

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 supported?

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

- Unaccounted externalities of conventional technologies.
- Subsidies favoring conventional technologies.
- Limited maturity of emerging technologies.

+ Urgency of addressing climate change.

Targets

- 1997: Indicative target of 12% of energy consumption by 2010.
 - 2001: indicative target of 21,1% 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 outlined 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% (RePowerEU)
- = In 2023, RES 44.7% of electricity.

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 renewable certificates

Cross-border trading: involves trading of RES certificates (Certificates/Guarantees of origin). Proposed in 2001, 2007, and in 2015 as a part of Energy Union plan.

- Aimed at achieving economies of scale.
- Designed to enhance both technical and economic efficiency.

Failed due to differences in national support schemes and levels of support (notably in FIT countries) and political concerns over losing control. 2018 RES Directive brought no significant changes.

- Statistical swaps between MS permitted.
- Joint targets or support schemes can be established by two or more Member States (e.g., Sweden and Norway)

Feed-in tariffs

- Preferred option for most EU states
- FiTs offer a fixed subsidy rate for a set period, covering all producer costs and ensuring a profit, effectively replacing the market.
- Favored by large renewable energy stakeholders (e.g., Germany, Spain).
- Governments determine the price, while markets (via investor responses) dictate the quantity.
- Highly effective in driving significant renewable energy deployment but at considerable expense.
- Provides greater income security to investors, thereby lowering financial costs.

Feed-in tariff

- FiTs can be tailored to technologies but face challenges.
- Prices set too high waste funds; too low hinder deployment.
- Adjustments risk breaching contracts.
- FiTs isolate RES producers from the market, limiting compatibility with the Internal Energy Market.
- Grid priority ensures renewable electricity is taken first.

Feed-in tariff

- “A Solar RES Case” – Spain, Italy, Czech Republic.
- Generous FiTs led to uncontrolled deployment and mechanisms unresponsive to falling PV costs.
- PV developers reaped high returns, causing overheated markets and soaring support costs.
- Policymakers responded with drastic tariff cuts and retrospective measures, undermining investor confidence.

Quota obligations

- Power plant operators earn certificates for green energy, sold to electricity suppliers or large consumers obligated to meet quotas.
- Certificates provide income beyond the electricity market price.
- Quota system with tradeable certificates: government sets quantity, market determines price.
- Partially aligns with market principles, enabling competitive price setting.

Quota obligations

- High risk premiums increase overall costs.
- Technology-neutral approach supports only the most cost-effective options.
- Quota systems with tradable certificates are generally cheaper but tend to favor mature technologies like onshore wind and biomass.

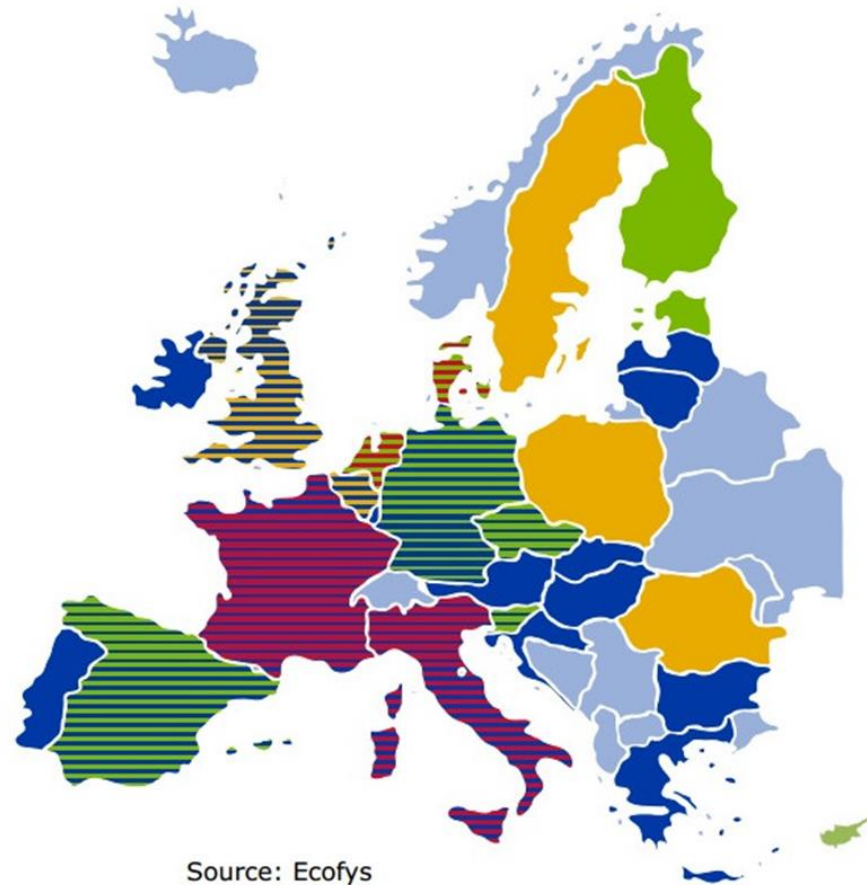
Feed-in premium

- Plant operators sell electricity on the market.
- They receive a fixed payment per unit of electricity, regardless of market price.
- More market-oriented but involves higher risk for producers, offset by the premium level.

Subsidy schemes in the EU (2013)

- Feed-in tariff (FIT)
- Feed-in premium (FIP)
- Quota
- Tenders

Note: This map does not include secondary support instruments like tax incentives, investment grants, etc.



Priority grid access

- RED I & RED II established priority access and dispatch for electricity from RES.
- Transmission and distribution operators are obligated to connect RES without discrimination -> RES electricity is accepted into the grid before conventional sources, provided grid stability is maintained.
- Variations in national implementation create inconsistencies, and high RES penetration sometimes leads to curtailment due to grid constraints.

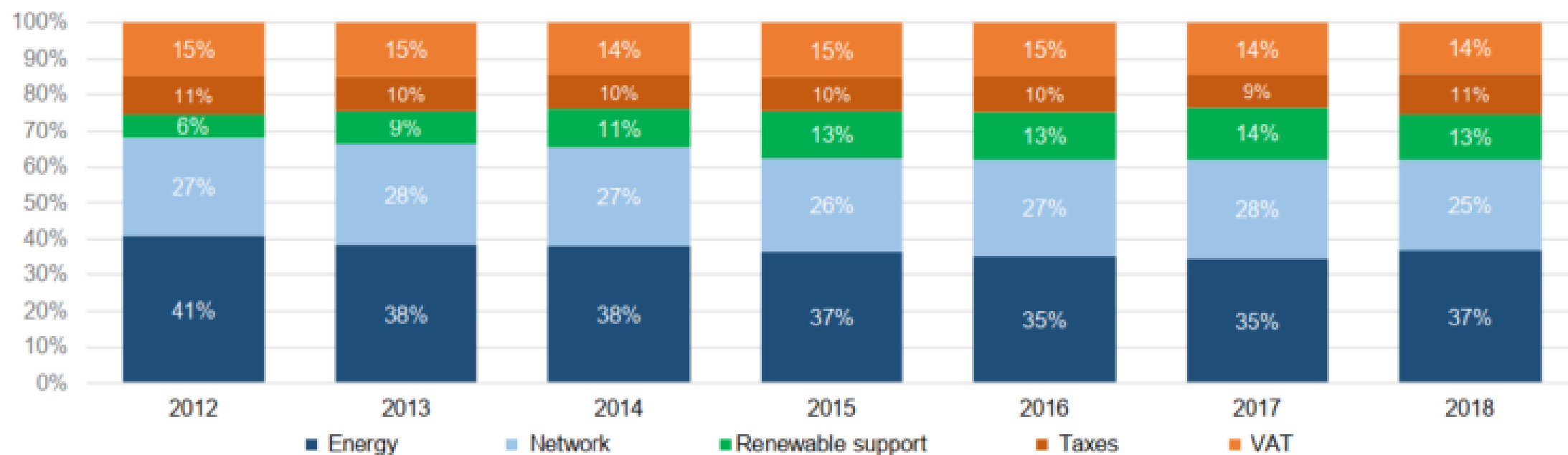
Priority grid access

- The 2019/944 Directive on common rules for the internal electricity market shifts towards market-based dispatch, retaining priority only for small installations (<400 kW until 2026) and demonstration projects.
- Investments in grid modernization, energy storage, and demand response aim to minimize curtailment and support RES integration.
- Priority access is evolving to balance market efficiency with equitable RES integration.

Growind demand for RES support reform

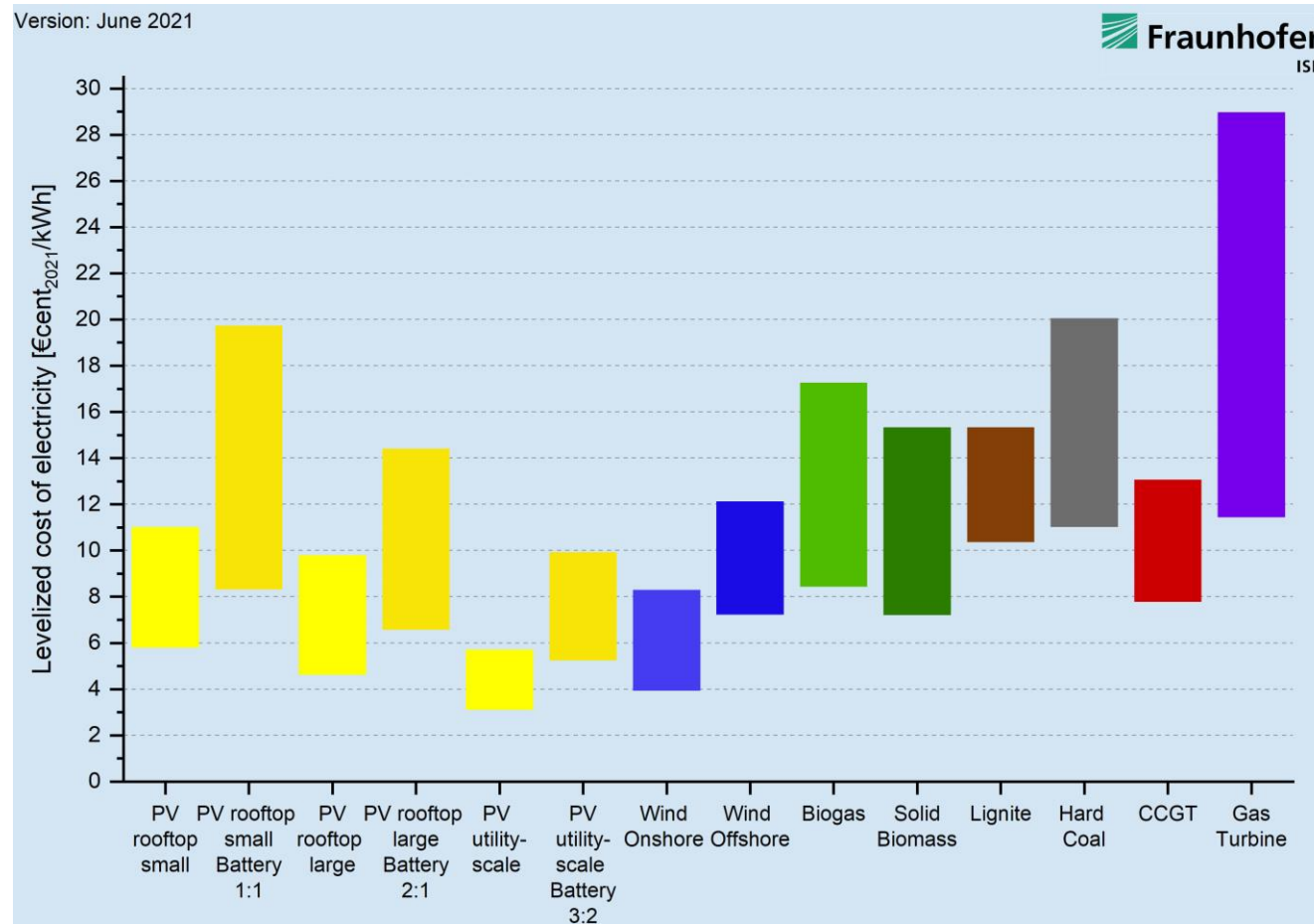
- Increasing costs of support.
- Production not reflecting situation on the market (negative prices).
- LCOE vs. VALCOE (value-adjusted LCOE).

EU electricity retail prices for households

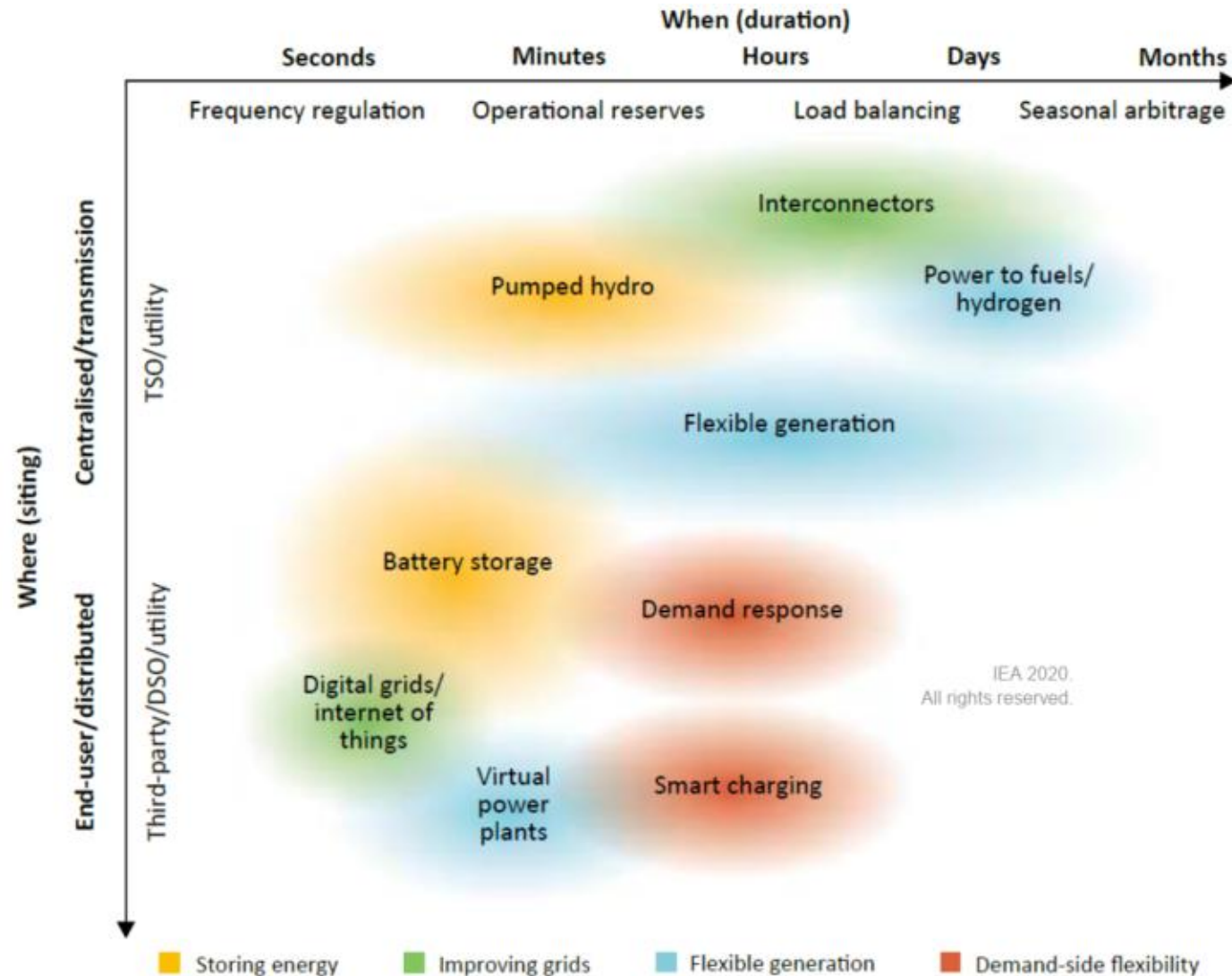


Source: ACER/CEER (2019), *Annual Report on the Results of Monitoring the Internal Electricity and Natural Gas Markets in 2018*, www.acer.europa.eu/en/Electricity/Market%20monitoring/Pages/Current-edition.aspx.

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



Flexibility needs for electrified economy



Shift to competitive support

- RES now seen as mature technology with significant market penetration.
- The EU's State Aid Guidelines (2014-2020) initiated a shift toward market-based mechanisms. Competitive auctions and tenders primary method for determining RES support.
 - Prices set through competition among producers, lowering costs for consumers.
 - Promotes integration of RES into electricity markets.
- Renewable Energy Directive II (2018/2001/EU)
 - Mandates competitive schemes as the main RES support instrument.
 - Encourages technology-neutral auctions, though Member States can justify technology-specific tenders for diversification.

Shift to competitive support

- Auctions and tenders - producers bid for the level of support required. Projects with the lowest bids win, ensuring cost-effectiveness.
- RES producers are increasingly exposed to market prices, incentivizing efficient operation.
- Gradual phasing out of priority dispatch for large RES installations.
- Neutral auctions allow all RES technologies to compete. Specific auctions can target emerging or underrepresented technologies for diversification.

Shift to competitive support

- Competitive mechanisms reduce costs for renewable energy support by fostering competition among developers.
- They integrate RES into wholesale markets.

VS.

- Increased market exposure introduces financial risks for project developers.
- Smaller players may face challenges in competing effectively.