

# | ELECTRICITY IN EUROPE 2017

Synthetic overview of electric system consumption, generation and exchanges in 34 European countries



European Network of  
Transmission System Operators  
for Electricity



**ENTSO-E, the European Network of Transmission System Operators for Electricity, represents 43 electricity transmission system operators (TSOs) from 36 countries across Europe.**

**ENTSO-E's 'Electricity in Europe' provides a synthetic overview of the consumption, generation and exchanges of electricity in the area covered by ENTSO-E's member TSOs during a given year. It also comments on the main evolutions in comparison to the previous year.**

The 2017 edition is mainly based on provisional data, as of 4 June 2018, delivered by ENTSO-E's members, and published on the ENTSO-E data portal as 'Power Statistics'. It is complementary to ENTSO-E's Statistical Factsheet. Note that Turkey (observer member) and Albania (member since March 2017) are not included in the statistics.

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# 1 EXECUTIVE SUMMARY: ENERGY TRANSITION IN PROGRESS

## Electricity consumption was stable in 2017

The overall electricity consumption reached 3,329 terawatt hours (TWh) in 2017. Compared with 2016, the electricity consumption slightly increased (+0.2%).

In 2017, the peak load of the overall electrical system was reached on 18 January (542 gigawatts [GW]) during a cold wave, and was lower than the previous year (-4 GW).

## Renewable generation continues to increase whilst nuclear generation decreases

Comparing 2017 to 2016, the net generating capacity (NGC) of nuclear power plants has decreased (– 2.3%). The same holds true for fossil NGC (– 3.1%), while wind and solar NGC increased (+ 9.8% and + 6.1%, respectively). In total, the capacity of renewable electricity sources (RES) (excluding hydro) amounts to almost 30% of the total NGC.

The generation from nuclear power plants also decreased (– 1.1%). This was partially compensated by generation from fossil fuels (+ 1.3%). Unlike in 2016, generation from renewables was driven by wind (+ 17%). Solar generation (6.1%) increased accordingly to the increase of NGC (+ 6.4%). Hydro generation fell due to unfavourable weather conditions (9.3%).

**The net generating capacity (NGC) is the maximum electrical net active power a power plant can feed-in continuously without exceeding the designed thermal limits.**

## Interconnected network allows the exchange balance of countries to fluctuate from year to year

Even if the structure of exchanges is rather stable, the exchange balance of countries can fluctuate due to border capacities, market prices, market coupling and the development of renewables.

In 2017, nine countries exported more than 10% of their annual national generation to neighbouring countries. Eleven other countries imported more than 10% of their annual internal consumption needs from other countries within the ENTSO-E perimeter.

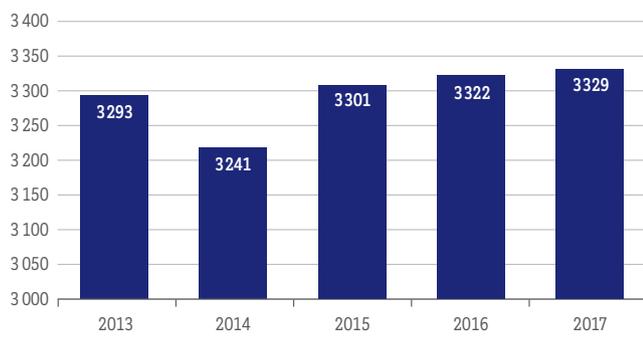
# 2 CONSUMPTION

## Evolution of overall consumption

### YEARLY ENERGY CONSUMPTION

In 2017, consumption reached 3,329 TWh, which represents a stabilisation (+0.2%) compared to the previous year (Figure 1).

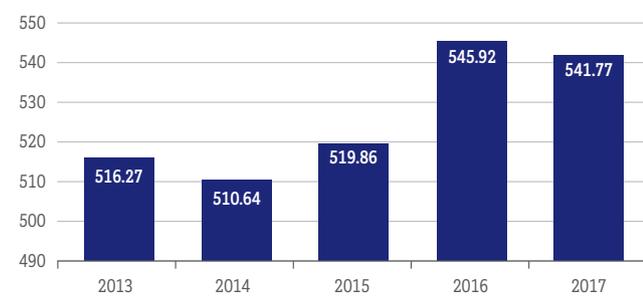
Figure 1: Electricity consumption between 2013 and 2017 in TWh



### PEAK LOAD

Due to the cold spell of January 2017, the peak load reached 542 GW on 18 January 2017. The highest historical peak load is that which was registered during the cold spell of January 2016 (546 GW).

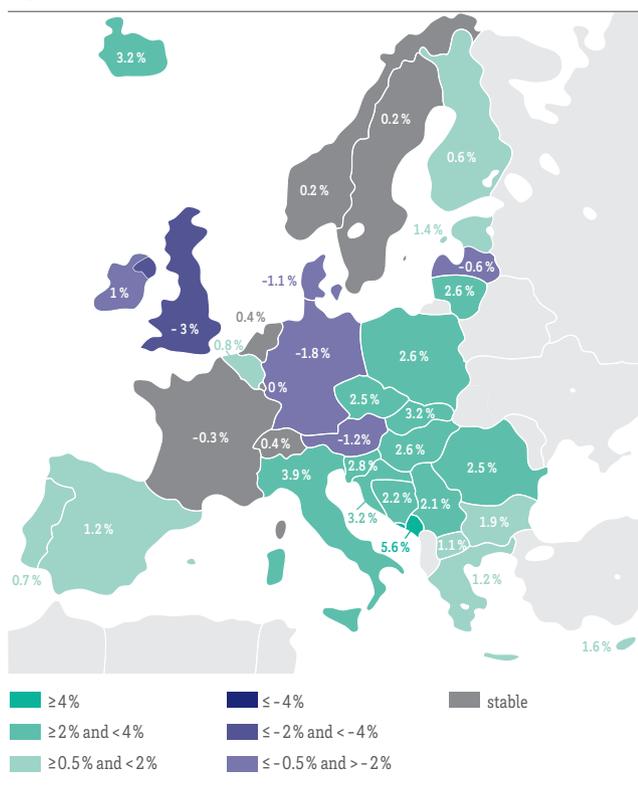
Figure 2: Maximum peak load in GW



## Evolution of consumption per country

The evolution of consumption between 2016 and 2017 is contrasted below. Whereas Eastern Europe is in a growth dynamic, Western Europe shows various situations, with a limited increase in the Hispanic peninsula and a stabilisation in central Europe, excluding Germany and Austria which saw a decrease in consumption like that of Great Britain.

Figure 3: Evolution of electricity consumption between 2016 and 2017

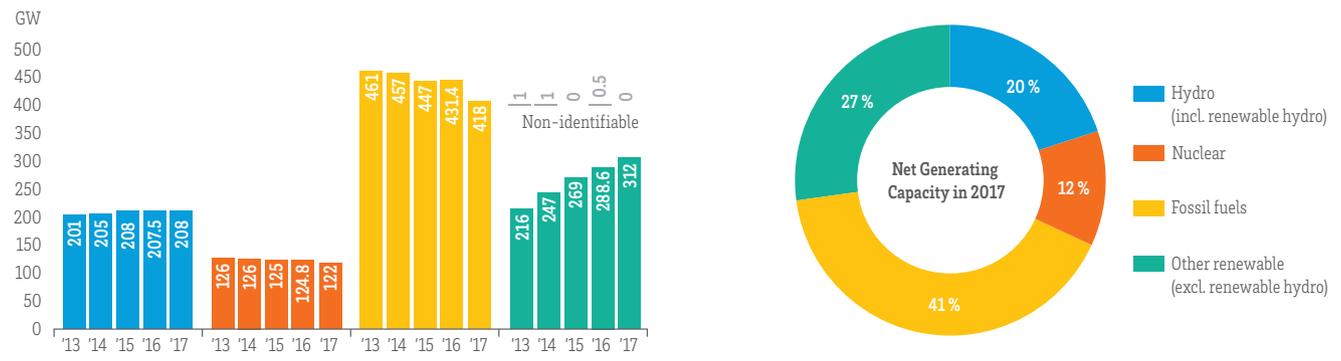


# 3 GENERATION

## Evolution of overall Net Generating Capacity

By the end of 2017, total NGC was 1,060 GW. Whilst NGC was stable with respect to hydraulic, non-hydro renewable energy sources increased by 24 GW (+ 8.2% compared to 2016), and represented almost 30% of total NGC. In contrast, fossil fuel NGC decreased by 3.1% and nuclear NGC by 2.3%.

Figure 4: ENTSO-E net generating capacity from 2013 to 2017

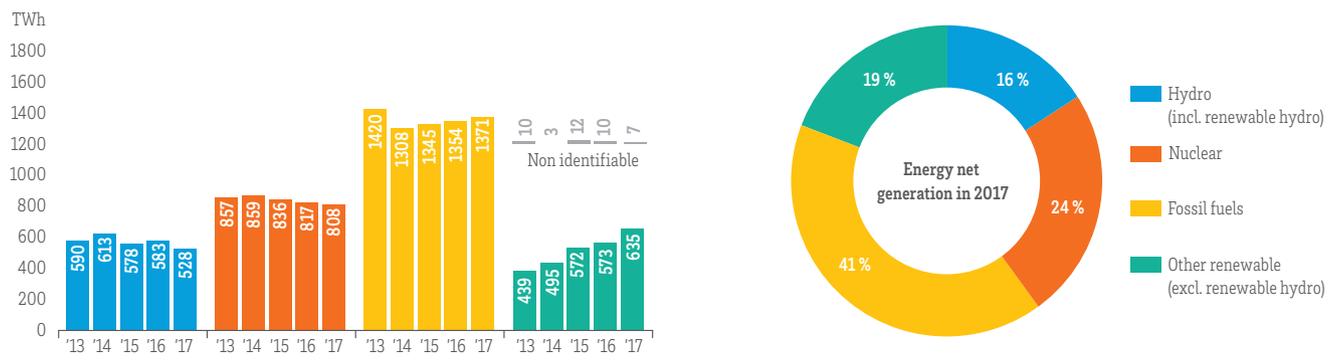




## Evolution of overall energy net generation

Whilst fossil fuels generation slightly increased by 1.3%, nuclear generation decreased by 1.1% in 2017 compared to 2016. In parallel, renewable (excluding hydro) generation increased (+10.9%) driven by a wind uptake (+17.3%). Meanwhile, hydro generation dropped by 9.3% due to limited rainfall.

Figure 5: ENTSO-E net generation from 2013 to 2017







## FOSSIL FUEL

Historically, fossil fuels have been the main electricity generation source for countries with no hydraulic resources or nuclear plants. In recent years, the share of electricity generation from fossil fuels has decreased in all European countries, associated with the development of RES generation, and the shutdown of some thermal plants which do not meet European environmental standards. However, in 2017, fossil fuel generation slightly increased, mainly due to a decrease in nuclear generation and hydro generation.

Figure 10: Share of fossil fuels' energy net generation in 2017

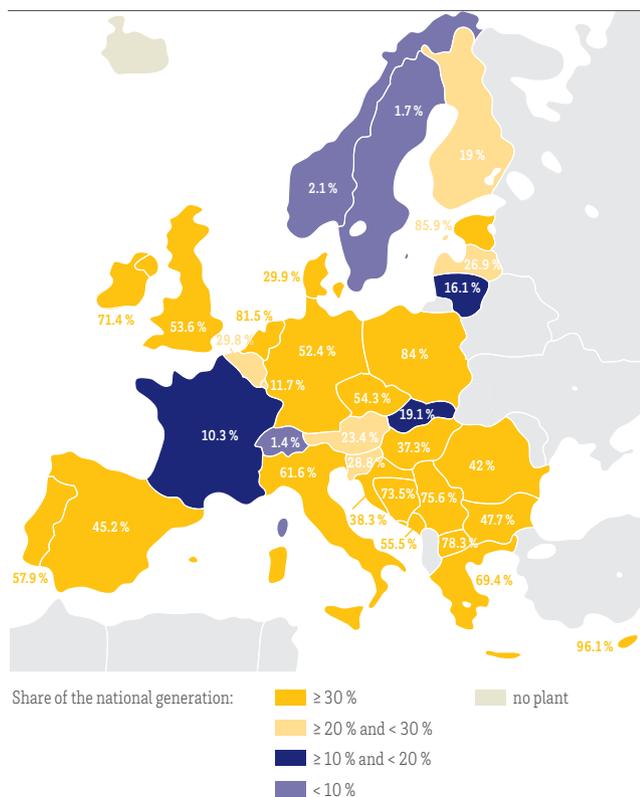
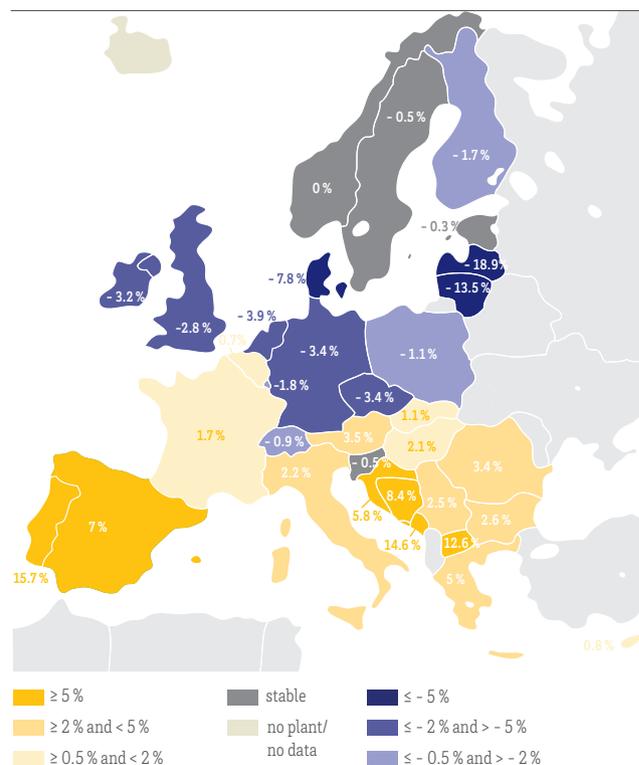


Figure 11: Evolution of fossil fuels' energy net generation by percentage point



## WIND ENERGY

Wind energy net generation increased by 17.3% compared to 2016. The evolution of electricity generated from wind is influenced by:

- | The evolution of capacities, which are generally increasing. Indeed, in 2017, wind NGC reached 167 GW (+ 9.8% compared to 2016)
- | The weather conditions of a specific year and country. Overall, 2017 saw favourable wind conditions.

Figure 12: Share of wind energy net generation in 2017

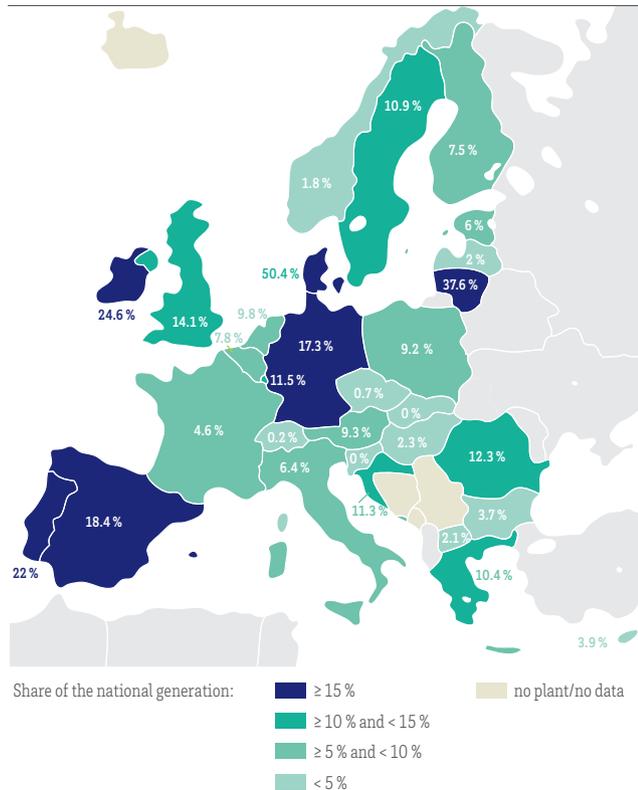
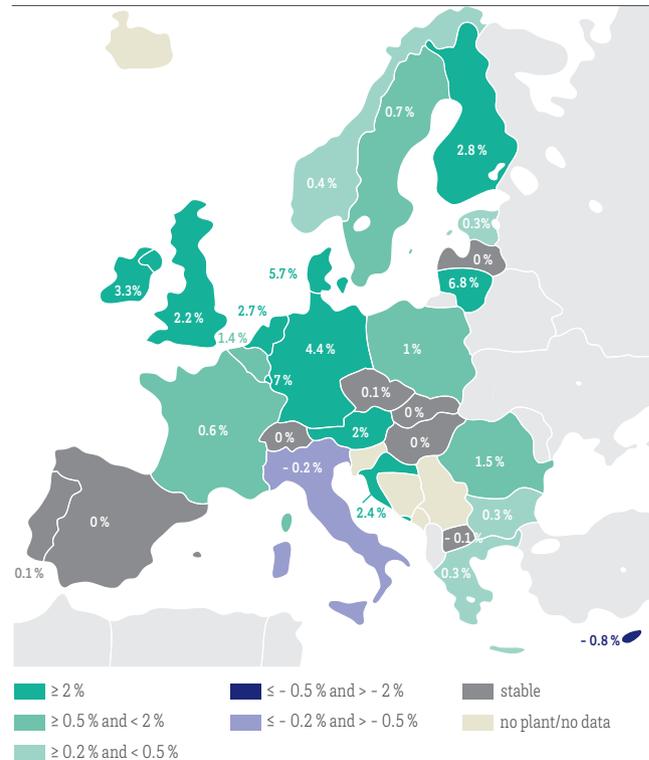


Figure 13: Evolution of wind energy net generation by percentage point



## SOLAR ENERGY

Similar to wind power, the growth of solar energy (+6.1%) depends on the evolution of net generating capacity (+6.4%), and weather conditions.

Figure 14: Share of solar energy net generation in 2017

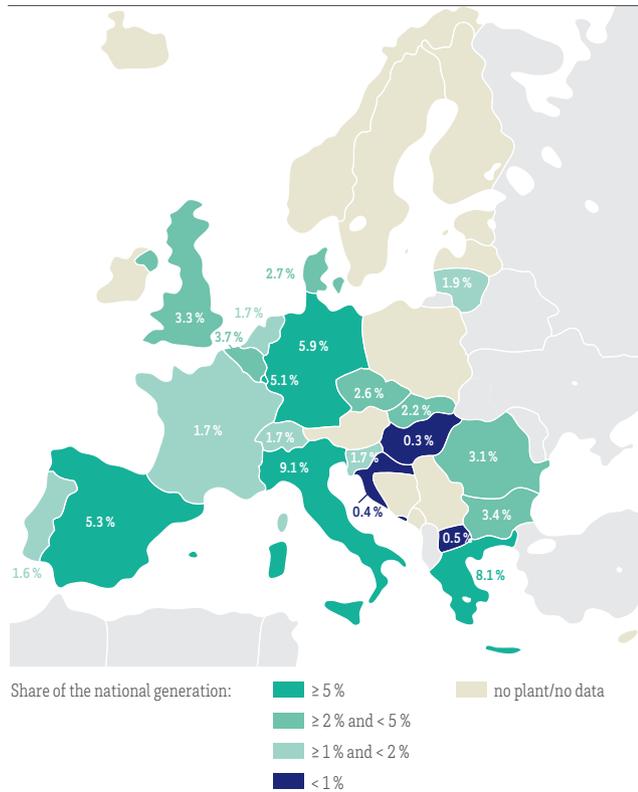
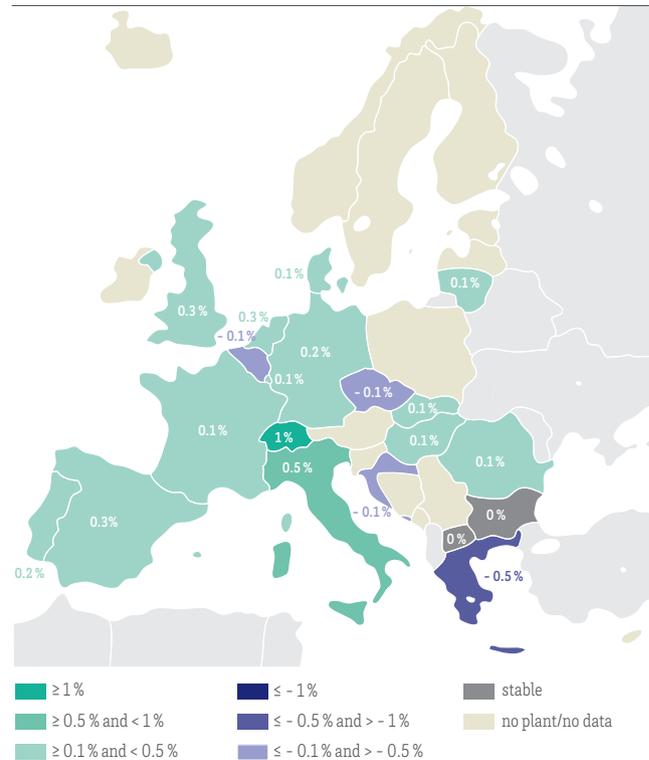


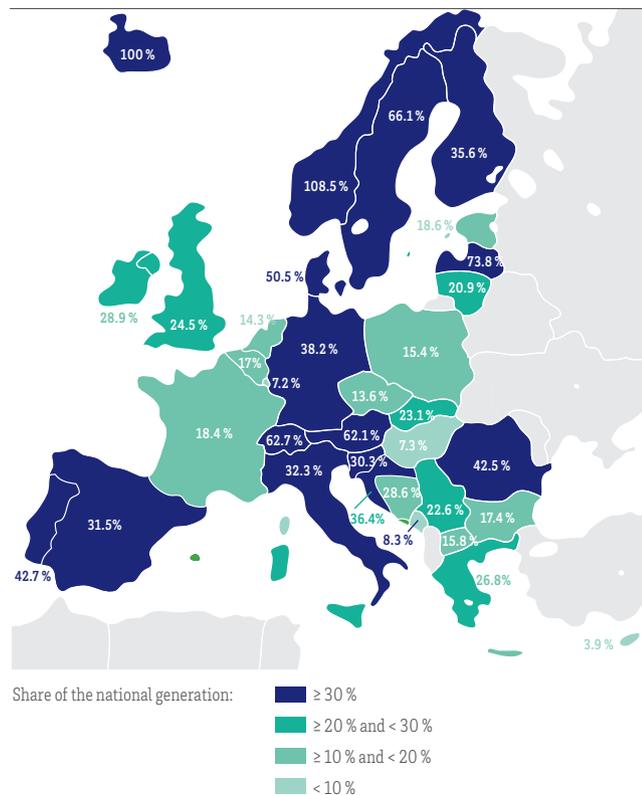
Figure 15: Evolution of solar energy net generation by percentage point



## Share of consumption covered by renewable generation

34.1% of the overall consumption is covered by renewable generation. Without hydraulic generation, renewable generation represents 19.1% of total consumption.

Figure 16: Share of consumption covered by renewable generation in 2017



# 4 EXCHANGES

## Exchange balances per country

The exchange balance of a country can fluctuate from year to year, linked to border capacities, market coupling and price influences, even if some countries are structurally importing or exporting.

The balance of electricity exchanges is the balance between the electricity physically flowing in and out of a country. It equates to the balance of commercial transactions of each country (exports minus imports).

However, in an interconnected system where electricity disperses through various paths, the electricity physical flow through a specific border between two countries usually differ from the commercial electricity transactions between these two countries. Summing up net balances separately, whether positive or negative, gives the amount of net exports and imports of the country. Exports and imports can be driven by market conditions or adequacy needs.

Figure 17: Exchange balances in 2017

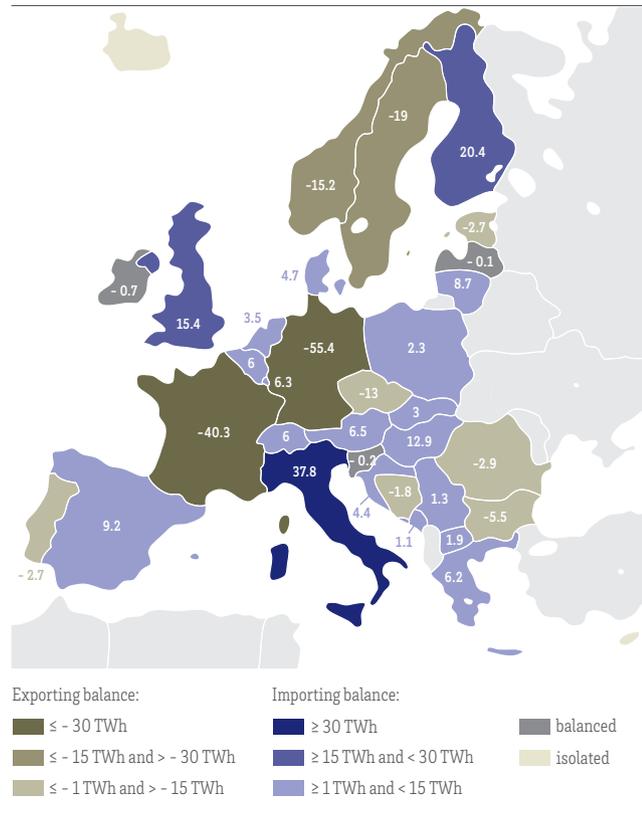
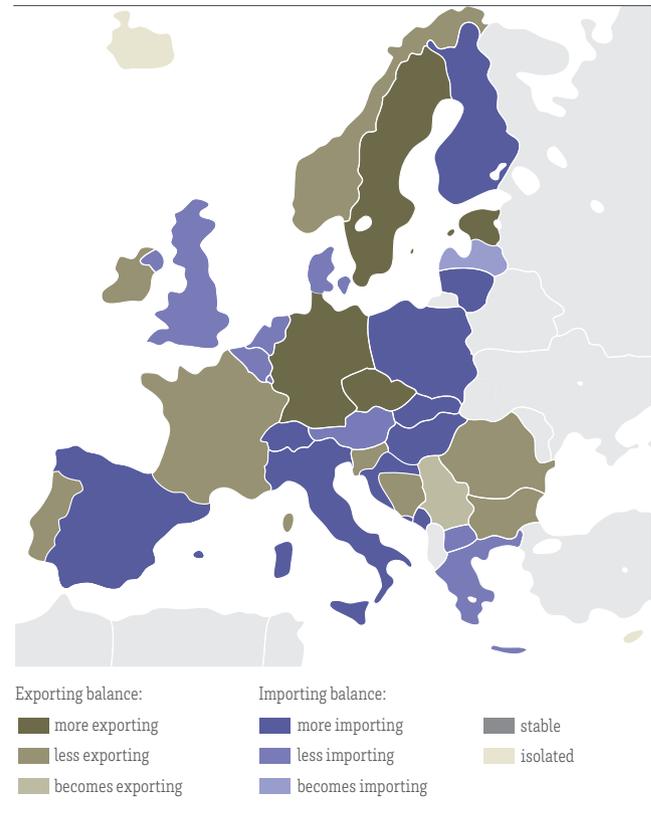


Figure 18: Evolution of exchange balances between 2016 and 2017

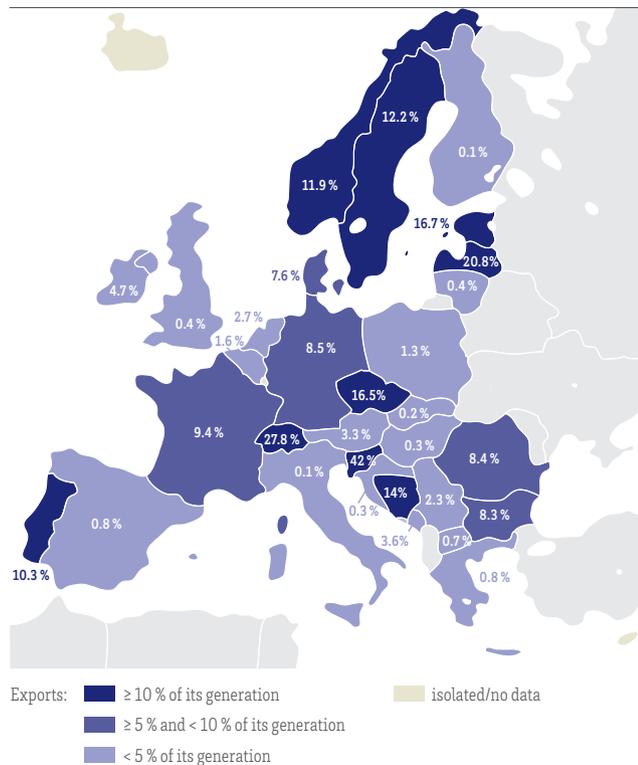


## Exported generation

In 2017, nine countries within the ENTSO-E perimeter exported more than 10% of their annual national generation to neighbouring countries.

Figures 19 and 20 are based on 'net exports' and 'net imports' calculations, excluding transit and loop flows. Net balance of exchanges per country are calculated on an hourly basis.

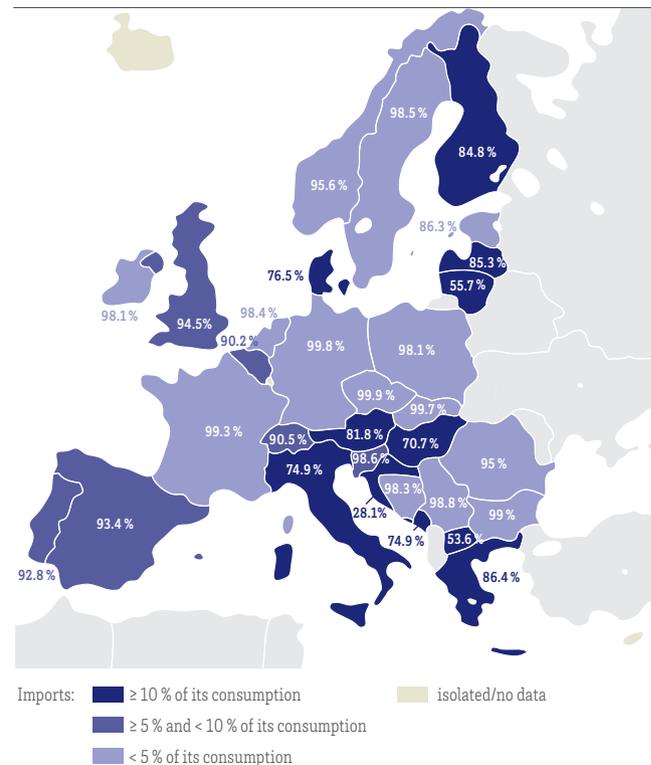
Figure 19: Share of yearly generation exported



## Imported generation

In 2017, 11 ENTSO-E countries imported more than 10% of their annual internal consumption needs from other ENTSO-E countries.

Figure 20: Share of yearly consumption covered by national generation



## Appendix: Data sources and references

### SOURCE OF DATA

All data are provided by ENTSO-E's member TSOs. Data for 2017 are taken from ENTSO-E's monthly statistics, whereas data from 2016 are based on ENTSO-E's yearly statistics. Data used for consumption, generation and exchange balance figures in chapters 2, 3 and 4.1 are taken from ENTSO-E's data portal: [www.entsoe.eu/data/data-portal/](http://www.entsoe.eu/data/data-portal/)

Data used for 'net export' and 'net import' calculations in chapters 4.2 and 4.3 are taken from the ENTSO-E Transparency Platform: [transparency.entsoe.eu/](http://transparency.entsoe.eu/)

### OTHER RELATED ENTSO-E PUBLICATIONS

Monthly statistics: [www.entsoe.eu/publications/statistics/monthly-statistics/](http://www.entsoe.eu/publications/statistics/monthly-statistics/)

Statistical Factsheet: [www.entsoe.eu/publications/general-publications/memo-entso-e-facts-figures/](http://www.entsoe.eu/publications/general-publications/memo-entso-e-facts-figures/)

Yearly Statistics & Adequacy Retrospect (YS&AR): [www.entsoe.eu/publications/statistics/statistical-yearbooks/](http://www.entsoe.eu/publications/statistics/statistical-yearbooks/)

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ENTSO-E, the European Network of Transmission System Operators for Electricity, represents 43 electricity transmission system operators (TSOs) from 36 countries across Europe. ENTSO-E was established and given legal mandates by the EU's Third Legislative Package for the Internal Energy Market in 2009.

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