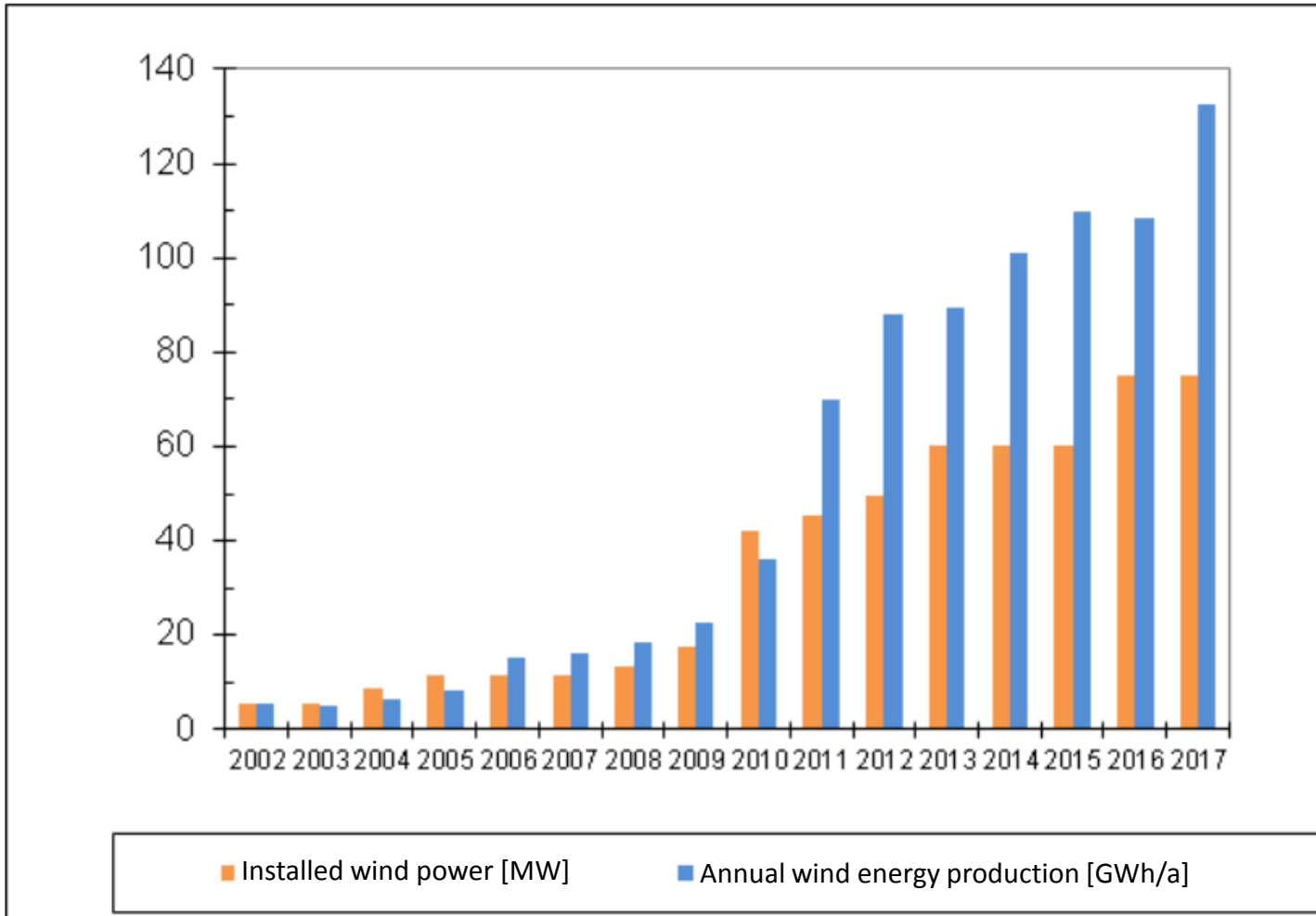
Big single plant
Power ≥ 1000 kW



wind park

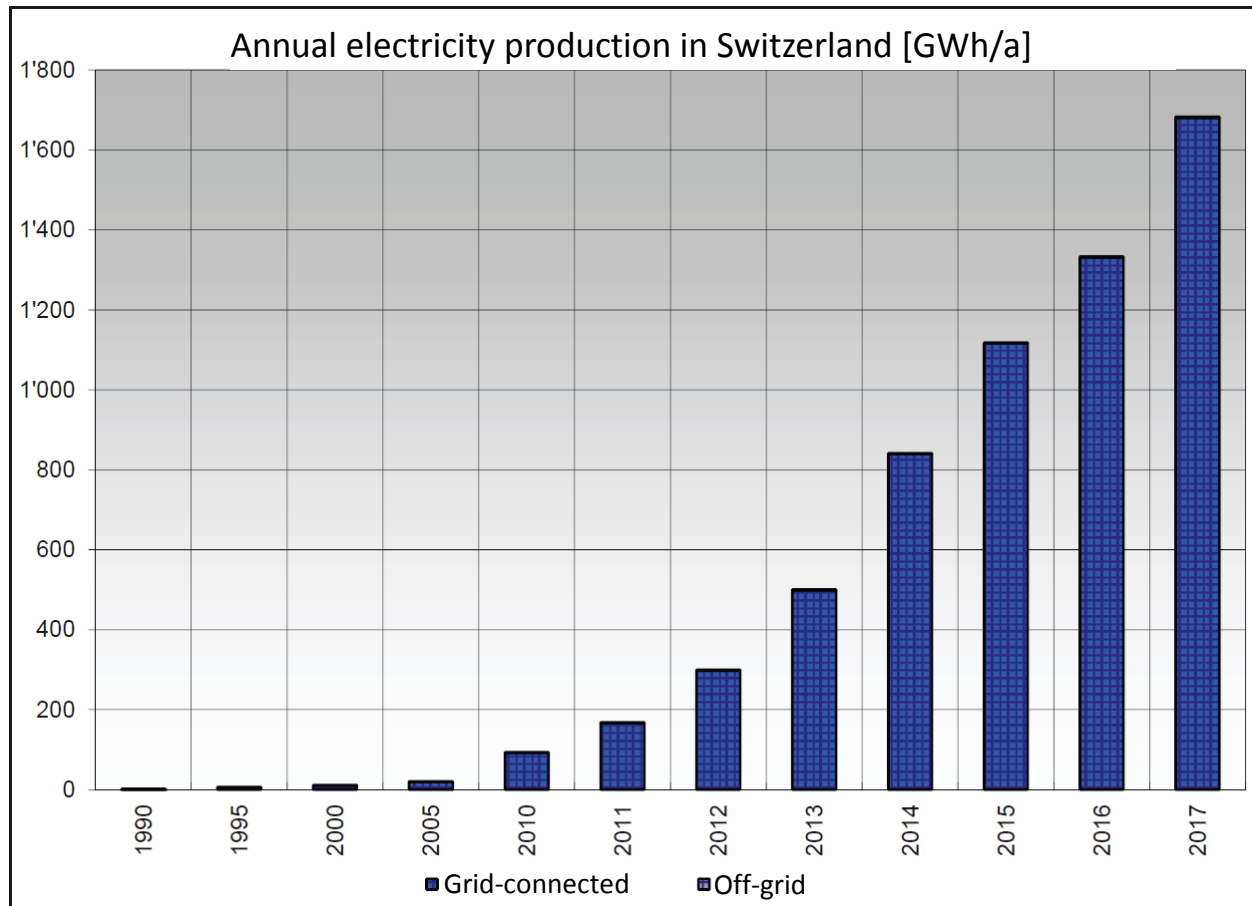
Source: wind-data.ch, Date: 09.08.18

Development of wind power



Source:
Suisse Eole

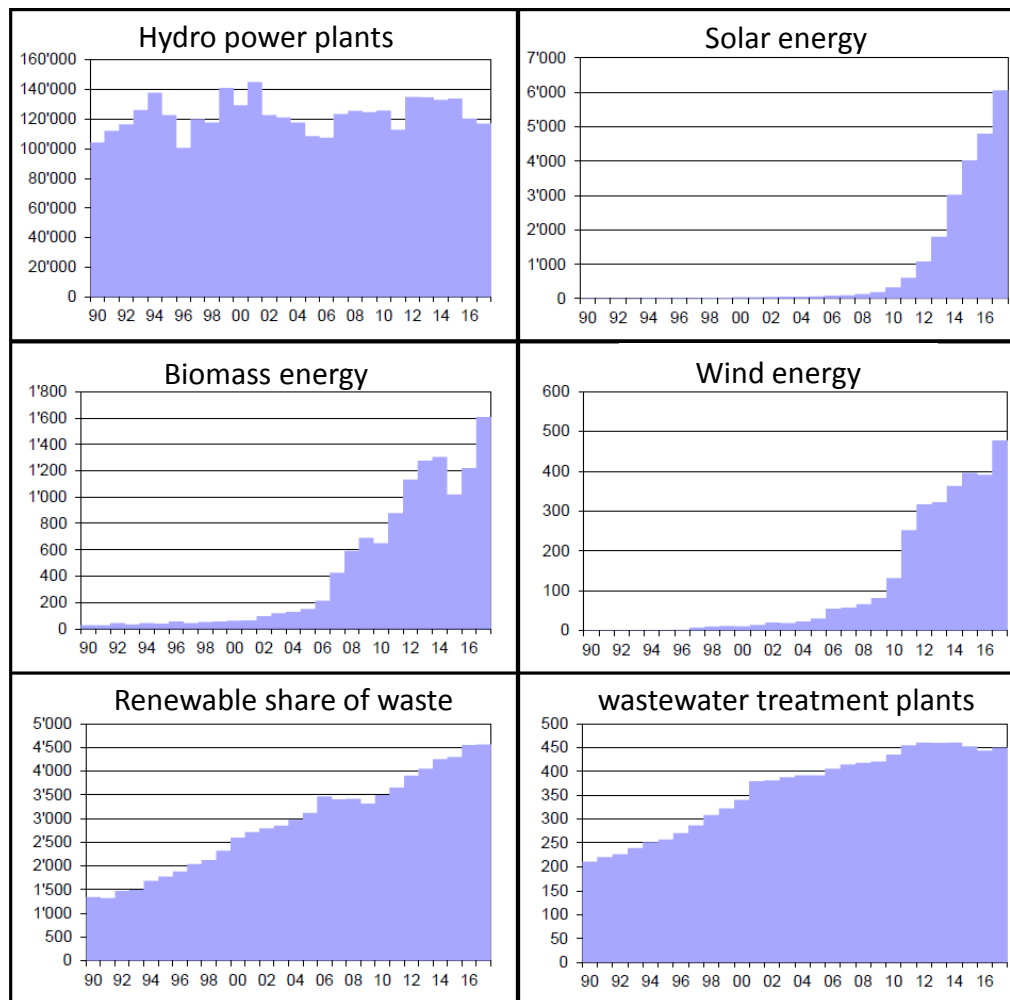
Development of photovoltaic power



Source: SWISSOLAR



RES annual production in TJ



Source: SFOE b

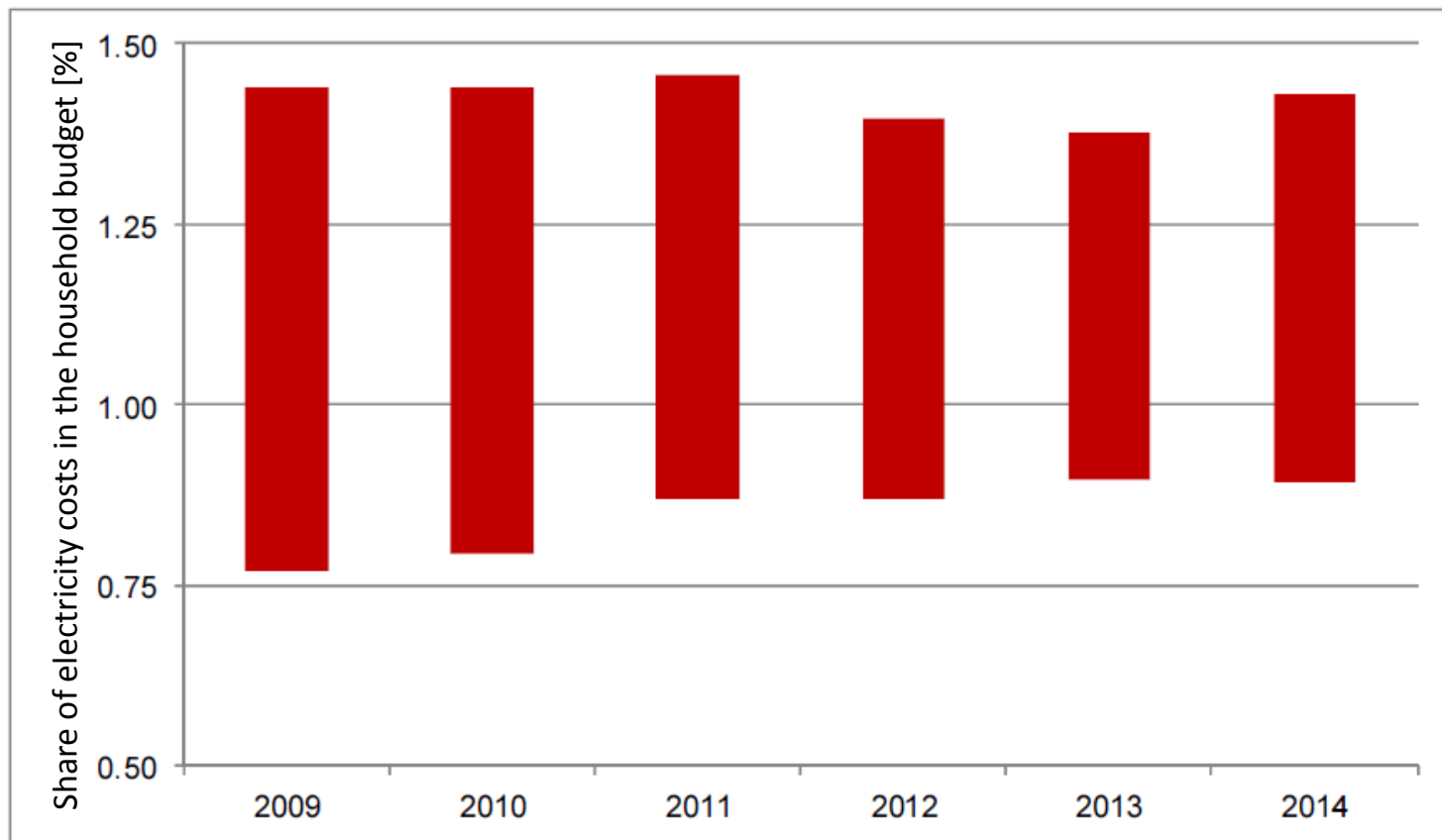




Market

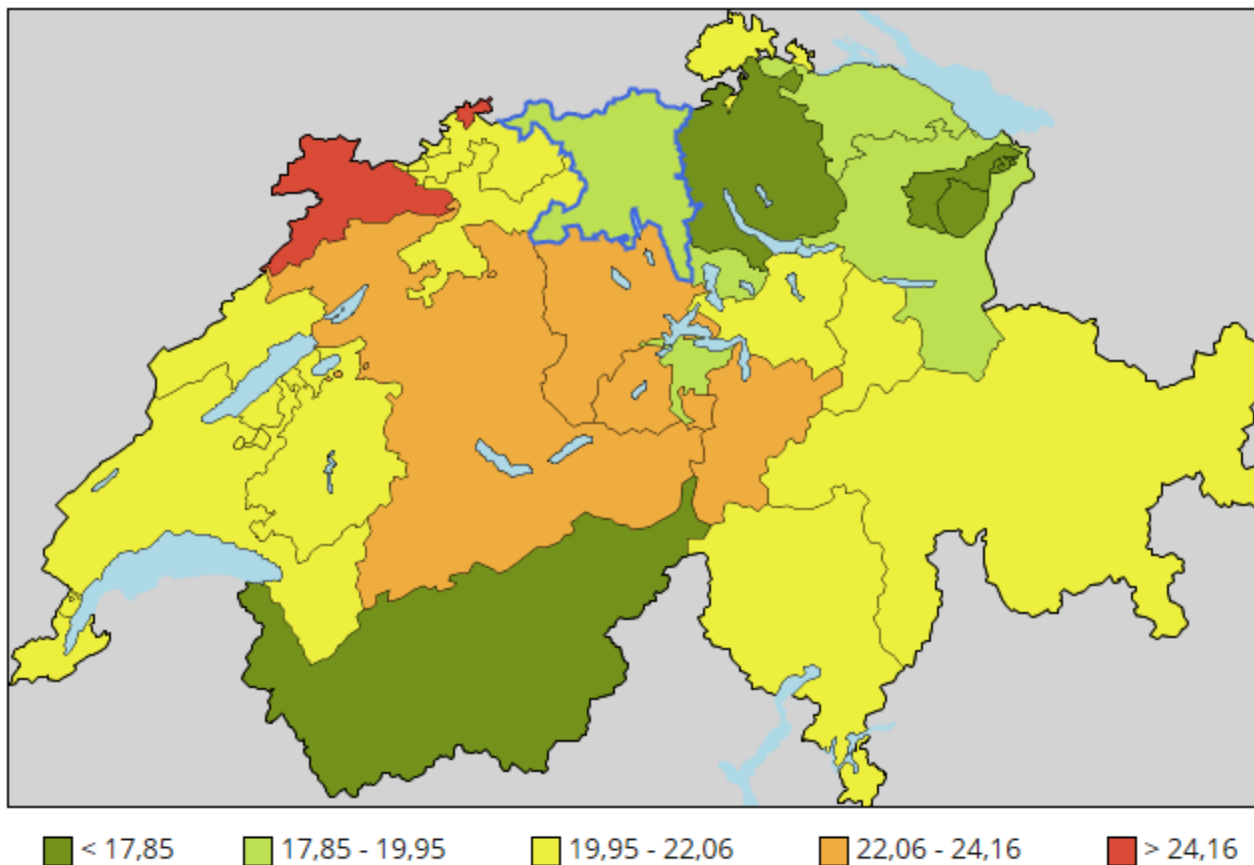


Electricity price development for households



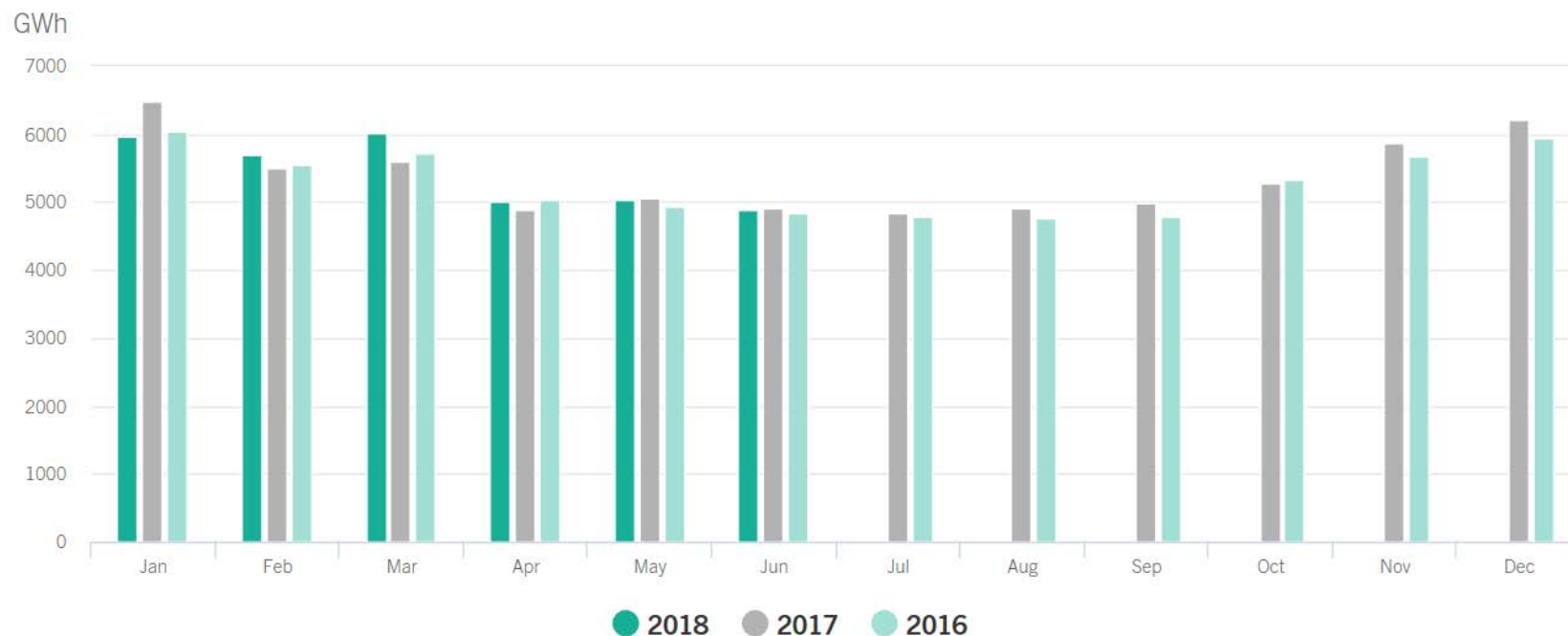
Source: ElCom a

Regional price differences for households



Electricity price for 2018 in CHF/MWh, category H4: 4500 kWh/a, Standard product, source: ElCom b

Total consumption in Switzerland

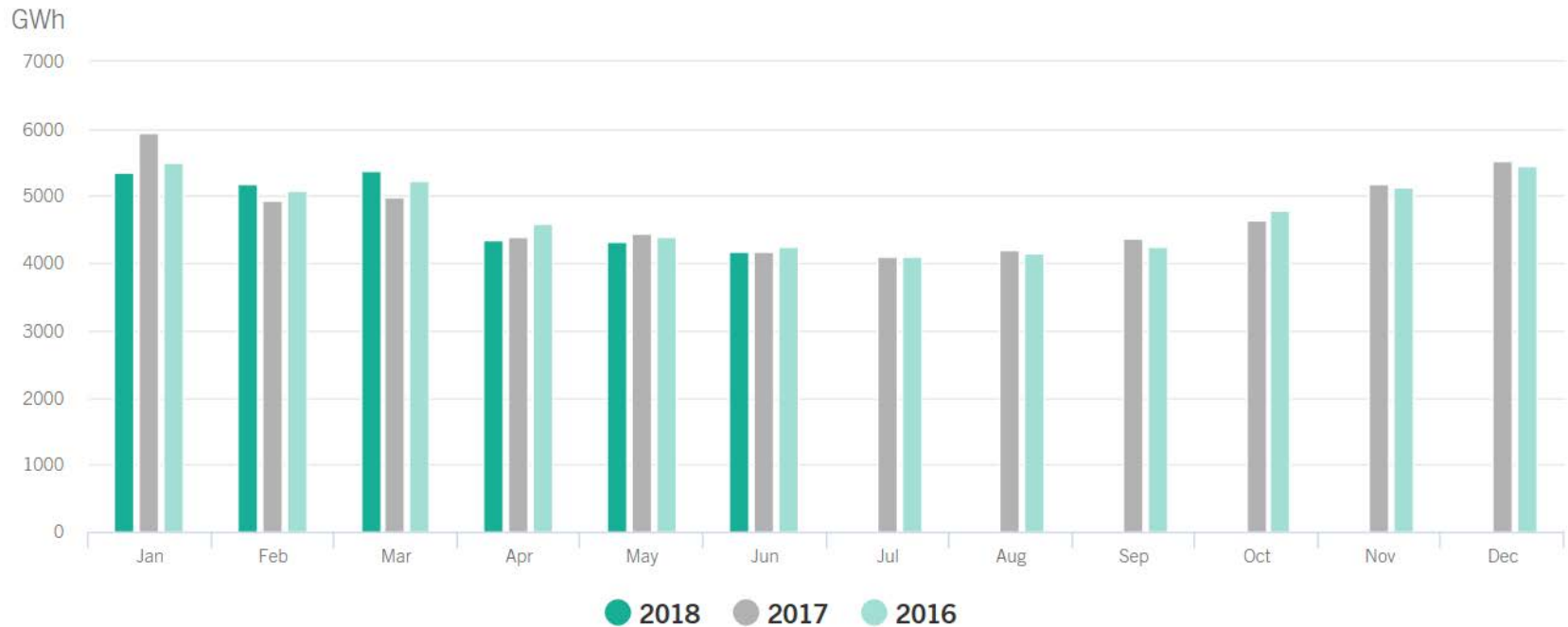


Source: Swissgrid

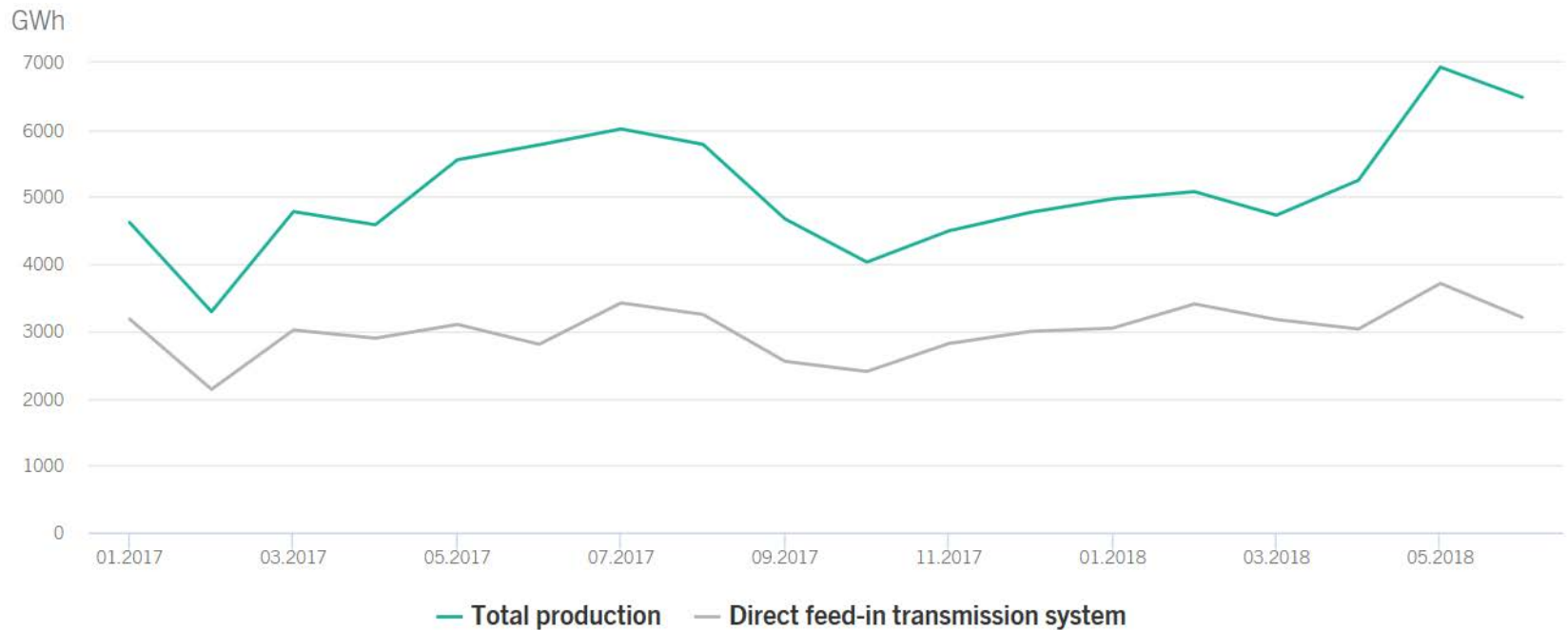
(including pumps in pumped storage plants, in-house consumption by power plants, and losses in the whole electric grid)



End user consumption



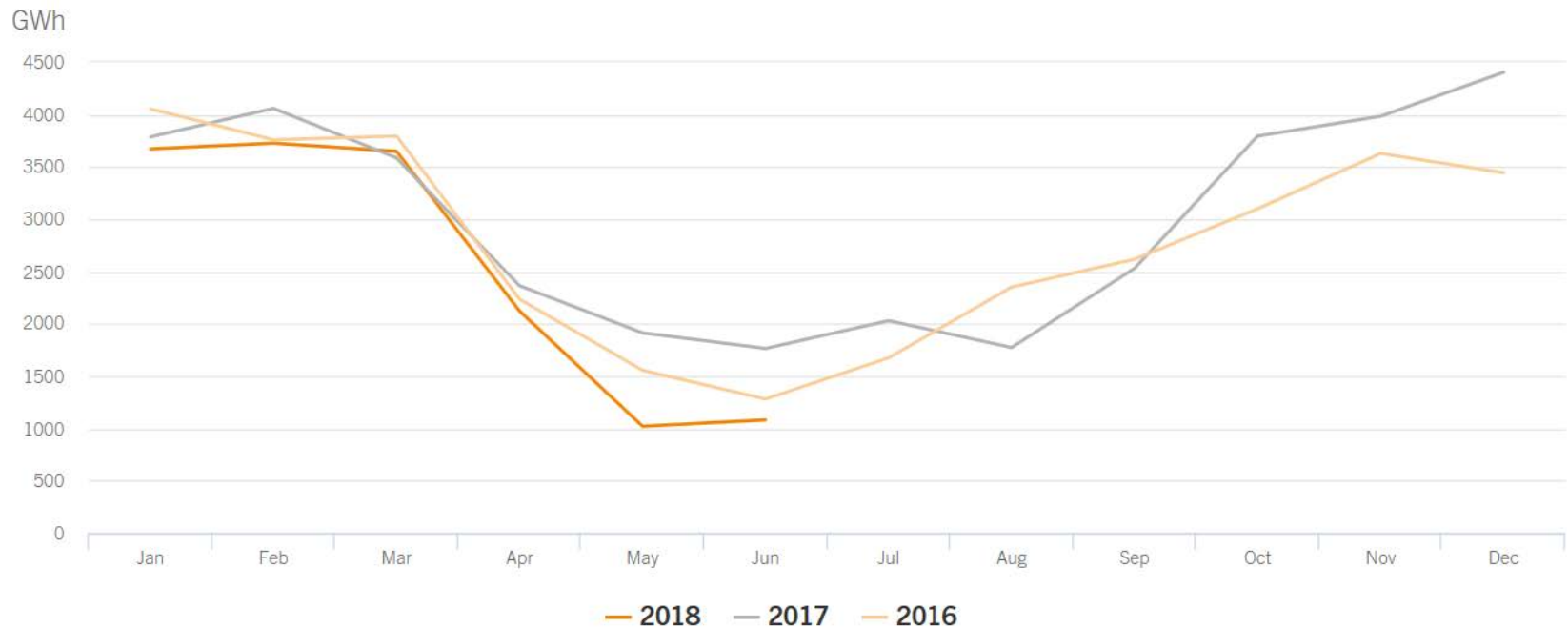
Energy generation in Switzerland



Source: Swissgrid



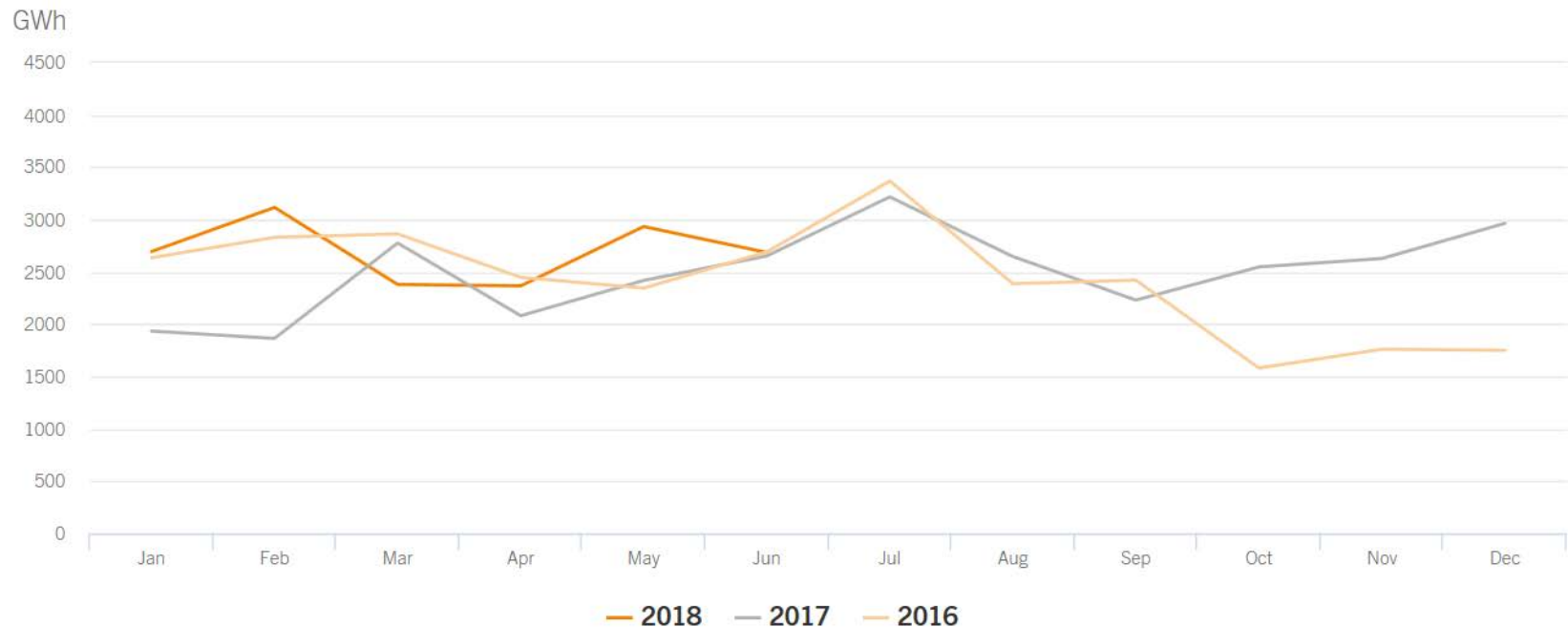
Power balance: Import



Source: Swissgrid

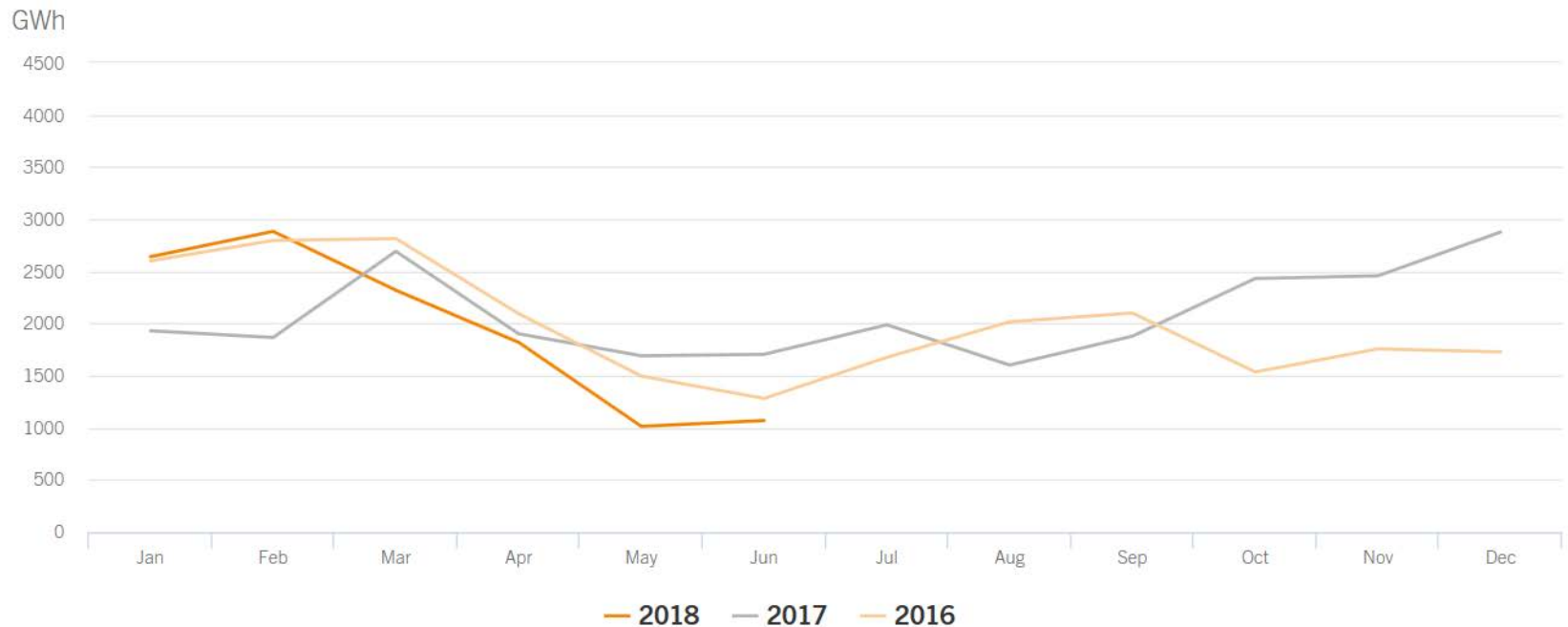


Power balance: Export



Source: Swissgrid

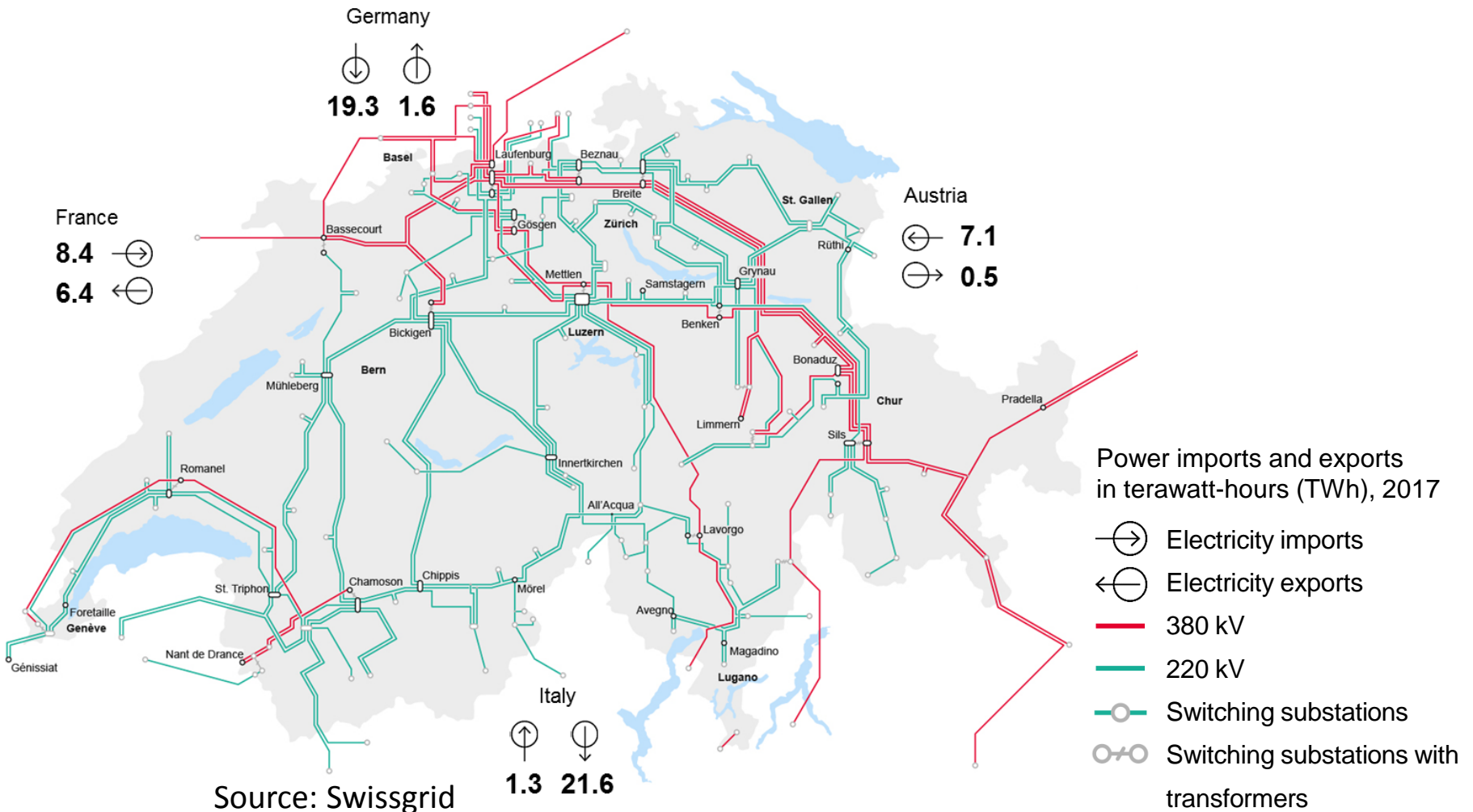
Power balance: Transit



Source: Swissgrid



Electricity exchanges



Switzerland is closely linked with Europe



The electricity markets in Europe are connected

- Swissgrid has created the technical conditions for participation in European Market Coupling.
- There is no bilateral electricity agreement with Europe, so Switzerland's participation is not possible.

Consequences

- Unplanned loop flows increasingly load the Swiss grid

Status: 2018

Source: Swissgrid



Sources

- ❑ Swiss Federal Electricity Commission (ElCom a), [Stromversorgungssicherheit der Schweiz](#)
- ❑ Swiss Federal Electricity Commission (ElCom b), <https://www.strompreis.elcom.admin.ch/>
- ❑ Swiss Federal Office of Energy (SFOE a), [Schweizerische Elektrizitätsstatistik 2017](#)
- ❑ Swiss Federal Office of Energy (SFOE b), Schweizerische Statistik der erneuerbaren Energien
- ❑ Swissgrid, [Production and consumption](#)
- ❑ Wind-data.ch, [Wind Turbines](#)
- ❑ Swiss Eole, [Statistik](#)
- ❑ Swissolar, [Markterhebung Sonnenenergie 2017](#)