

Renewables in the EU

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Why RES?

- Energy security – Renewable energy sources are distributed globally, unlike fossil fuels, which are geographically concentrated.
- Environmental concerns – They have a lower environmental impact, which varies according to the technology used.
- Strategic economic development – Benefits include rural development, the agricultural sector, high-tech manufacturing, and innovation.
- Energy access – Distributed or off-grid solutions can lead to a decentralized energy system.
- Diversification of energy sources – Expands the variety of energy options available.

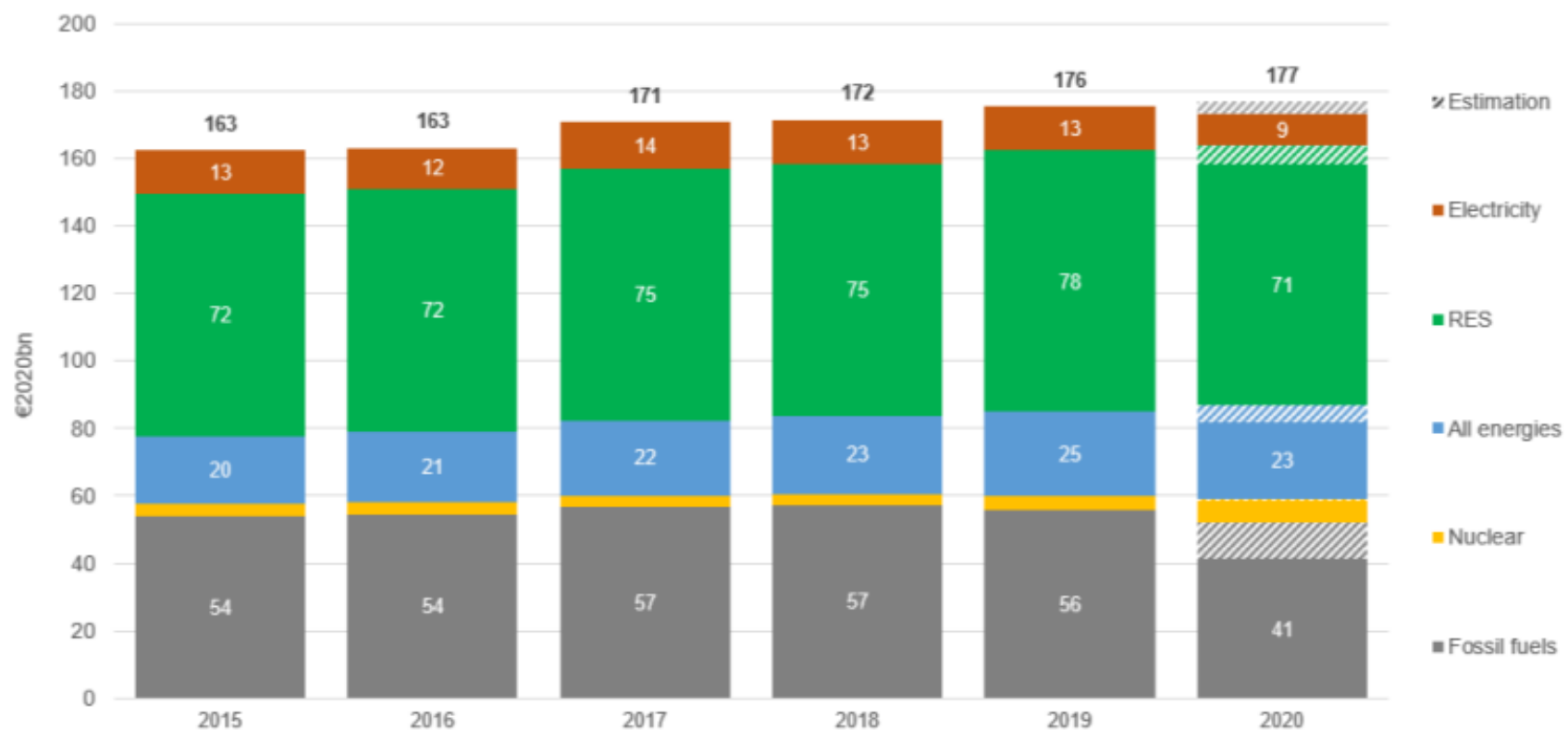
Should RES be subsidized?

Economic barriers - present when the cost of a technology is above the cost of competing alternatives. Mainly related to:

- Externalities of conventional technologies not internalized.
- Subsidies for conventional technologies.
- Level of technology maturity.

+ Climate change urgency.

EU subsidies by fuel type



Source: Study on energy subsidies and other government interventions in the EU. All energies represent subsidies not directly attributable to energy carriers or fuels (e.g. energy efficiency measures, energy demand/consumption incentives, irrespectively of the energy carrier, investment grants, and particular R&D expenditures)

Targets

- 1997: indicative target of 12% of energy consumption by 2010.
 - 2001: indicative target of 21% for the electricity sector by 2010.
 - 2020 targets (Energy and climate package, 2009) → RED I 2009/28/EC.
 - RES energy from 5% in 2005 to at least 20% of final consumption in 2020.
 - Binding national targets.
 - 2030 targets (CEP) → RED II 2018/2001/EU.
 - Binding EU target of 32% in gross final energy consumption.
 - National ambitions summarized in National Energy and Climate Plans (NECPs).
 - Fit for 55 – EU target of 40%.
 - 2023 - Provisional agreement to raise 2030 target to at least 42.5%, aiming for 45% (based on RePowerEU)
- = In 2021 39% of electricity, (vs. 37% from fossil fuels), 21,8% of energy.

Member State	Share of renewables in 2005	Share required by 2020
Austria	23.3%	34%
Belgium	2.2%	13%
Bulgaria	9.4%	16%
Cyprus	2.9%	13%
Czech Republic	6.1%	13%
Denmark	17%	30%
Estonia	18%	25%
Finland	28.5%	38%
France	10.3%	23%
Germany	5.8%	18%
Greece	6.9%	18%
Hungary	4.3%	13%
Ireland	3.1%	16%
Italy	5.2%	17%
Latvia	32.6%	40%
Lithuania	15%	23%
Luxembourg	0.9%	11%
Malta	0%	10%
The Netherlands	2.4%	14%
Poland	7.2%	15%
Portugal	20.5%	31%
Romania	17.8%	24%
Slovak Republic	6.7%	14%
Slovenia	16%	25%
Spain	8.7%	20%
Sweden	39.8%	49%
United Kingdom	1.3%	15%

Trade in renewables

Cross-border trading → trading of RES certificates (Certificates of origin). Suggested in 2001, 2007 (and again in 2015 as a part of Energy Union plan).

- For economy of scale.
- For both technical and economical efficiency.

Failed due to different support schemes with different level of support (esp. in FiT countries) in EU MS and political concerns of losing control.

- Statistical swaps between MS allowed.
- Two or more MS may combine targets, or support schemes (Sweden+Norway).

Feed-in tariffs

- In a majority of EU states.
- FiTs provide a fixed rate of subsidy for fixed period. Cover all producer's costs and profit, essentially replacing the market.
- Instrument of choice for big RES players (Germany, Spain...). Governments set the price, markets (investor responses) set the quantity.
 - Very successful in triggering large deployment of RES, but at a high cost.
 - Greater security around income to investors, therefore reducing financial costs.

Feed-in tariff

FiT could be tailored to different technologies. But:

- difficult to set the right price – too high and money is wasted, too low and no deployment. Once the price is set, it is hard to make radical changes without breaking contracts.
- FiTs separate the RES producer from the market (a limited compatibility with Internal energy market).
- Grid priority - the grid must take RES electricity first.

Feed-in tariff

- „A solar RES case“ – Spain, Italy, the Czech Republic...
- Generous FiT tariffs in place, volumes of deployment not controlled or capped and support mechanisms not sufficiently responsive to rapidly falling costs.
- PV developers earn high rates of return on their capital – overheated markets and rapid rises in support costs.
- Policy makers react by dramatically reducing tariffs and introducing retrospective measures to recouple some of the costs – detrimental impact on investor confidence in the government.
- Also impact on the other RES in given country.

Quota obligations

- Power plant operators receive certificates for their green energy to sell to the actors (usually electricity suppliers, sometimes also large consumers) obliged to fulfil the quota obligations.
- Selling the certificate provides an additional income on top of the market price of electricity.
- Quota obligations with tradeable certificates. Here government sets the quantity, the market the price.
- (Some) compatibility with market principles, competitive price determination.

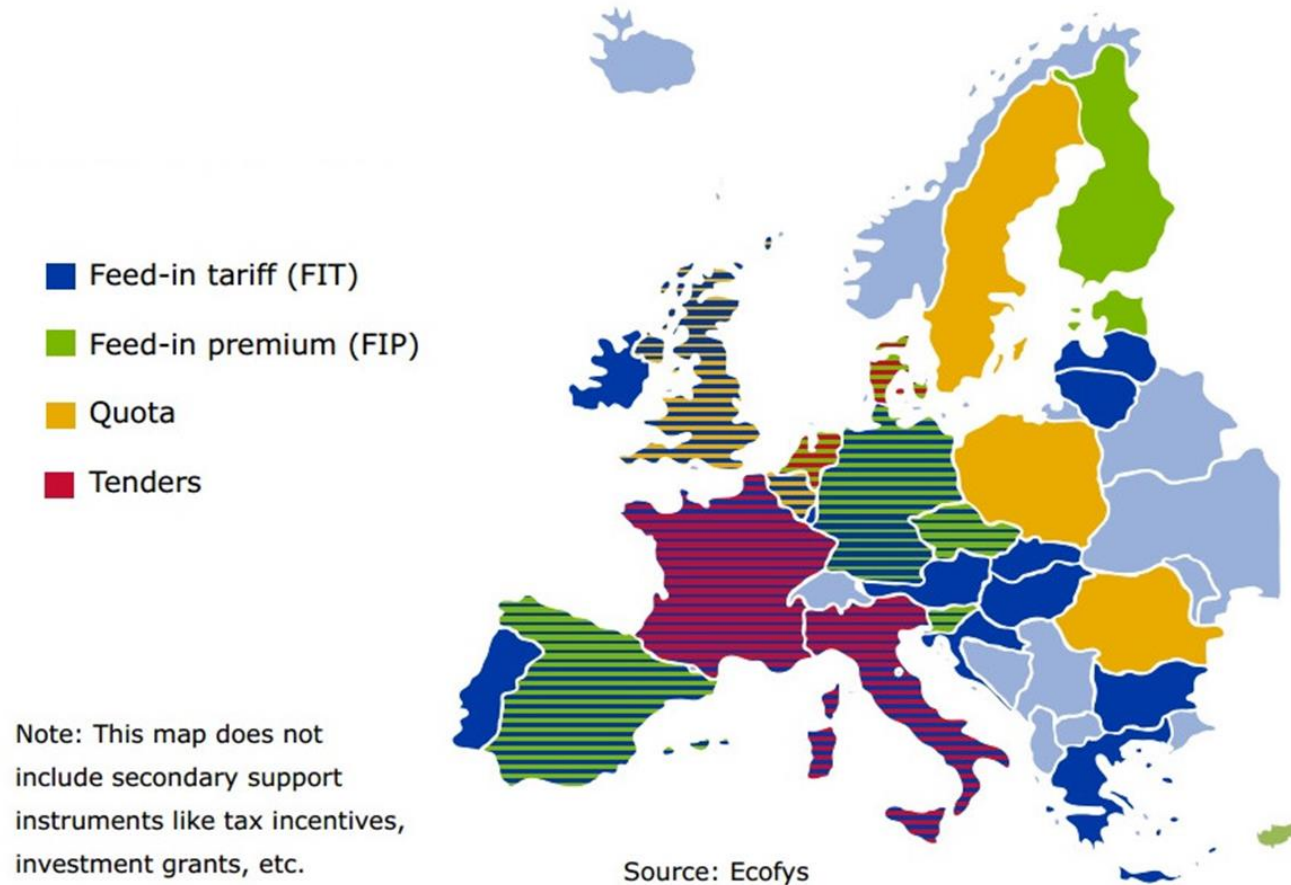
Quota obligations

- High risk premium – increases costs.
 - Technology neutral way – only the most cost-effective technologies supported.
- = Quota systems with tradable certificates tend to be cheaper, but favor mature technologies like onshore wind and biomass.

Feed-in premium

- Plant operators have to sell the electricity at the market.
- To receive a fixed payment for each unit of electricity generated independent of the market price of electricity.
- More market oriented, higher risk for producer (compensated by the level of the premium).

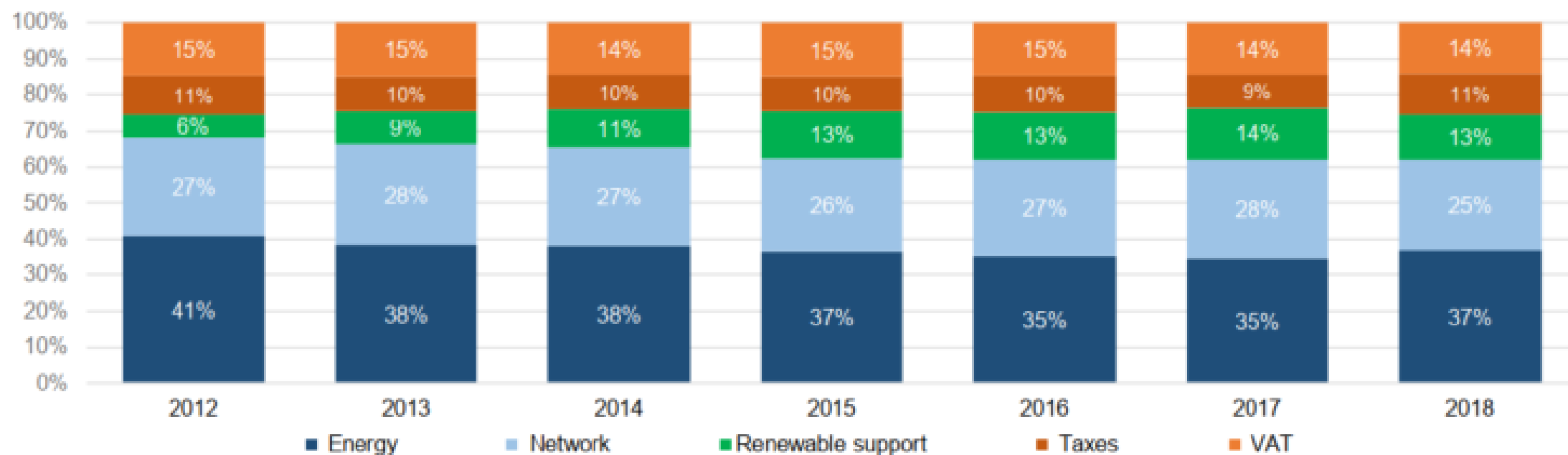
Subsidy schemes in the EU (2013)



Growind demand for RES support reform

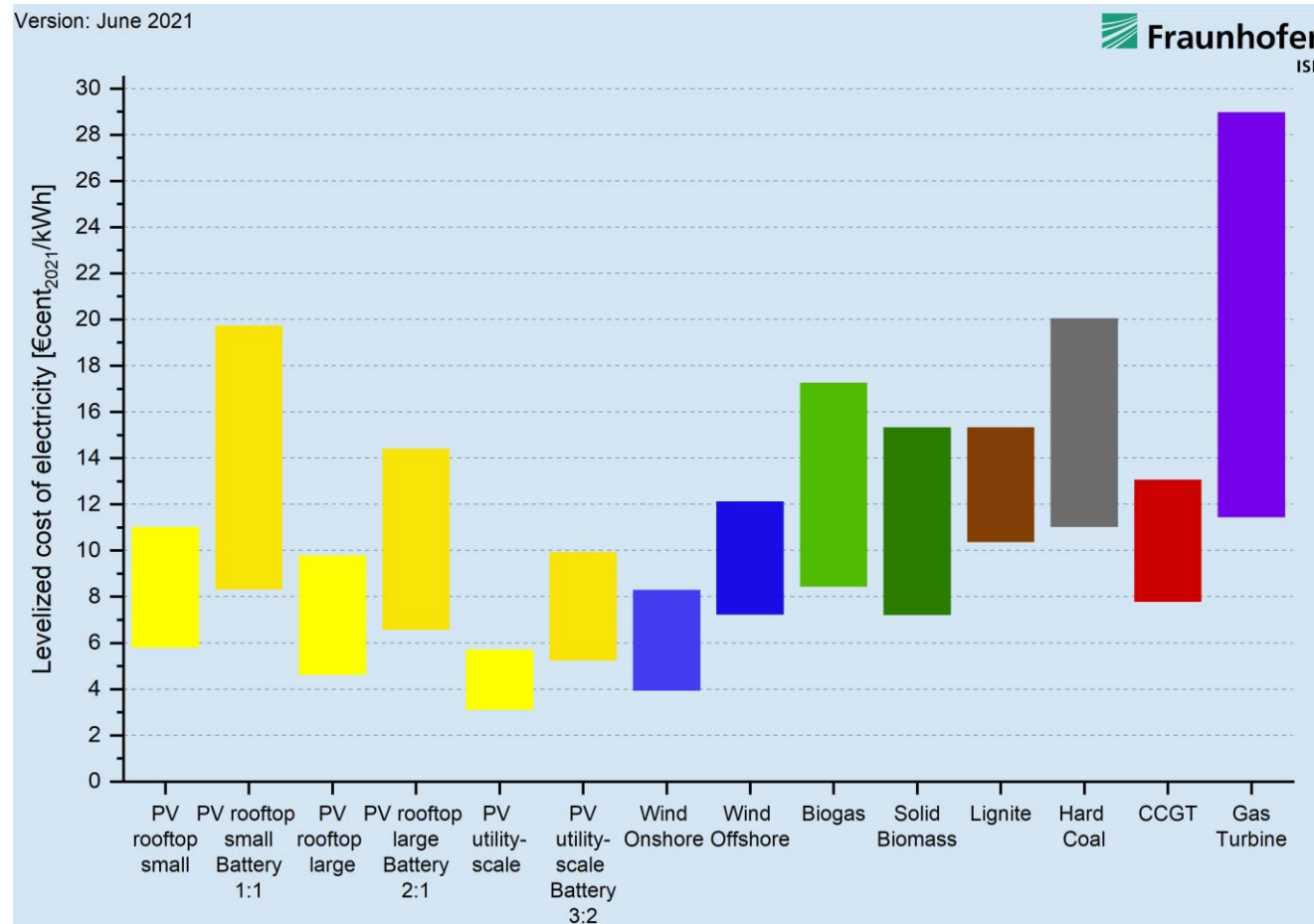
- Increasing costs of support.
- Production not reflecting situation on the market (negative prices).
- LCOE vs. VALCOE (value-adjusted LCOE).

EU electricity retail prices for households

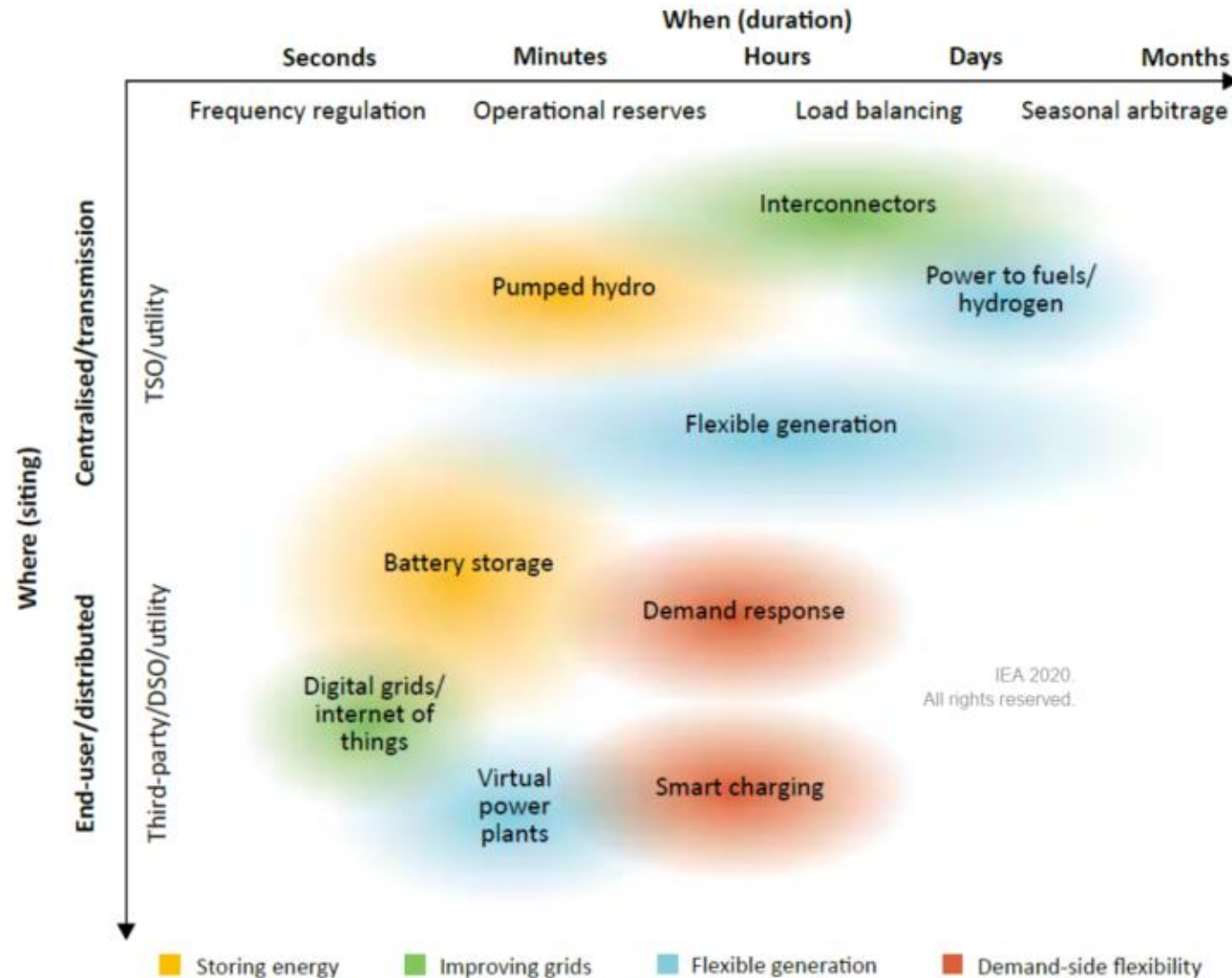


Source: ACER/CEER (2019), *Annual Report on the Results of Monitoring the Internal Electricity and Natural Gas Markets in 2018*, www.acer.europa.eu/en/Electricity/Market%20monitoring/Pages/Current-edition.aspx.

Press release: „Renewables clearly superior to conventional power plants due to rising CO₂ prices“



Flexibility needs for electrified economy



RES support reform

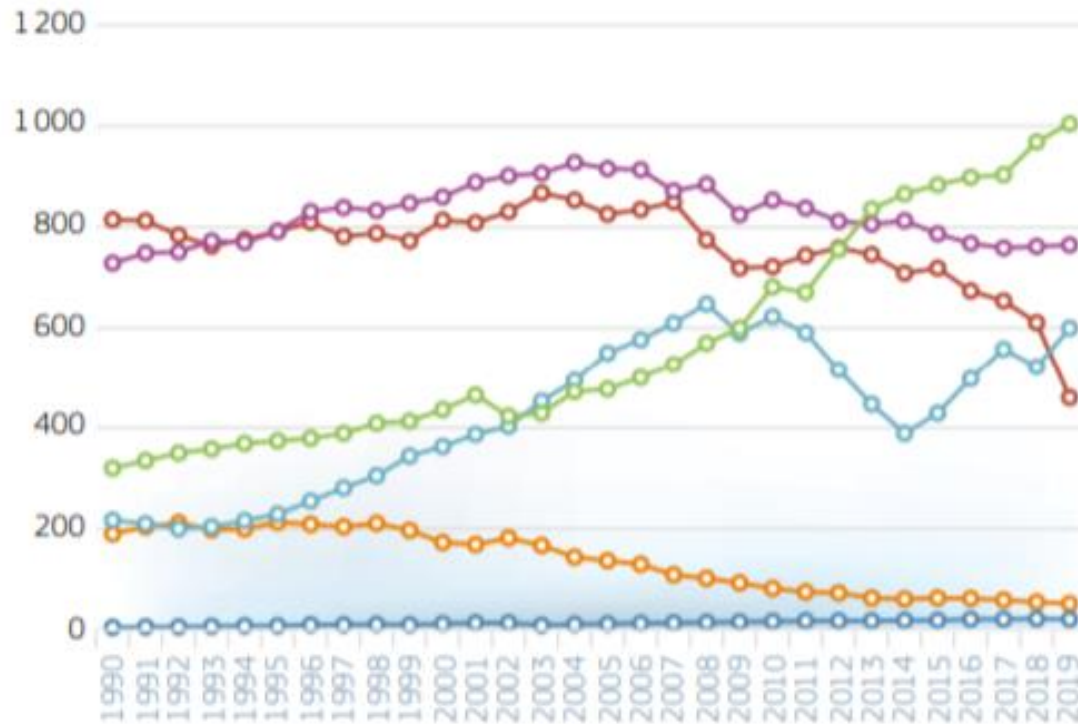
- RES gradually considered 'mature technology' with a significant level of penetration.
- 2014 - Guidelines on State aid for environmental protection and energy 2014-2020.
 - A gradual shift from feed-in-tariffs to feed-in premiums and competitive auctions at new installations, which support the integration of renewables in the electricity market (today auctioned feed-in premium in most of the EU).
- Winter package 2019 - Priority dispatch only for installations up to 500 kW (250 kW after 2026), existing generators, and innovative technologies. Others to be responsible for their imbalances.

EU's state aid rules

- 2021 – The State Aid guidelines aligned with European Green Deal and 2030 goals.
 - Rules on closure of coal, peat and oil shale plants.
 - Support for performance of buildings and clean mobility, EV infrastructure, clean vessels and aircraft.
 - Natural gas as a bridge fuel (no lock-in effect).
 - CfD for clean technologies.

Gross electricity generation

EU27_2020 - BY FUEL - ALL FUELS - 1990-2019 (TWh)



Solid Fossil Fuels, Peat, Oil Shale and Sands

Renewables and Biofuels

Nuclear

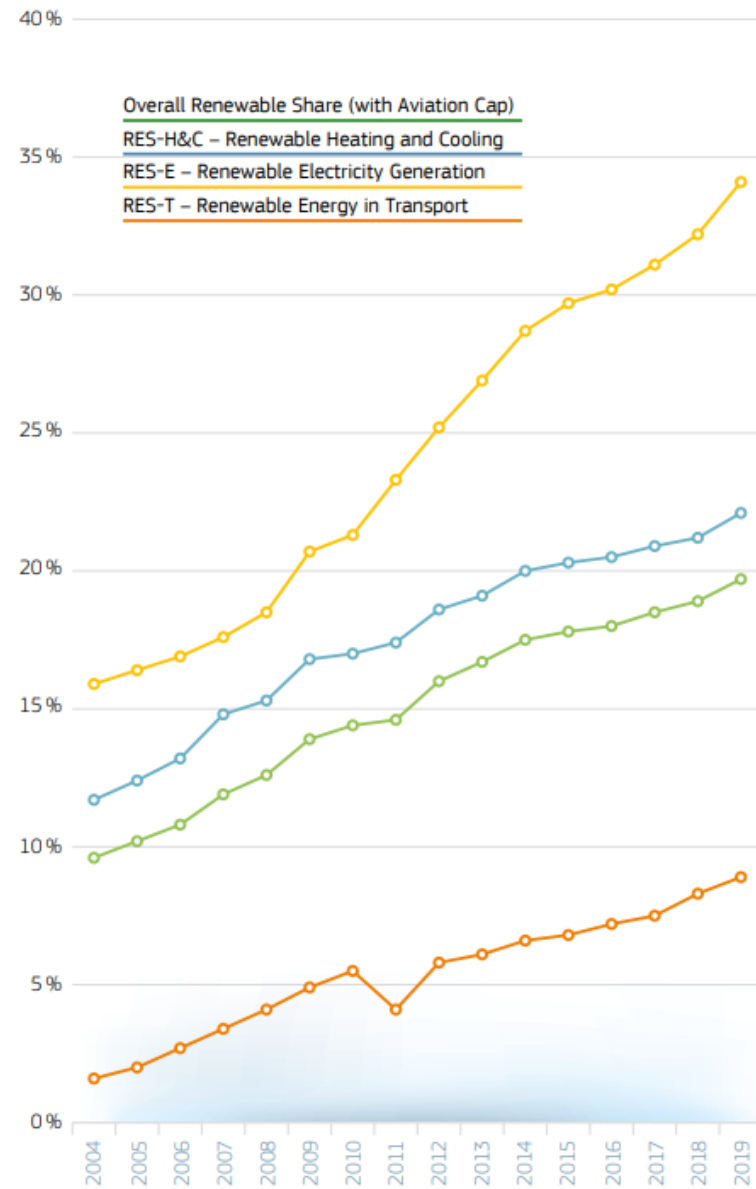
Natural and Manufactured Gases

Oil and Petroleum Products

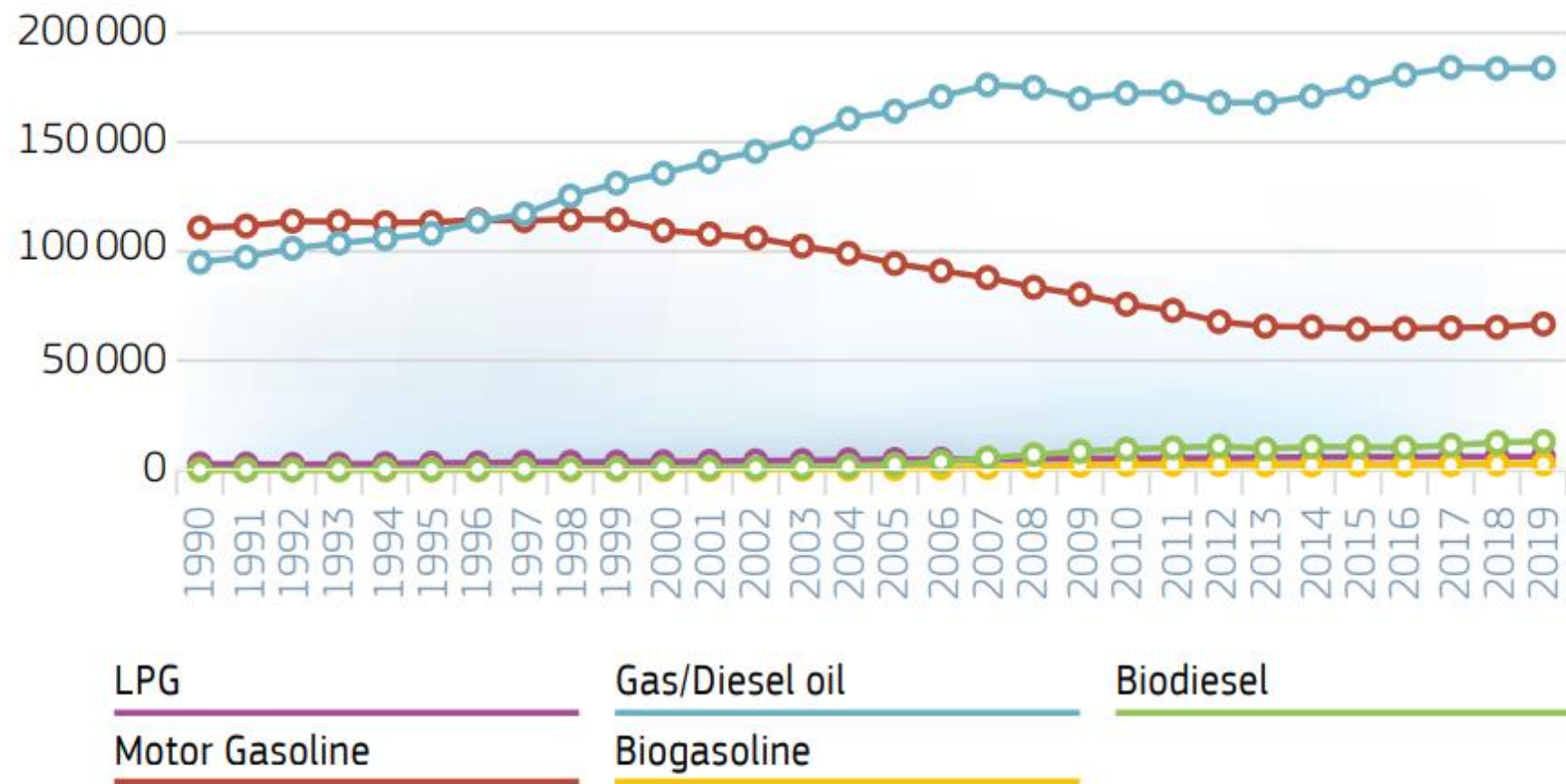
Wastes non-RES

2.12.1 Renewable Energy (RES) Shares*

IN THE GROSS FINAL ENERGY CONSUMPTION –
EU27_2020 (%)



EU27_2020 – FUELS CONSUMPTION IN THE TRANSPORT SECTOR – 1990-2019 (ktoe)



Source: Eurostat April 2021

Methodology and Notes: [See Appendices](#)

Buildings

- Not a specific RES target for buildings. However, average national RES usage in buildings should increase by 1.3% per year between 2021-2030.
- Share of RES from 9% in 1990 to 24% in 2017.

