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Renewable Energy Sources Development in the Czech Republic and Central Europe

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- EU27 Situation: Targets and Reality
- CE Countries: Targets and Reality
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EU27 Situation

- Renewable Energy Directive 2009/28/EC
  - part of EU 2020 Energy Strategy from 2010
  - 20% share of energy from renewable sources by 2020
  - 10% share of energy from renewable sources in transport by 2020
  - to achieve a 20% improvement in energy efficiency by 2020
  - mandatory national targets

- National targets for CE countries
  - Czech Republic 13% (6.1% in 2005) own target 14% (revised in 2013)
  - Slovak Republic 14% (6.7% in 2005)
  - Poland 15% (7.2% in 2005)
  - Austria 34% (23.3% in 2005)
  - Hungary 13% (4.3% in 2005) own target 14.65%
  - Germany 18% (5.8% in 2005)

EU27 Situation

- In 2017 renewable energy represented 17.5 % of energy consumed in the EU
- National targets for CE countries‘ share of RES on gross final energy consumption in 2019
  - Czech Republic 13% (6.1% in 2005) 15.2%
  - Slovak Republic 14% (6.7% in 2005) 16.9%
  - Poland 15% (7.2% in 2005) 12.2%
  - Austria 34% (23.3% in 2005) 33.6%
  - Hungary 13% (4.3% in 2005) 12.6%
  - Germany 18% (5.8% in 2005) 17.4%
- How many countries will fail to comply with the Directive?

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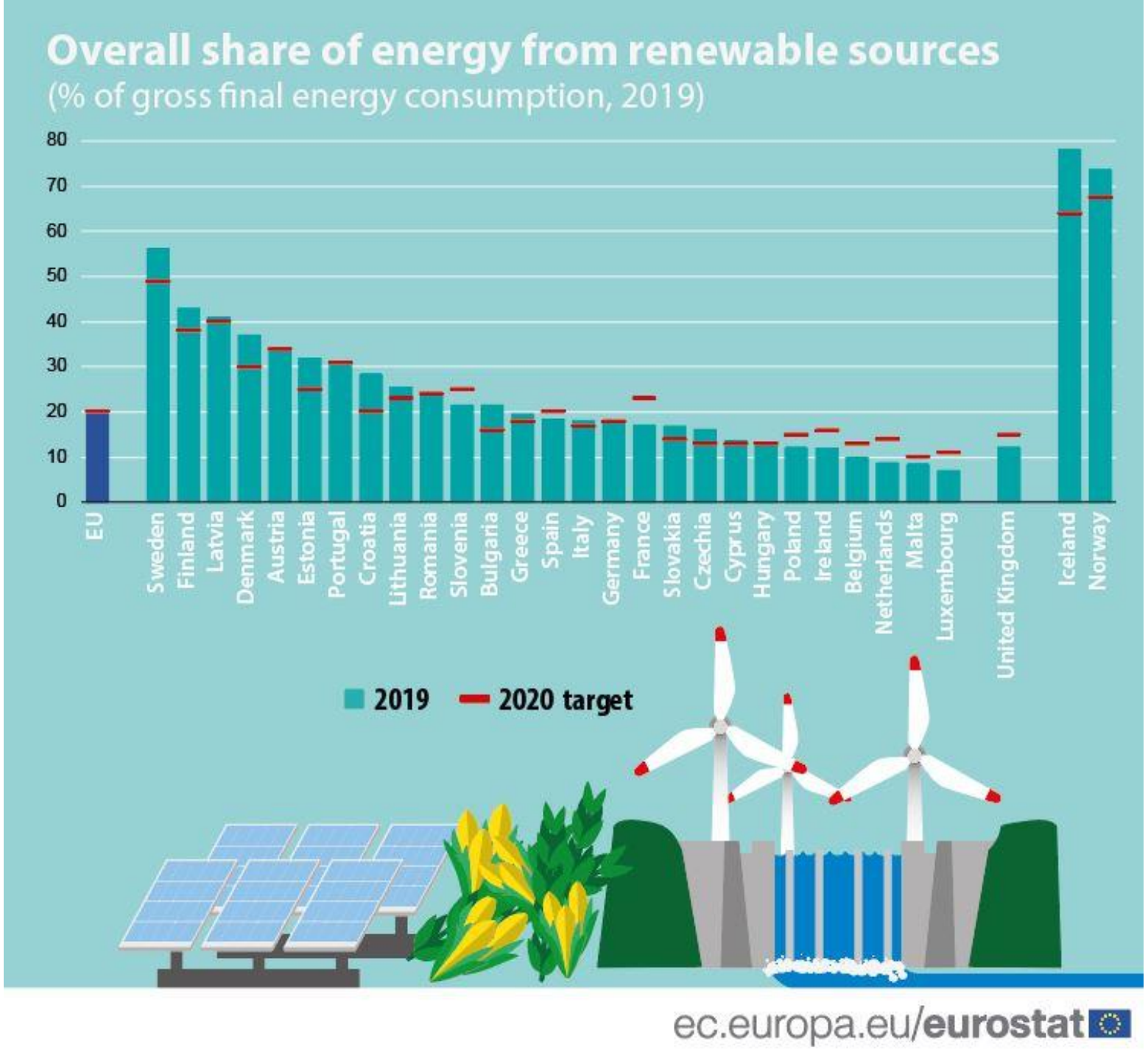

January 2021 data

Source: Eurostat

https://ec.europa.eu/eurostat/statistics-explained/

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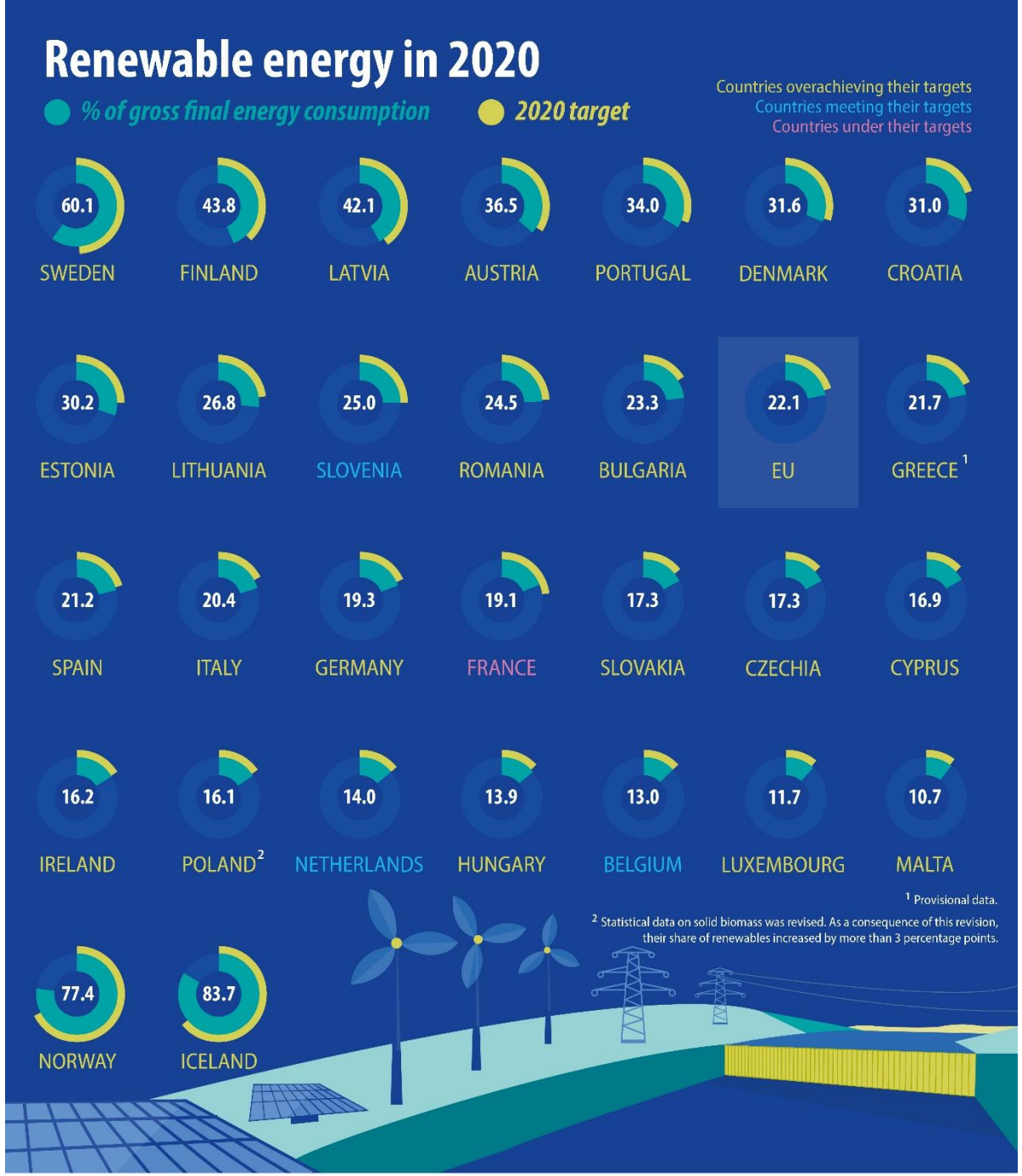

January 2022 data

Source: Eurostat

https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Renewable_energy_statistics

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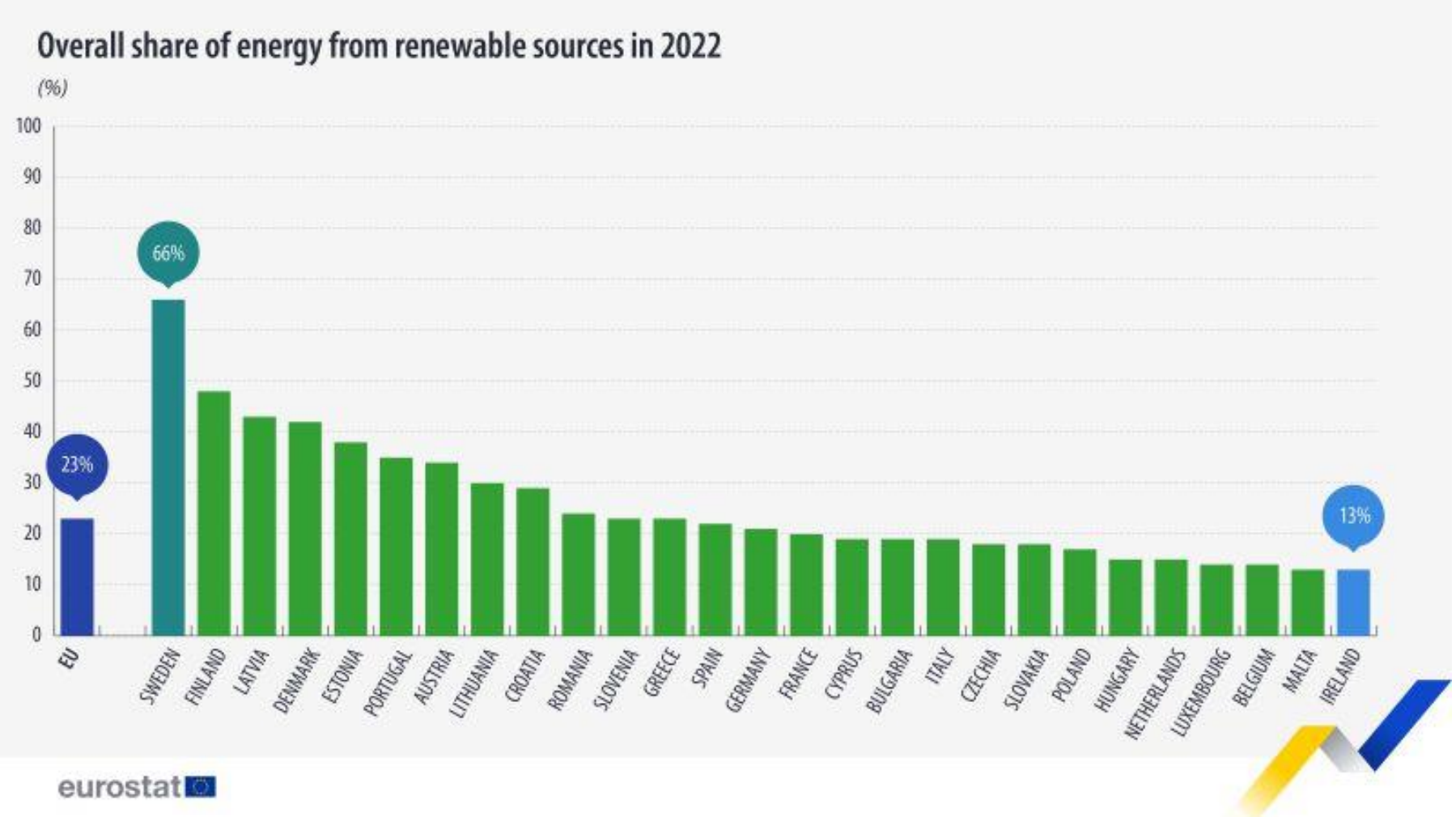
EU27 Situation



December 2023 data

Source: Eurostat

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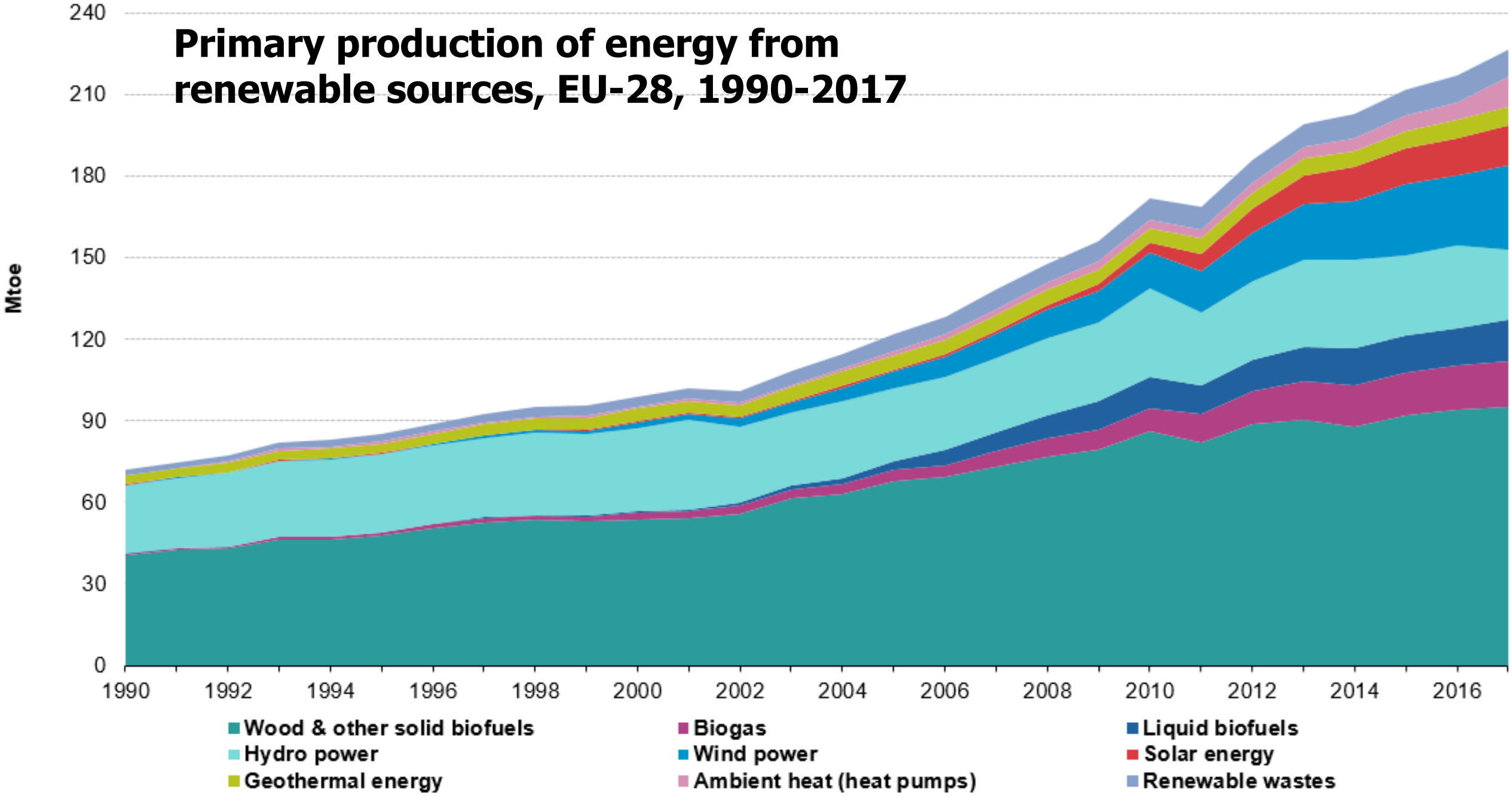
Primary production of energy from renewable sources, EU-28, 1990-2017



EU27 Situation

- However, the gross inland energy consumption of RES is relatively low:
  - Czech Republic 10.5% (of which biofuels 9.2%)
  - Slovak Republic 9.2% (of which biofuels 6.7%)
  - Poland 8.5% (of which biofuels 6.9%)
  - Austria 28.9% (of which biofuels 16.1% and hydro 9.6%)
  - Hungary 11.1% (of which biofuels 10%)
  - Germany 13.3% (of which biofuels 8.2% and wind 2.8%)
- The rise mainly covered by **biofuels and bioliquids**

- (The difference between **gross inland energy consumption** and **gross (energy) consumption** is that in gross energy consumption the **transformation output** (electricity or heat produced from other energy sources) **is included**. Therefore, gross energy consumption is a product-specific consumption and does not reflect the demand for primary energy.)
- **Gross inland energy consumption** is primary energy production plus recovered energy products, imports and stock change, less exports and fuel supply to maritime bunkers (for seagoing ships of all flags). It therefore reflects the energy necessary to satisfy inland consumption within the limits of national territory.

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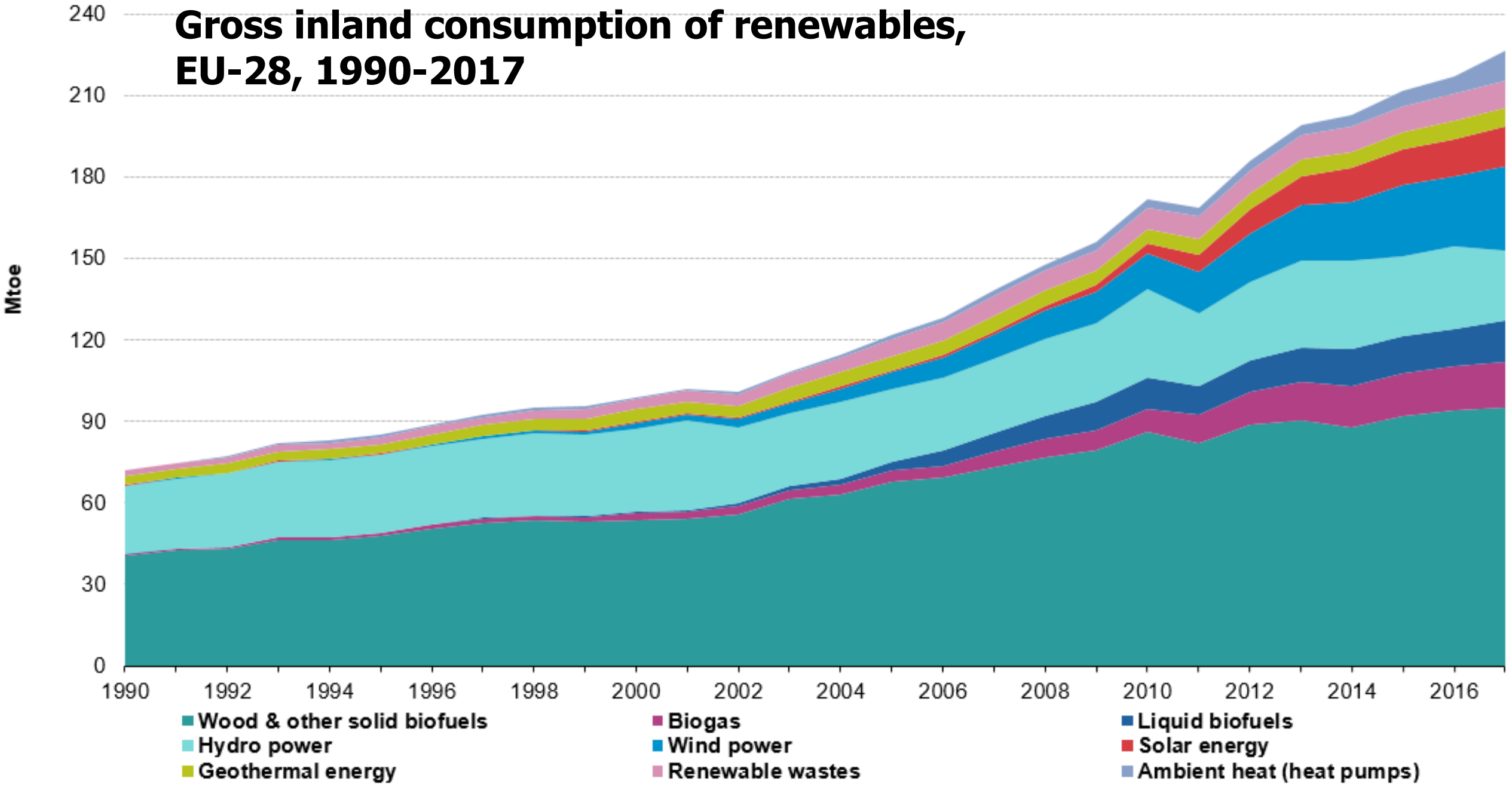
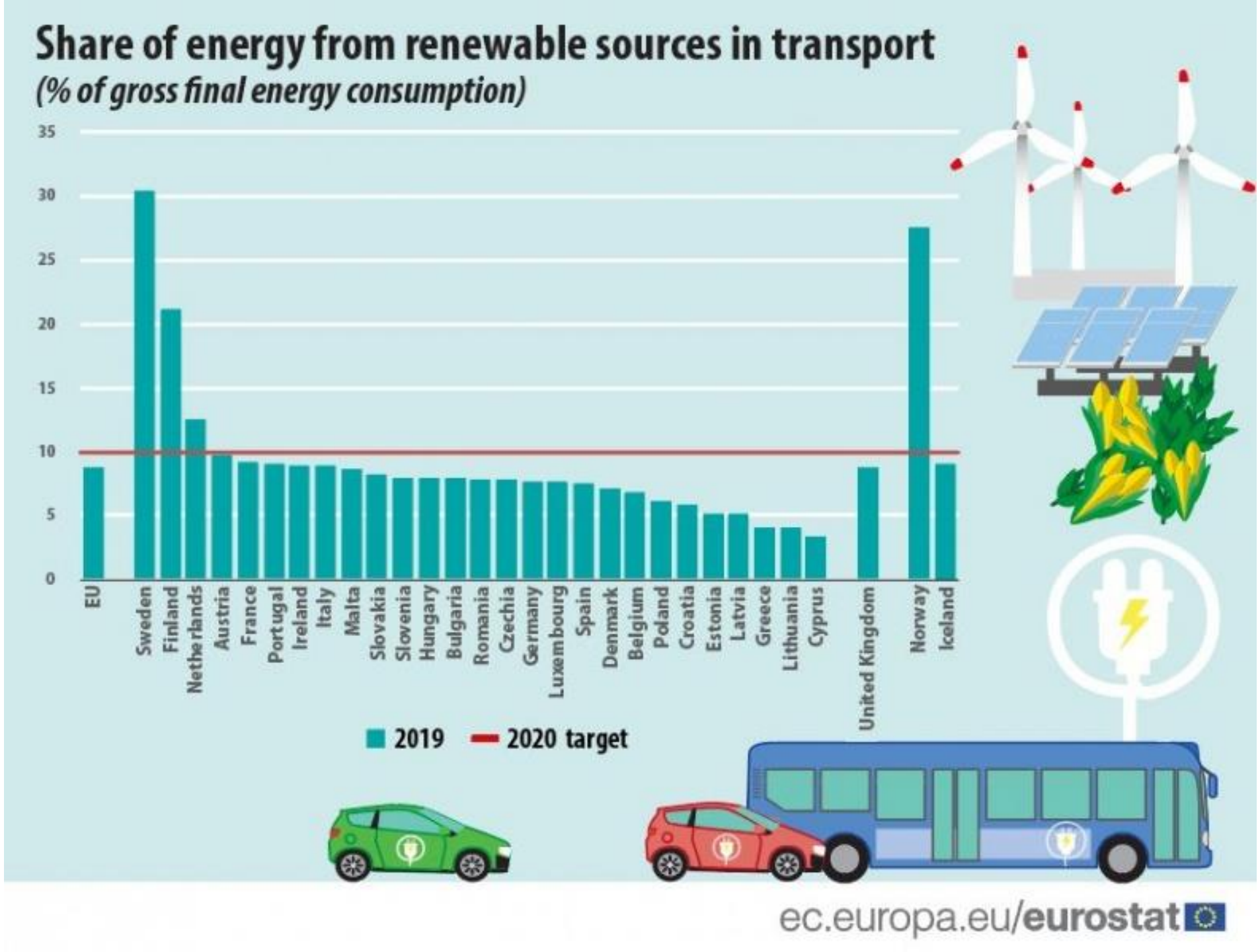
Gross inland consumption of renewables, EU-28, 1990-2017



EU27 Situation

- The share of energy from RES used in transport activities reached 8.9 % in 2019
  - Czech Republic 7.8%
  - Slovak Republic 8.3%
  - Poland 6.1%
  - Austria 9.8%
  - Hungary 8.0%
  - Germany 7.7%

- How many countries will fail to comply with the Directive?



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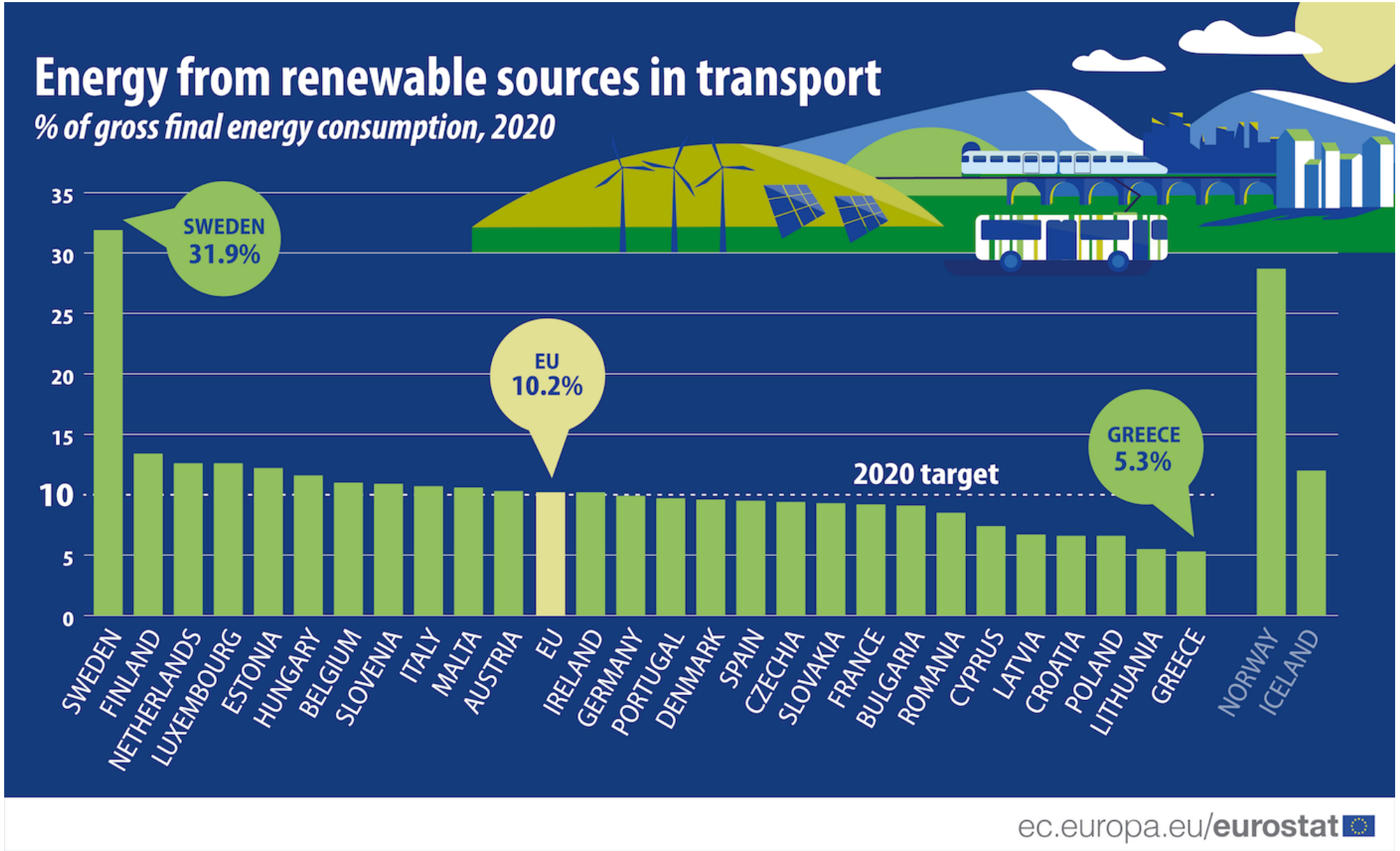

January 2022 data

Source: Eurostat

https://ec.europa.eu/eurostat/en/web/products-eurostat-news/-/ddn-20220202-2

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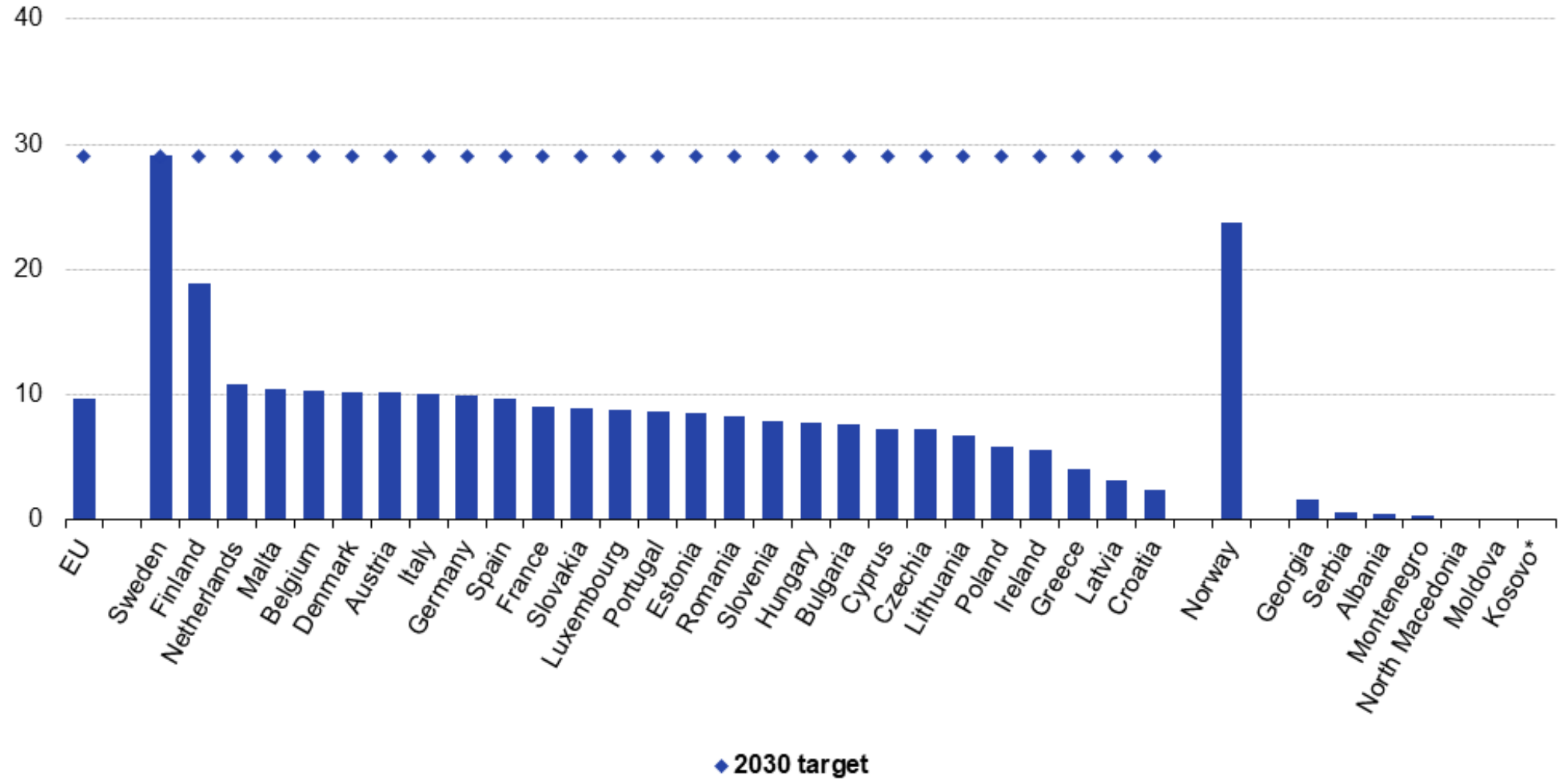
Share of energy from renewable sources in transport, 2022 (%)



* This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo declaration of independence.

Source: Eurostat (online data code: nrg_ind_ren)

eurostat

December 2023 data

Source: Eurostat

https://ec.europa.eu/eurostat/en/web/products-eurostat-news/-/ddn-20220202-2

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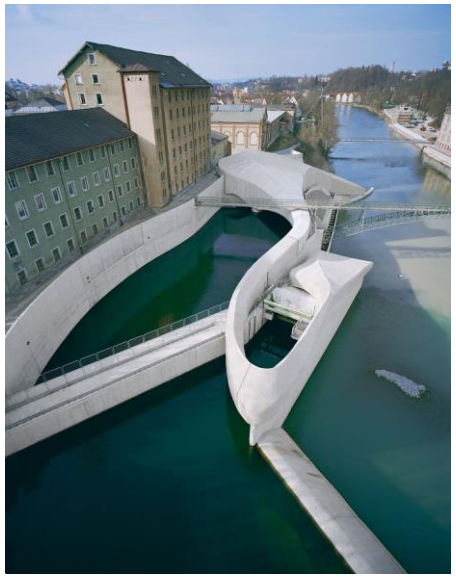
EU27 Situation

- Electricity generation
  - In 2019, electricity generation from renewable sources contributed more than one quarter (34 %) to total EU-28 gross electricity consumption
  - Wind power is for the first time the most important source, followed closely by hydro power



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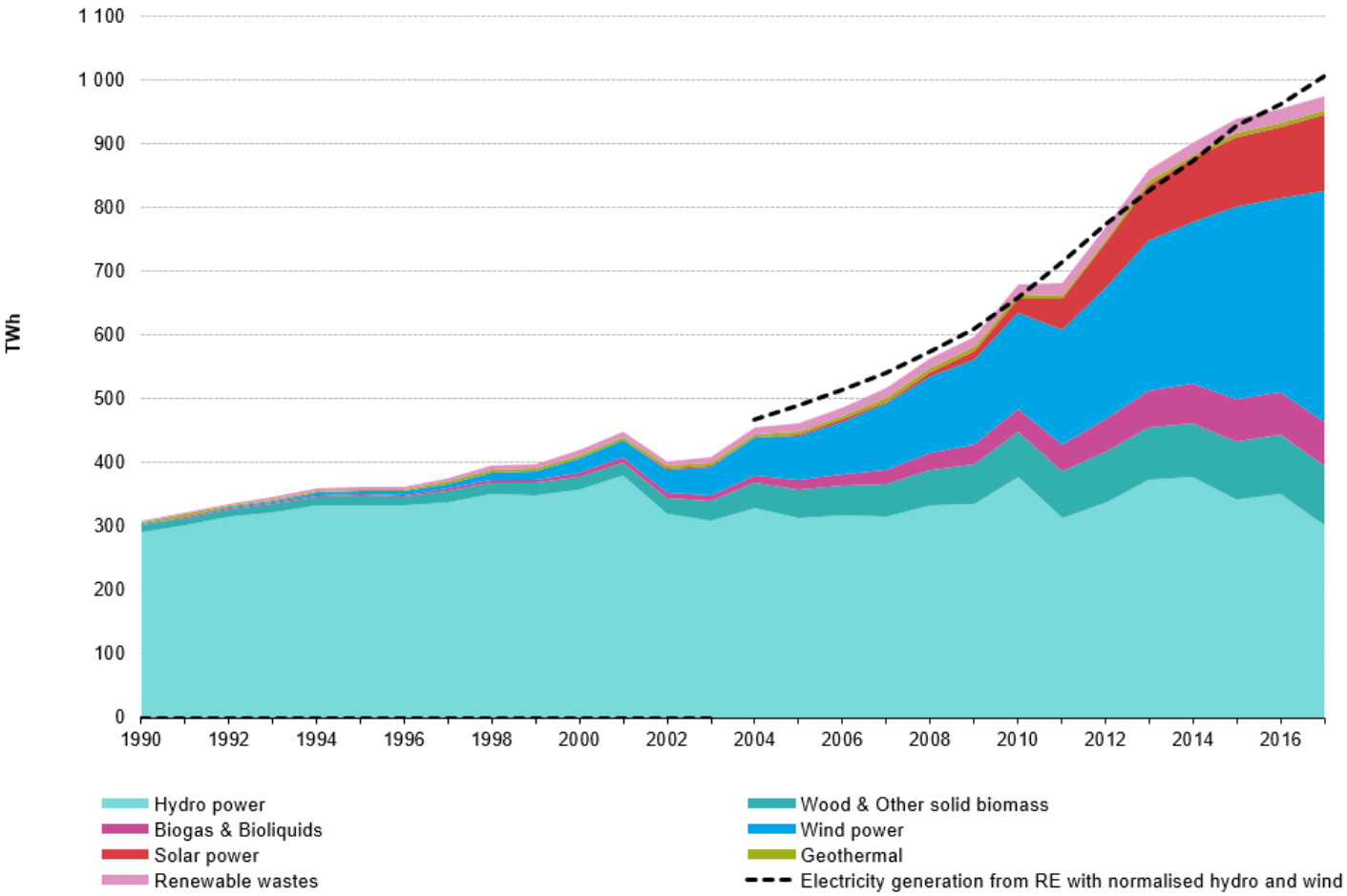
Gross electricity generation from renewable sources, EU-28, 1990-2017



January 2021 data

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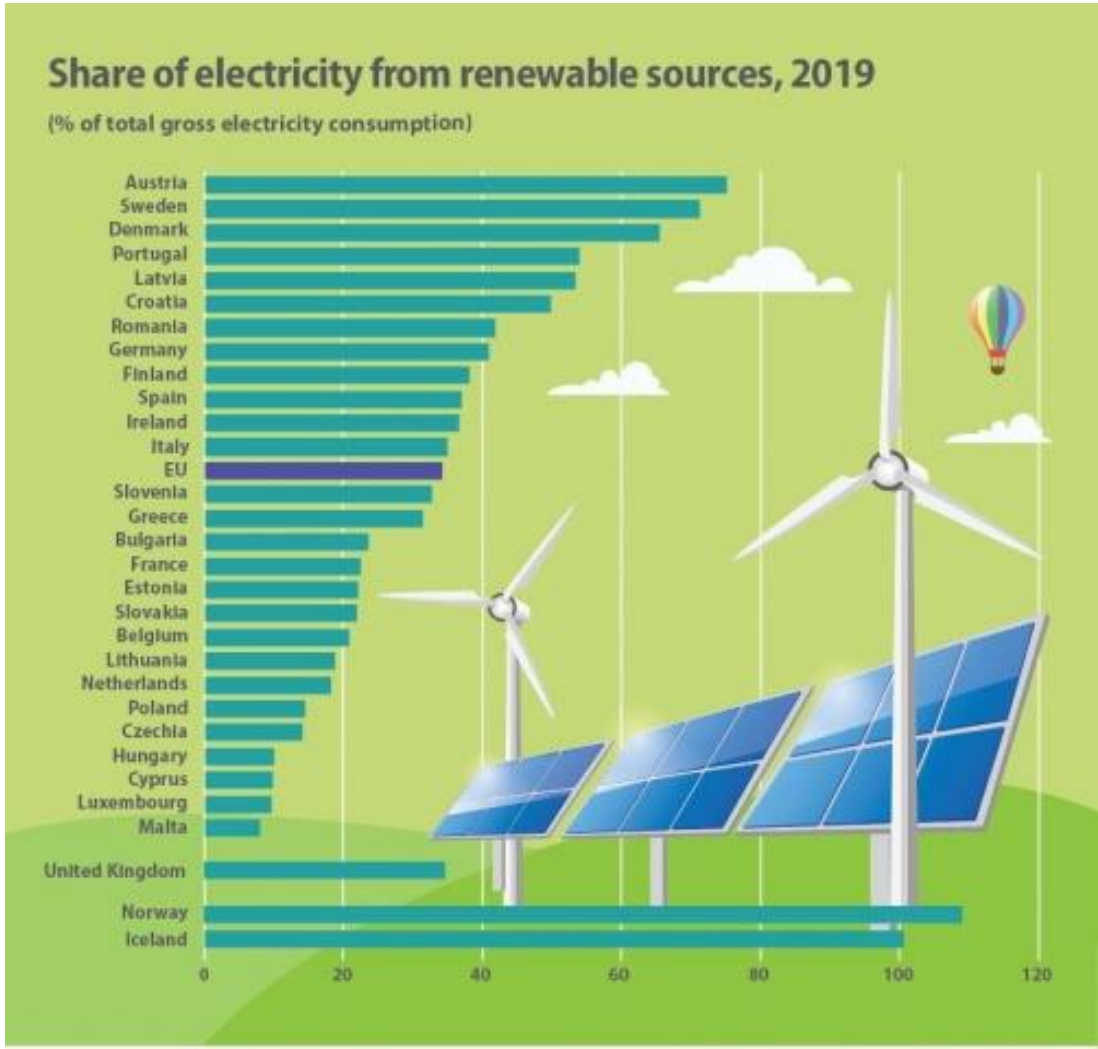

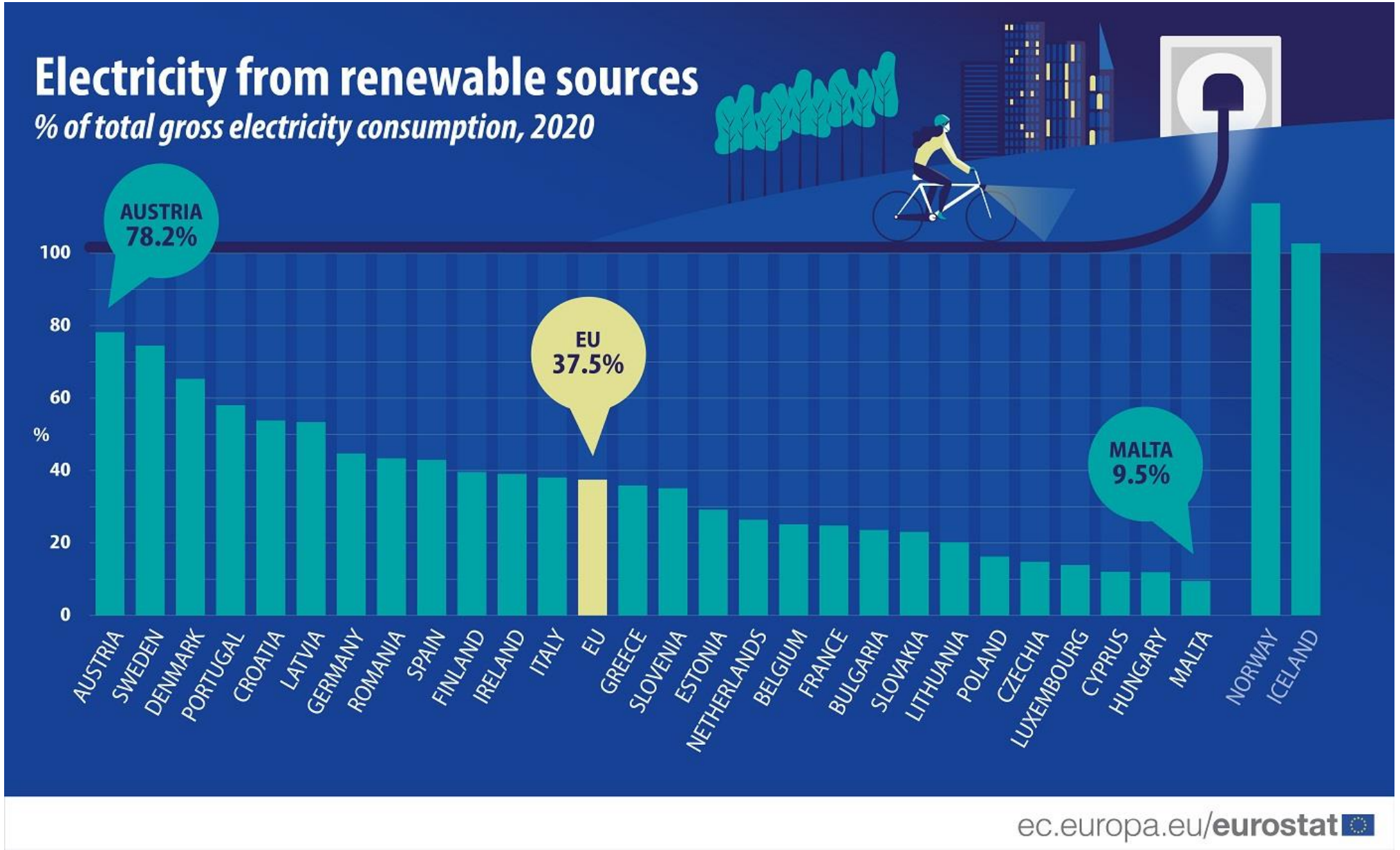

January 2022 data

Source: Eurostat

https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Renewable_energy_statistics#Share_of_renewable_energy_more_than_doubled_between_2004_and_2020

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RES Development Experience in CE (V4)

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Czech Republic

Obligations Resulting from Membership in International Organizations		
	Obligation	**Obligation as Amended by**
1.	Reduction in greenhouse gas emissions by 8% by 2012.	Kyoto Protocol (1997) 2005
2.	A greater renewable energy share in gross final consumption, reaching a level of 8% by 2010 and a level of 15% by 2030.	EU Accession Agreement (Athens, April 16, 2003)
3.	A greater renewable energy share in gross final consumption, reaching a level of 13% by 2020.	Directive of the European Parliament and of the Council 2009/28/EC
4.	Reaching a renewable energy share of 10% in all sorts of transportation displayed in gross final energy consumption in transportation in the Czech Republic by 2020.	Directive of the European Parliament and of the Council 2009/28/EC
5.	Emissions from sectors not covered by the EU ETS will not exceed 2005 levels + 9% by 2020.	EU Climate and Energy Package 2009
6.	The main aim is to hold the increase in the global average temperature to well below 2°C ideally to 1.5 °C) above pre-industrial levels.	The Paris Agreement (UNFCCC) 2016
7.	A greater renewable energy share in gross final consumption, reaching an overall target of 32% by 2030 for the EU as a whole (20.8% for the Czech Republic, see below).	The EU Winter Package - Directive (EU) 2018/2001 on the Promotion of the Use of Energy from Renewable Sources & The Regulation on the Governance of the Energy Union and Climate Action
Source: T. Vlček and E. Trmalová from publicly available sources		

Czech Republic

- Act No. **180/2005** Coll. pioneered the term ‘green bonus’
- operators of the regional distribution systems the transmission system were required “to purchase all electricity from renewable sources“
- responsibility was put on CEPS for maintaining the stability of the network in the event of unstable production of electricity from renewables

Tab. 7.4: Scenario of Renewable Energy Share in Final Energy Consumption According to the National Renewable Energy Action Plan of the Czech Republic

Year	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Share (%)	6.1	6.2	7.0	7.0	7.4	8.3	*9.4*	*10.,1*
Year	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Share (%)	*10.8*	*11.3*	*11.8*	*12.1*	*12.5*	*12.9*	*13.2*	*13.5*

Note: data in italics are figures planned according to the Scenario, while other figures represent actual levels.
Source: The Ministry of Industry and Trade, 2010d, p. 88.

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Czech Republic

- The system of state promotion of renewables was set so generously that, for example, the target of 1,695 MWe of installed capacity in photovoltaic power plants, which the Czech National Renewable Energy Action Plan set for 2020, has been exceeded already in 2010.
- While in 2005 the purchase price of electricity from photovoltaic power plants was 6.04 CZK/kWh, the Energy Regulatory Office more than doubled this value in 2006, to 13.2 CZK/kWh (which is about twelve times the market price of electricity)

Installed Capacity of Photovoltaic Power Plants in the Czech Electrification System (MW)														
Year	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Inst. capacity	0.13	0.13	0.74	3.4	39	465	1,959	1,971	2,086	2,132	2,067	2,075	2,068	2,069
Source: Energetický regulační úřad 2018, p. 25 (note: data for 2004-2007 are from the previous reports)														

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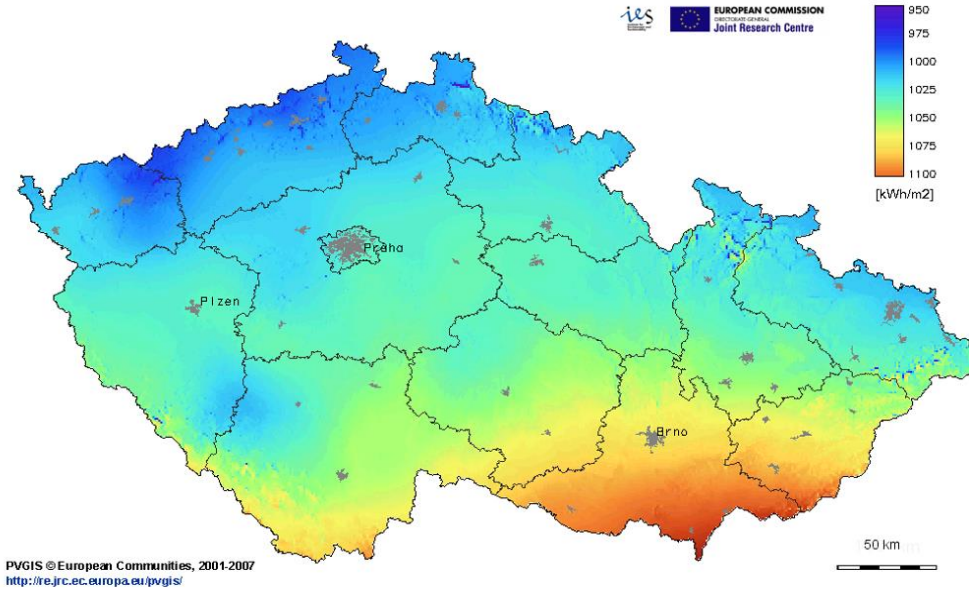
Czech Republic

- **Renewable Energy Crisis**
- erupted on February 16, 2010, when the distribution companies met the request of CEPS and stopped the approval of applications for installation of new photovoltaic and wind power plants into the network
- It lasted until September 2011, and than again from January 2012 until the end of the year in Southern Bohemia and Southern Moravia
- November and December 2010 – amendments No. 330/2010 and No. 402/2010 to the Act180/2005 Coll. (in force from 2011)
  - State will support only those PVE connected to the distribution grid
  - Solar farms will be cut of support (support of PVE of 30 kWp maximum)
  - PVE installed on rooftops and buildings will be supported only
  - Retroactive solar tax of 26% for all PVE launched in 2009 and 2010 (not for 30kWp PVE on rooftops)
  - Purchase price for electricity from RES set at 7.5 CZK/kWh
  - Temporary solutions

Czech Republic

- new Act No. **165/2012** Coll. On supported energy sources (in force from 2013)
  - closely tied to Directive 2009/28/EC and the National Renewable Energy Action Plan
  - even though Directive 2009/28/EC understands the levels of the National Action Plan as minimum, the new Act understands them as maximum
  - these levels are calculated every year not only for the entire Czech Republic, but for single regions as well



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Czech Republic

The development of contribution to the RES, CHEP and DS for end consumers (CZK per 1 MWh)							
2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
52,18	166,34	370,00	419,22	583,00	495,00	495,00	495,00

Share of price components for electricity supply to households in 2010 and 2014		
Electricity incl. margin	42,27 %	30 %
Market operator	0,12 %	0,2 %
System services of ČEPS	**3,94 %**	**2 %**
Renewables, cogeneration and decentralized sources	**4,41 %**	**10 %**
Electricity distribution and transport	**31,86 %**	**40,2 %**
Ecological tax	0,72 %	0,6 %
VAT	16,67 %	17 %
Source: Energetický regulační úřad		

- the amendments and the new act contributed to the stabilization of the renewable sector
  - the price to be paid is high
  - a rough suspension of the sector and a significant change of terms led to the bankruptcy of tens of companies trading with photovoltaic technologies, while the state is financially burdened with support to decentralized production and renewables for the next tens of years
  - renewables were depreciated in the public eyes to a great measure
- What was the effect, can we speak of positives figures in RES?

Czech energy sector

Installed Capacity and Gross Electricity Production in the Czech Electricity Grid on December 31, 2020				
Type of Power Station	Installed Capacity (MWe)	Percentage (%)	Electricity Production (GWh)	Percentage (%)
Thermal	10,058.3	47.1	35,197.6	43.2
Gas Combined Cycle	1,363.5	6.4	6,041.3	7.4
Gas Fired	962.2	4.5	3,790,1	4.7
Hydropower	1,093.9	5.1	2,143.9	2.6
Pumped-storage Hydropower	1,171.5	5.5	1,293.1	1.6
Nuclear	4,290.0	20.1	30,043.3	36.9
Wind	339.4	1.6	699.1	0.9
Photovoltaic	2,071.3	9.7	2,235.1	2.7
Geothermal Power	0	0	0	0
Total	21,350.3	100	81,443.4 (gross) 76,126.2 (net)	100 93.5
Source: Energetický regulační úřad				

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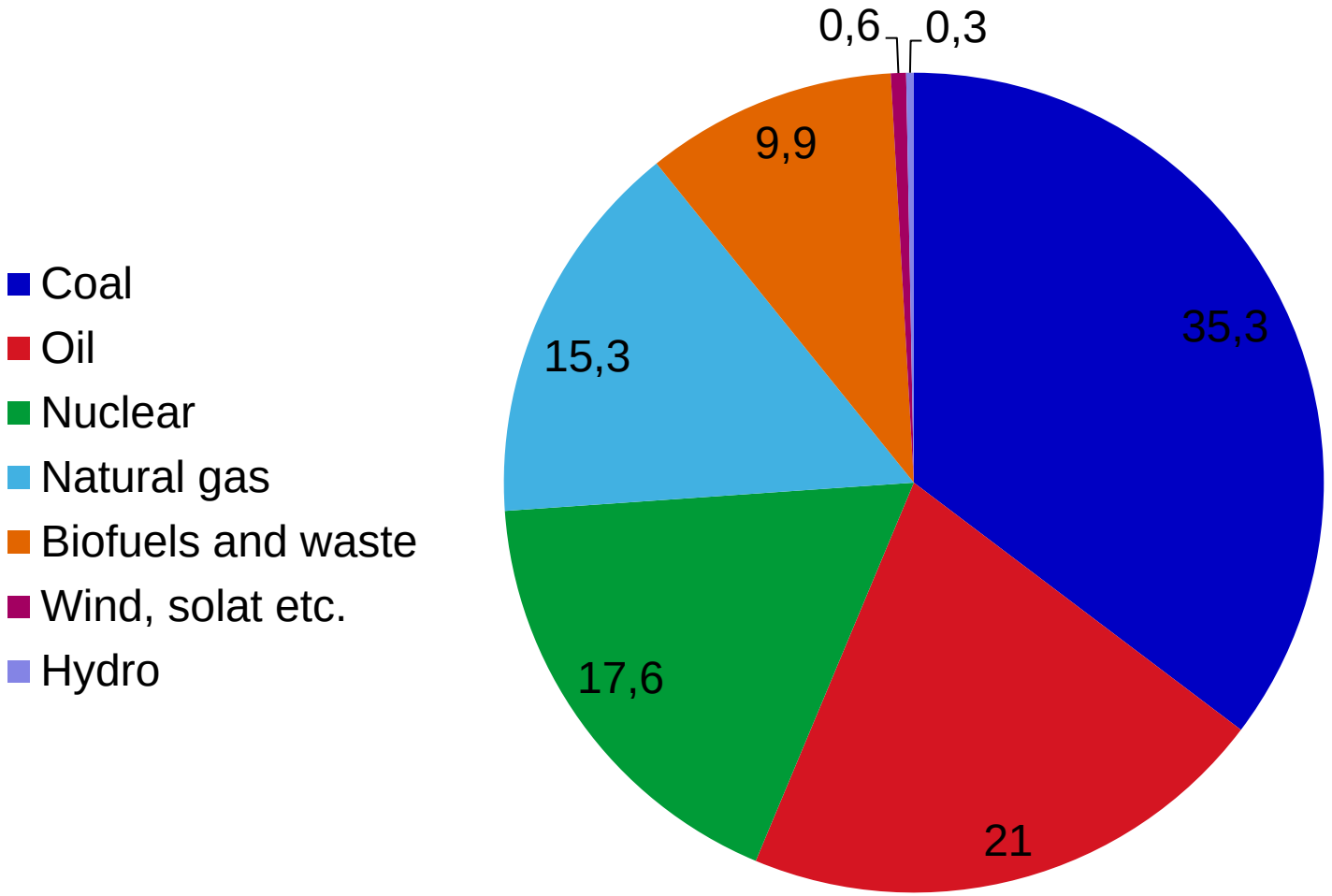
Czech Republic (TPES 2018)



Indicative Corridors for Czech Republic's Energy Sector in 2040			
Structure of Brutto Electricity Generation		**Structure of Energy Mix**	
Nuclear	46 – 58 %	**Nuclear**	25 – 33 %
RES and secondary sources	18 – 25 %	**RES and secondary sources**	17 – 22 %
Natural Gas	5 – 15 %	**Gaseous fuels**	18 – 25 %
Coal	11 – 21 %	**Solid fuels**	11 – 17 %
		Liquid fuels	14 – 17 %
Source: Ministerstvo průmyslu a obchodu, 2014, p. 44			

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Slovak Republic

- A greater renewable energy share in gross final consumption, reaching a level of 14% by 2020
  - Target to be reached mainly by traditional hydroenergy development
  - Primary understanding of RES was to diversify from dependence on Russia
- Act No.309/2009 Coll. on Supporting renewable sources of energy and highly effective combined production
  - Preferred connections of PVE and WE and purchases from the regional distribution grid operators
  - Surcharge („green bonus“)
  - Responsibility for stability put on regional distribution grid operators
  - Limitation of support for 30 kWp and 15 years

Slovak Republic

- Effect
  - unplanned solar boom as a result of generous FiTs in 2011
  - Act amendments
  - government cut back the subsidies out of concern for grid instability and thef inancial burden on final consumers
  - the size of solar installations qualified for subsidies was scaled back from 125 MW to 100 kW, and the FiT rates were nearly halved
  - subsidies for solar PV to only rooftop installations of at most 30 kW of capacity
  - high energy prices for end consumers
  - renewables have been associated with instability, high costs and intermittency
  - problem in capacity of electricity transmission lines and unfavorable natural conditions
  - New Act PI/2018/69 in process

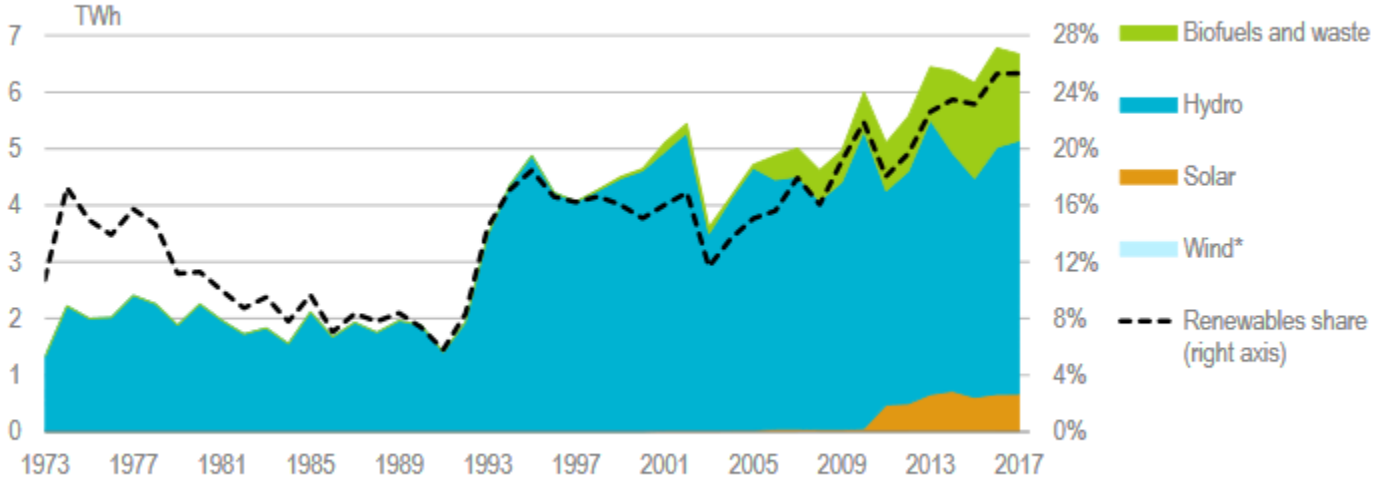
- Potential
  - Potential in hydroenergy development (55% potential in use)
  - Potential in biomass (developed agriculture and forestry – 40% of the country are forests)
  - PVE has potential, but is not likely to be substantially developed - National Grid Operator considers and defines it as" non-predictable RES" - more serious and difficult administrative procedures are applied
  - Geothermal energy fhas potential or heating due to geographical conditions

Slovak Republic

Source: Energy Policies of IEA Countries:

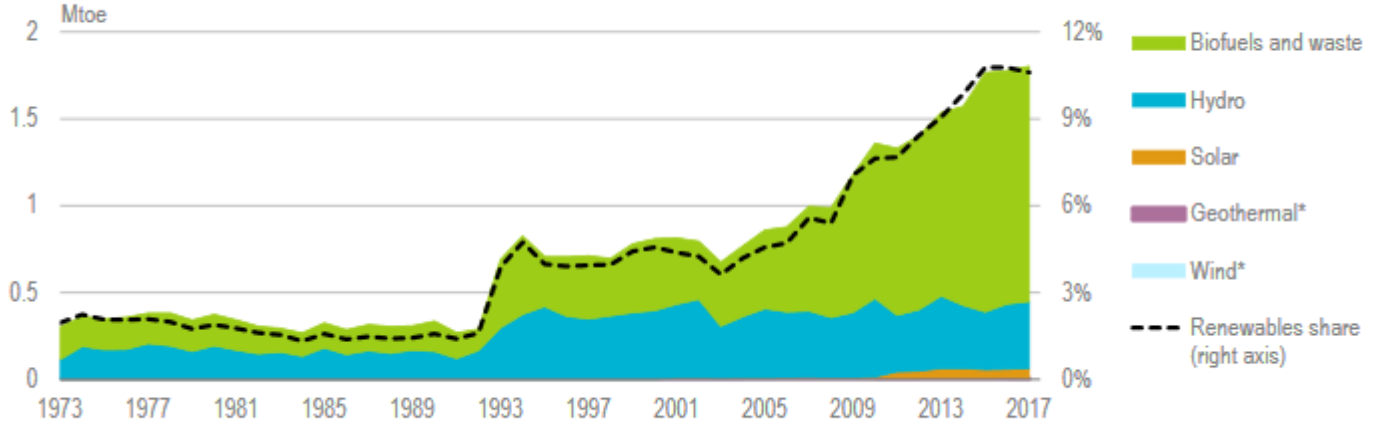
Slovak Republic 2018 Review

Figure 10.5 Renewable energy and waste in electricity generation, 1973-2017



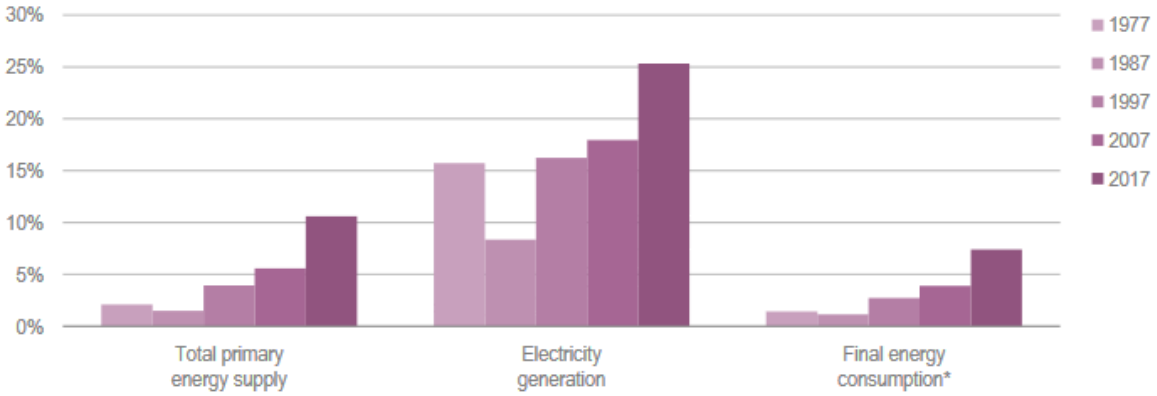
*Negligible.

Figure 10.2 Renewable energy and waste in TPES, 1973-2017



* Negligible.

Figure 10.1 Share of renewable energy in TPES, electricity and TFC, 1976-2016



*Latest data for final consumption are for 2016.

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Poland

- A greater renewable energy share in gross final consumption, reaching a level of 15% by 2020
  - Target to be reached mainly by biomass development
- Act of 20 February 2015 on Renewable Energy Sources ("RES Act")
  - support scheme based on an auction system
  - Ministry of Economy announces maximum prices for 1 MWh of RES-E 60 days before the first auction of each calendar year
  - The bidder offering the lowest price won the auction
  - the price remain unchanged for a period of 15 years
  - the winner or winners will be obliged to sell the declared amount of RES-E for that price even if the market price turns out to be higher
  - producers of electricity from renewable sources are exempt from the tax on the sale and consumption of electricity
  - For microinstallations the electricity distribution companies will be obliged to buy any surplus of energy produced with installed capacities of up to 40kW for 100% of the energy market average price in the past quarter

Poland

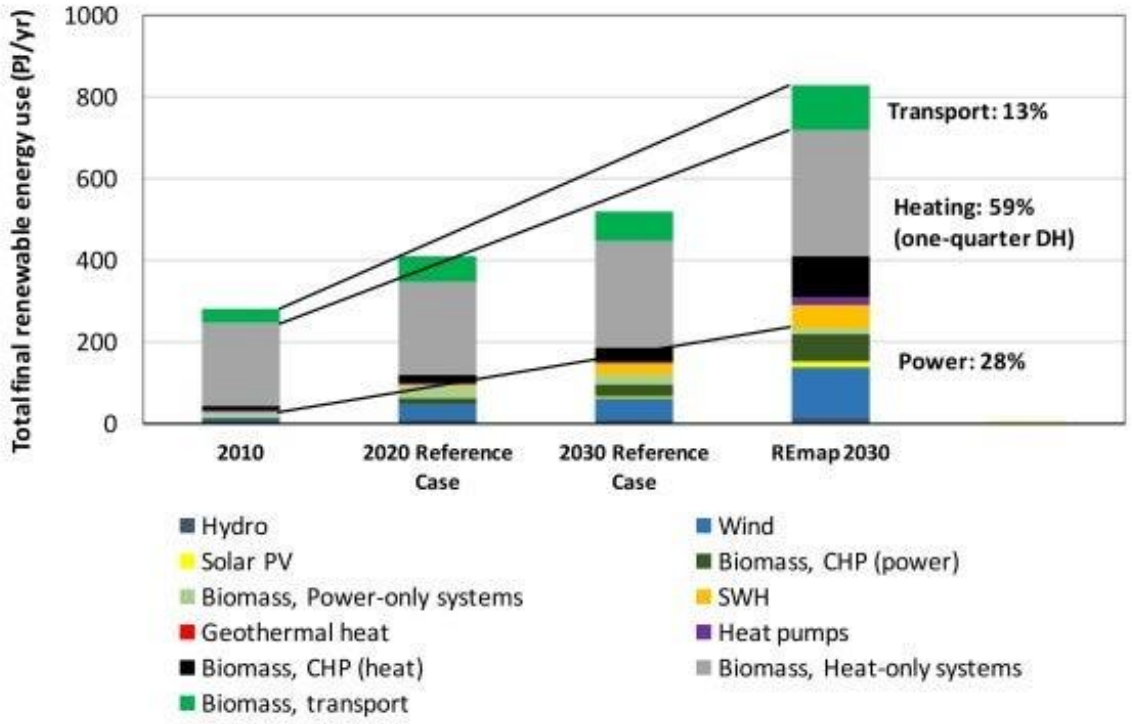
- Major Amendment from 20 February 2018
  - change in definitions
  - reform in the auction baskets and other elements
  - reform in volumes, FiTs (up to 50 kW) and FiPs (50-500 kW)

- RES will be divided into 5 independent baskets:
  - Basket I – RES installations using only non-agricultural biogas for electricity generation, and RES installations using biomass, bioliquid fuels (including dedicated biomass combustion installations, hybrid systems and dedicated multi-fuel combustion installations);
  - Basket II – installations using (i) only hydropower, (ii) only bioliquid fuels, (iii) only geothermal energy, (iv) only offshore wind energy for electricity generation;
  - Basket III – installation using only agricultural biogas for electricity generation;
  - Basket IV – installations using: (i) only onshore wind energy and (ii) only solar radiation for electricity generation;
  - Basket V – RES hybrid installations.

Poland

- Effect
  - certificate system have been used to encourage the production and use of RES
  - producing companies and suppliers must fulfill quota of RES
  - certificates are used to confirm the quota to the Energy Regulatory Office
  - it helped to develop wind energy
  - but certificates were issued in large quantities to co-firing biomass with coal in existing power plants
  - little effect on development of new technologies and the certificates themselves became unattractive to investors
  - biomass accounts for around 50% of RES electricity
  - Should Poland reach its EU obligations, it will be a short-lived victory, as soon as the TPPs retire, the biomass use will drop down considerably (IEA 2017, p. 103)

- Potential
  - Based on IRENA, if Poland updates grid, biomass and wind can be further developed to have 25% RES on energy consumption in 2030

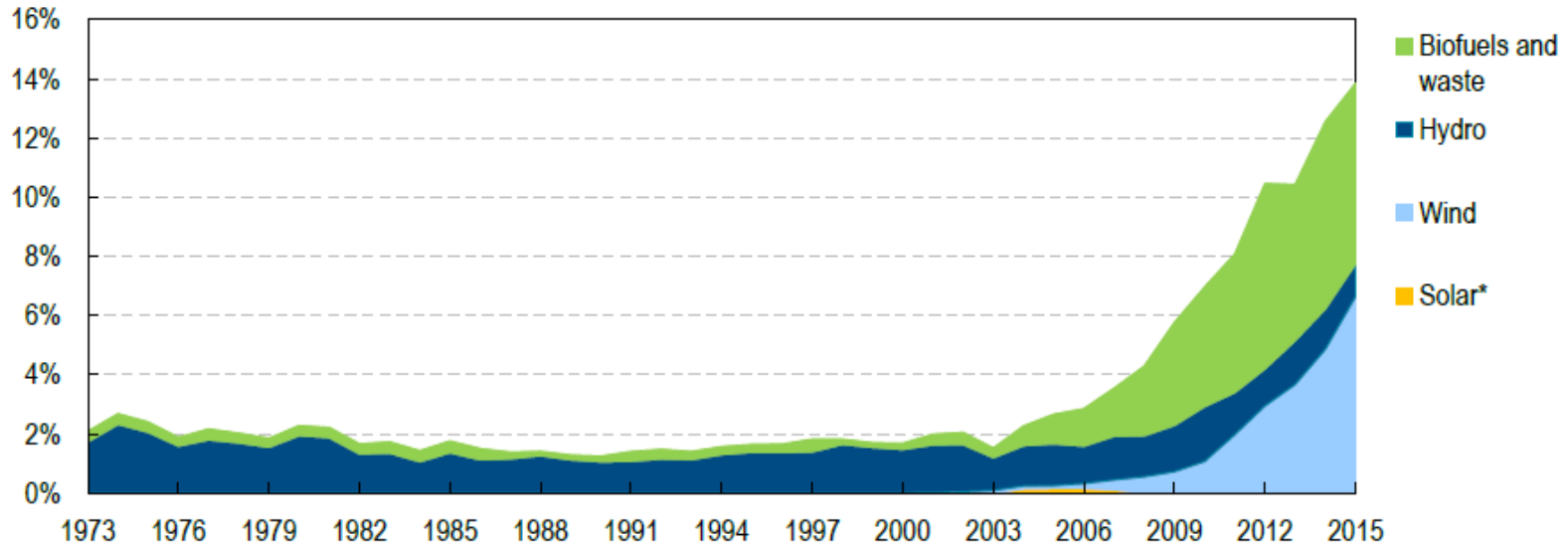


Poland

Source: Energy Policies of IEA Countries:

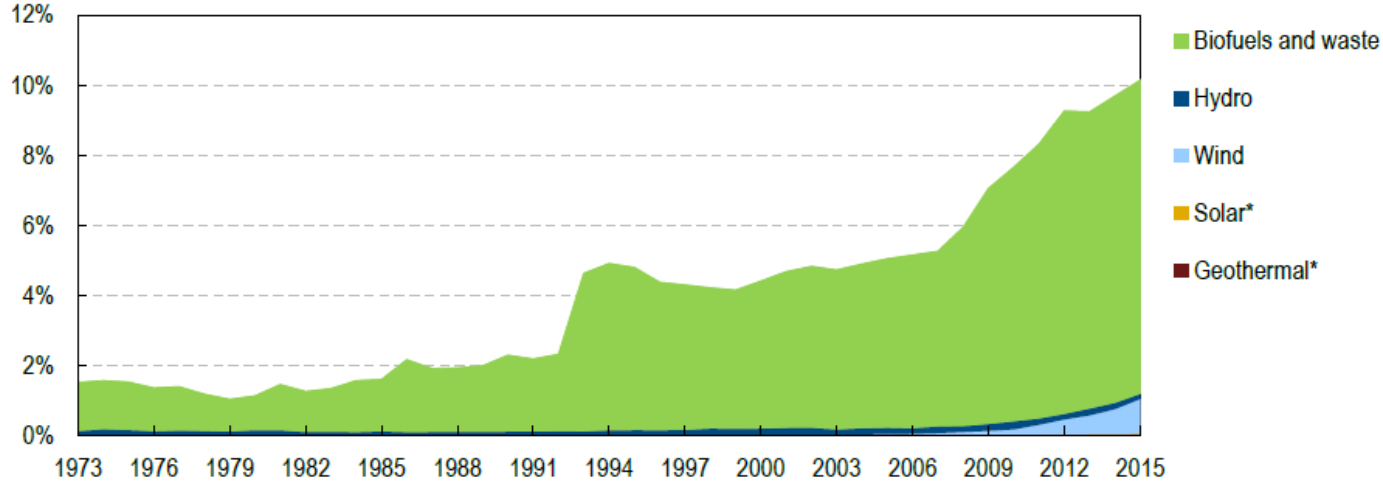
Poland 2017 Review

Figure 6.4 Renewable energy as a percentage of electricity generation, 1973-2014



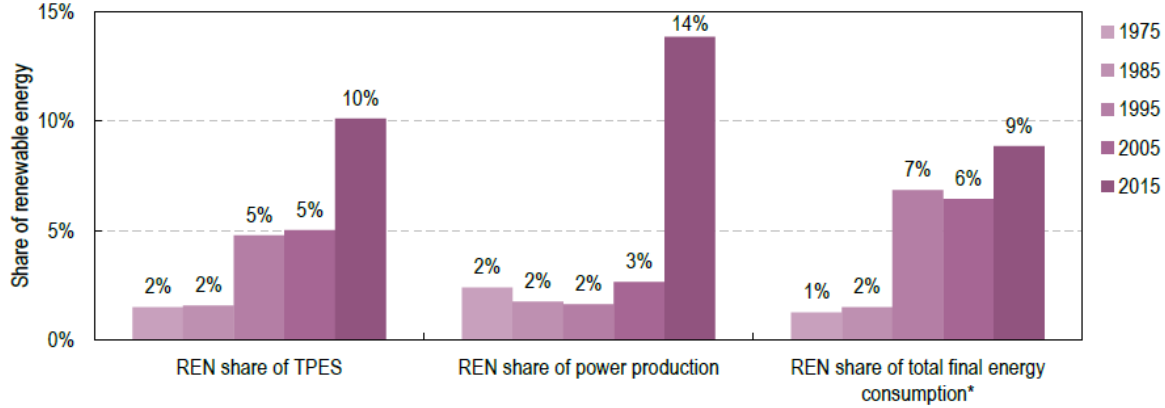
*Negligible.

Figure 6.2 Renewable energy as a percentage of TPES, 1973-2014



*Negligible.

Figure 6.1 Renewables share of TPES, electricity generation and TFC, 1975-2015



*Latest consumption data are from 2014.

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Hungary

- A greater renewable energy share in gross final consumption, reaching a level of 13% by 2020 (own target 14.65%)
  - Target to be reached mainly by biomass development
  - biofuels dominate renewable energy supply in Hungary, both in terms of total primary energy supply (TPES) and electricity generation
  - biofuels are the main RES with nearly negligible importance of all other sources (onshore wind mainly)
  - solar power has been the fastest growing source of RES (from 4 MWe in 2011 to 168 MWe in 2015)

Hungary

- In 2003-2011 FiT (KÁT)
  - similar logic like in Slovakia or Czech Republic
  - limited development of RES
  - grow in electricity prices lead to abolishment of FiT
- Energy and Climate Awareness Raising Action Plan (Government Decision 1602/2015)
  - development of METÁR (Feed-in Premium)
  - new RES not supported by KÁT
  - market premiums depending on the capacity of the power plants

Hungary

- problem with wind power plants lead to amendment of the law
- the Act now does not explicitly ban wind farms, but bans wind turbines within a 12-kilometre radius of populated areas
- the installation of wind turbines on agricultural land is restricted to those areas which have been out of
- cultivation for at least three years
- only older 2 MW wind turbines are allowed and at a height of no more than 100 metres

- an environmental tax (recycle fee) has been levied on solar panels, which is high by international comparison

Hungary

Source: Energy Policies of IEA Countries:

Hungary 2017 Review

Figure 5.1 Renewable energy as a percentage of TPES, 1973-2015

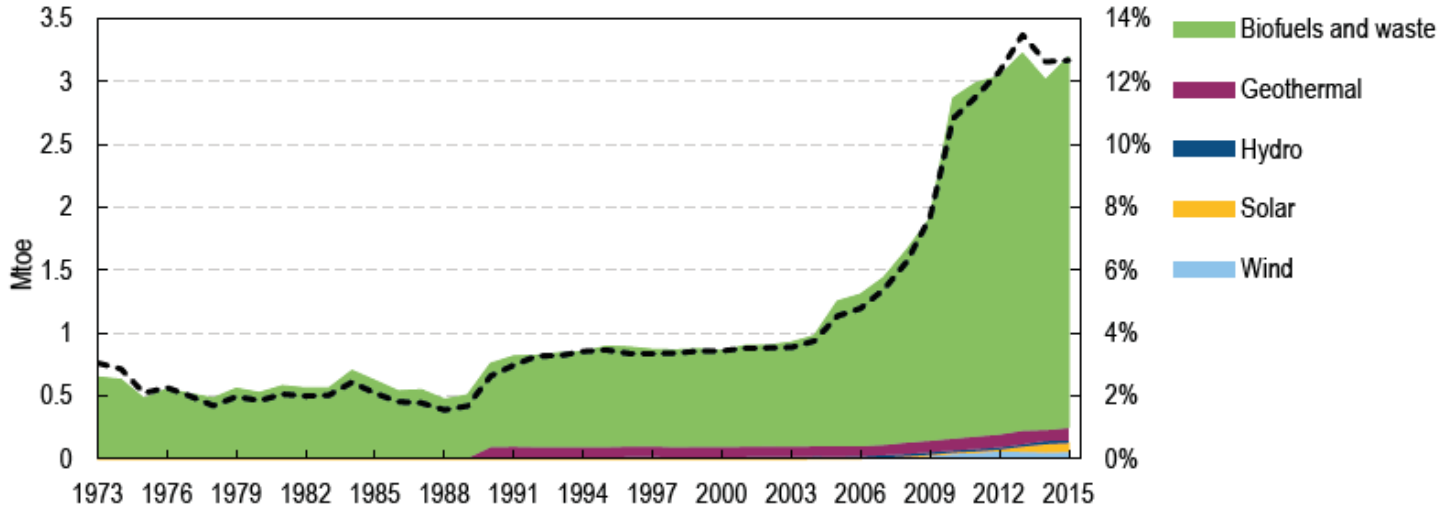
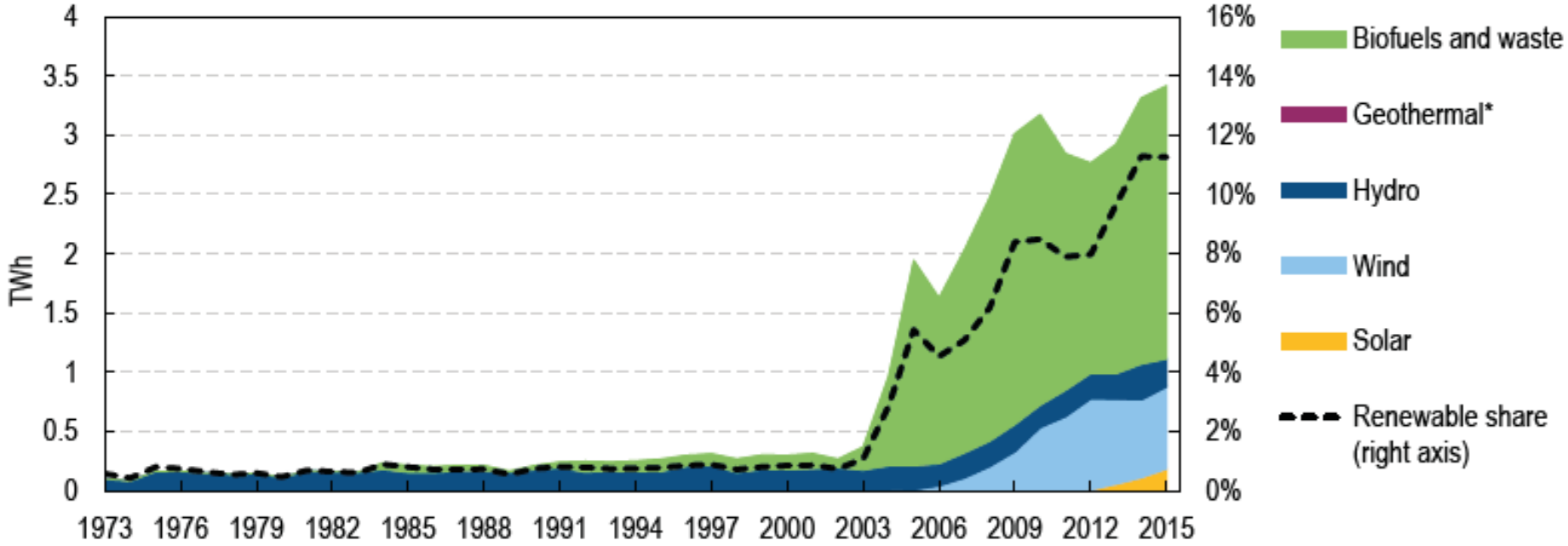


Figure 5.3 Renewable energy as a percentage of electricity generation, 1973-2015



*Negligible.

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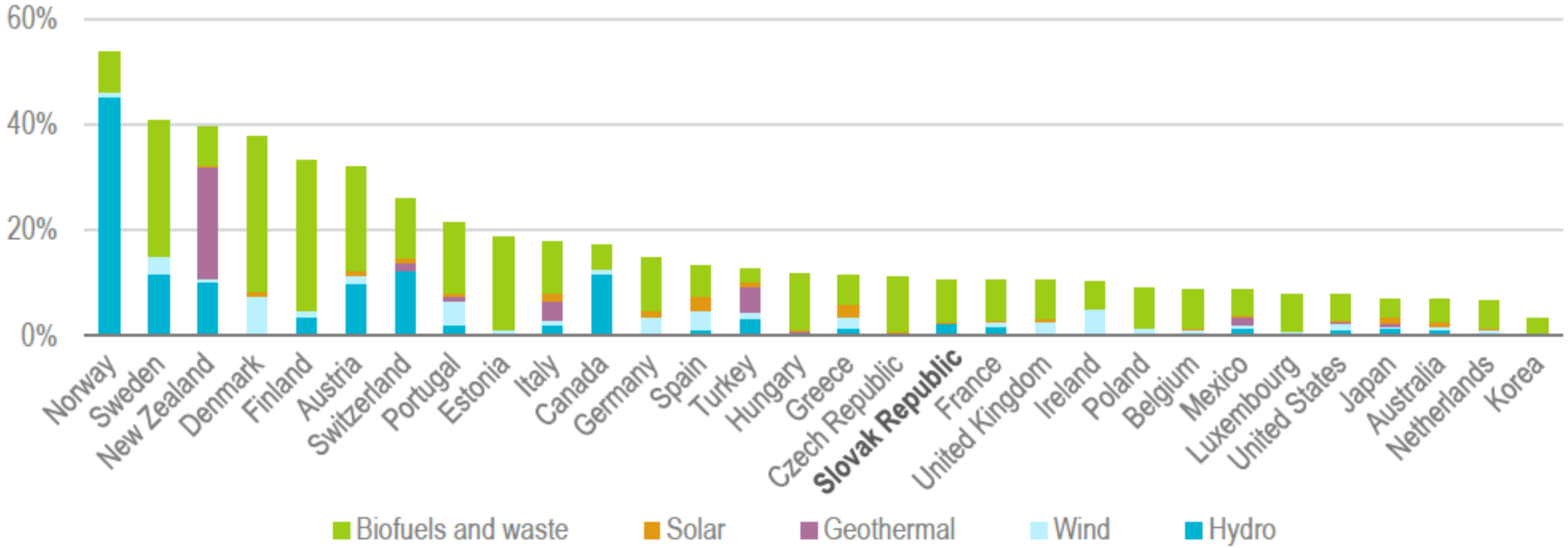
Summary and New Targets

Figure 10.3 Renewable energy and waste in TPES in IEA member countries, 2017



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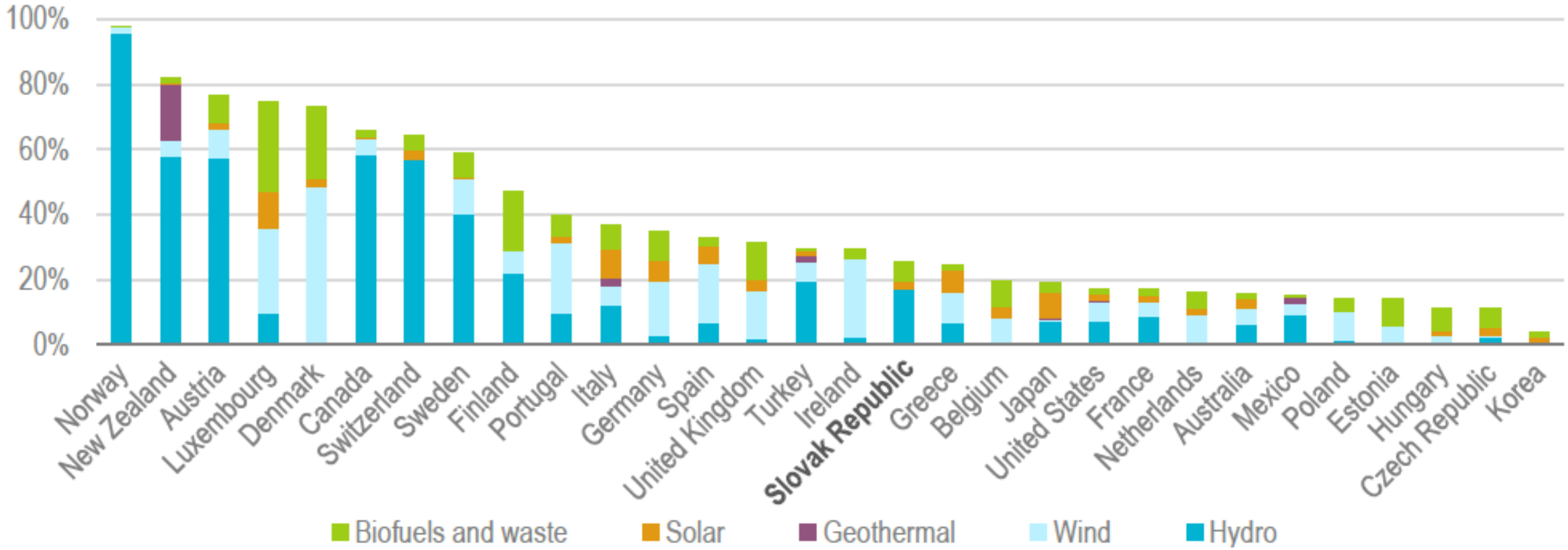
Summary and New Targets

Figure 10.6 Renewable energy in power generation in IEA member countries, 2017



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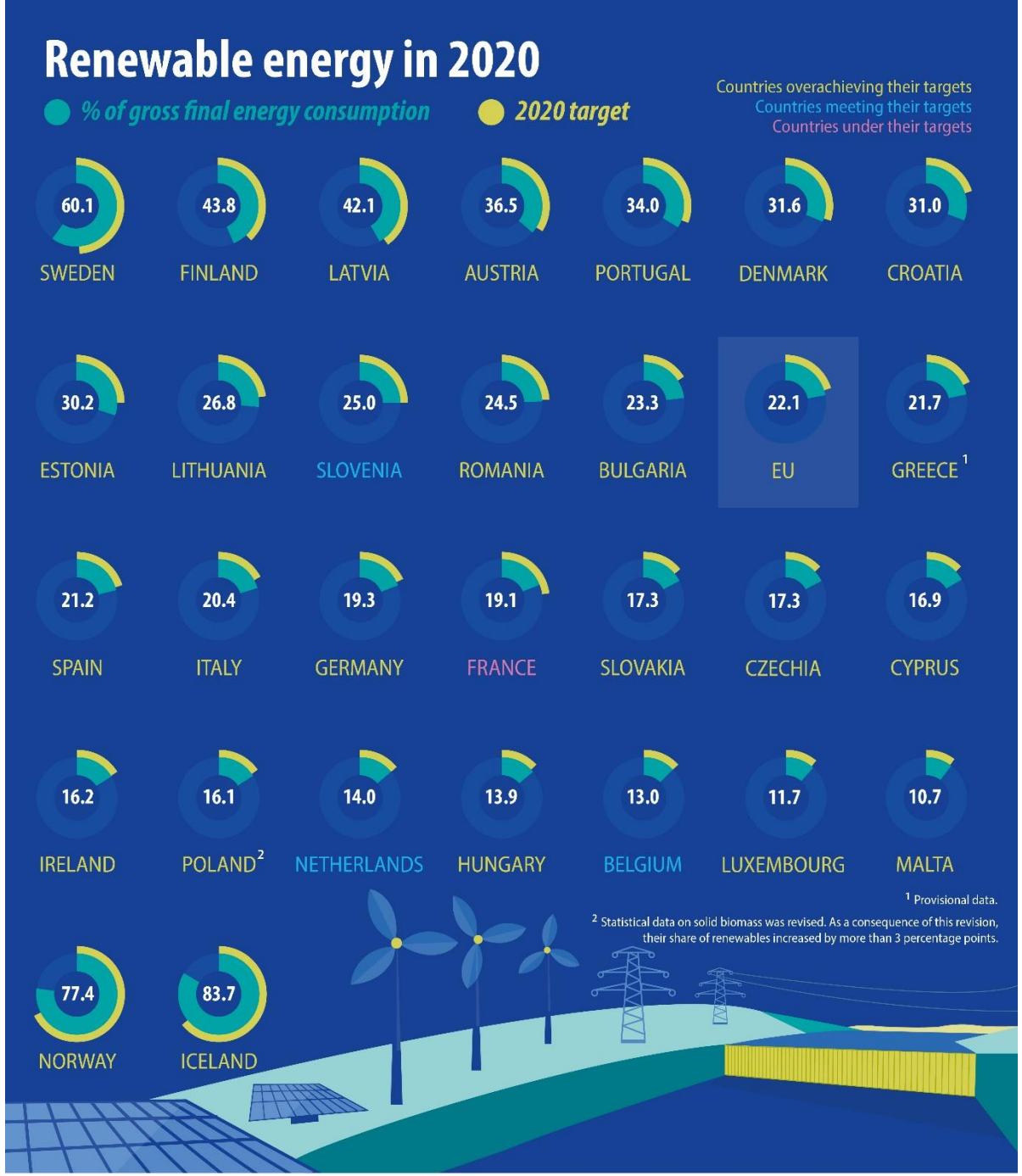

January 2022 data

Source: Eurostat

https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Renewable_energy_statistics

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Summary and New Targets

- Czech Republic
  - interest in RES not from the country, rather from the EU
  - problems in preparations of the law
  - consequent restrictions and limitations to RES development
- Slovak Republic
  - interest in RES primarily in diversification on Russia
  - problems in preparations of the law
  - consequent restrictions and limitations to RES development
- Poland
  - interest in RES not from the country, rather from the EU
  - fears of the future and competitivenes of coal leads to legal limitations and regulations of RES
- Hungary
  - interest in RES not from the country, rather from the EU
  - problems in preparations of the law
  - consequent restrictions and limitations to RES development

Summary and New Targets

- Directive (EU) 2018/2001 on the Promotion of the Use of Energy from Renewable Sources & The Regulation on the Governance of the Energy Union and Climate Action
  - also called The EU Winter Package
  - target a greater renewable energy share in gross final consumption, reaching an overall target of 32% by 2030 for the EU as a whole
  - revised by Directive (EU) 2018/2002 to 32.5% by 2030
  - part of Clean Energy for All Europeans

- Directive (EU) 2023/2413 amending Directive (EU) 2018/2001 from 18 October 2023 raises the overal targets to 42,5 % (with growth expectation to 45 % in line with the REPowerEU) by 2030

Summary and New Targets

- As per Article 3 of the Directive, Member States are required to set national contributions to meet the binding target as part of their **integrated national energy and climate plans**. From 1 January 2021, the share of energy from renewable sources in each Member State's gross final consumption of energy shall not be lower than the target for 2020.

- **22%** proposal by the Czech Republic (from 13% in 2020)
- **19.2%** proposal by the Slovak Republic (from 14% in 2020)
- *Values from 2018/2002*

21% proposal by Hungary (from 13% in 2020)

21% proposal by Poland (from 15% in 2020)

- Transportation – everyone **29 % in 2030**

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Thank you for your attention.

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