ERC FORUM

2023

Decarbonization in the Energy Sector

Opportunities, challenges and best practices pertaining to Clean Energy

ERRA | Ardian Berisha

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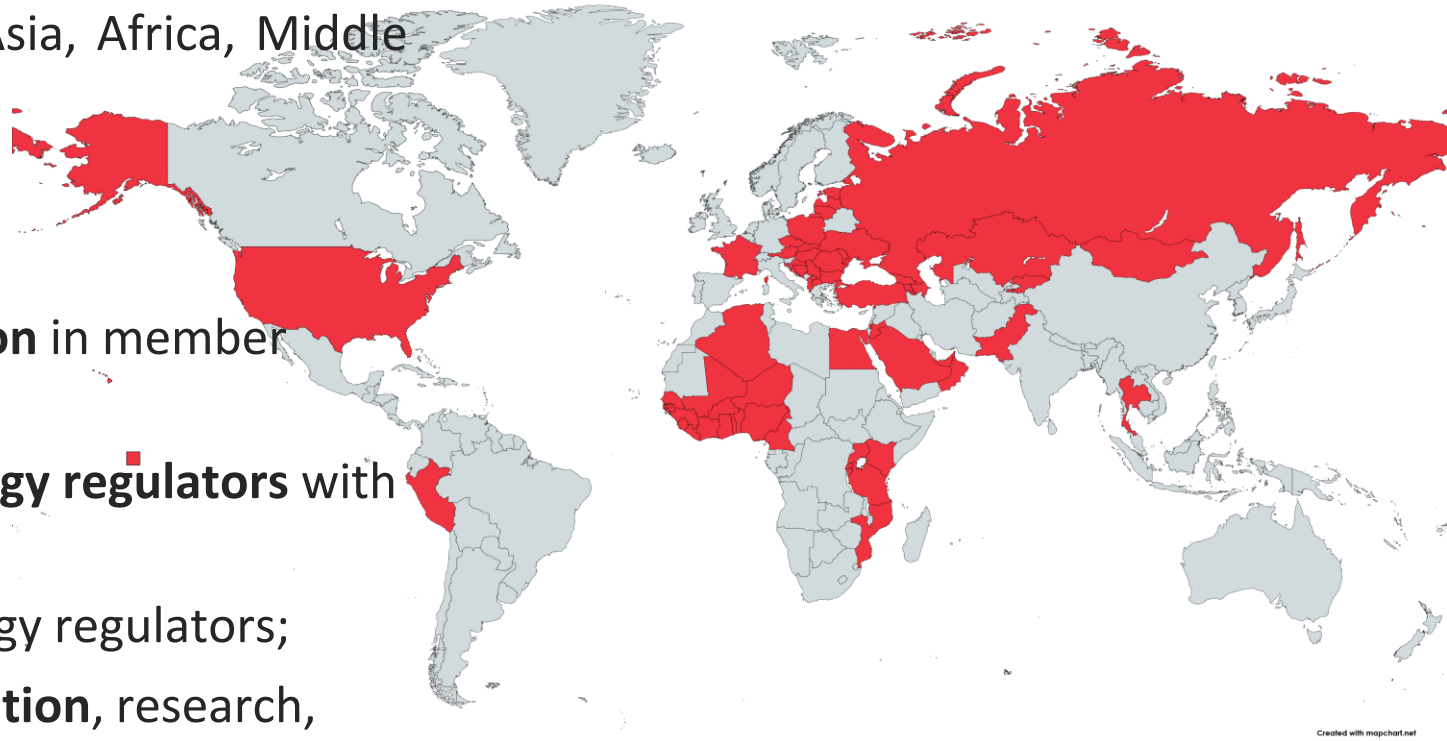
1. European climate policy objectives and incentive schemes
2. The energy crisis and its impact on decarbonization
3. Policy considerations for sustainable integration of RES

About ERRA

ENERGY REGULATORS REGIONAL ASSOCIATON

The Energy Regulators Regional Association (ERRA) is a voluntary organization comprising of **46 independent energy regulatory bodies** primarily from Europe, Asia, Africa, Middle East, South and North America.



Purpose & Objectives

- To **improve national energy regulation** in member countries;
- To foster development of **stable energy regulators** with autonomy and authority;
- To **improve cooperation** among energy regulators;
- To **facilitate the exchange of information**, research, **training** and experience among members and other regulators around the world.

European climate policy and implementation

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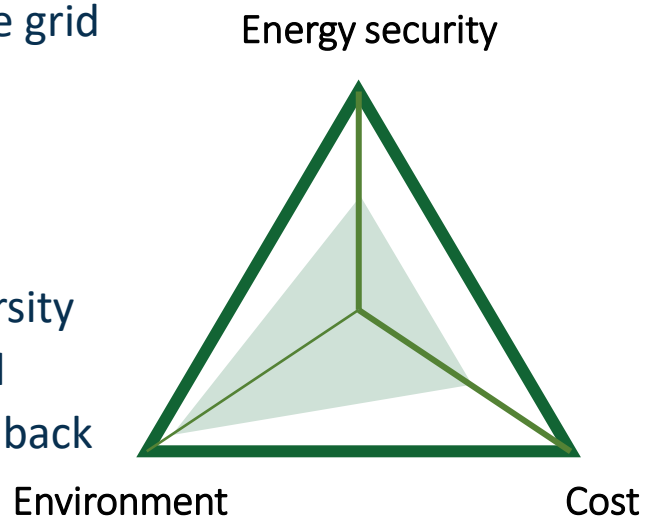
The Energy Trilemma

Energy security

- short term system security (safe grid frequency)
- Long-term security: resource adequacy
- import independence and diversity of fuels, economic security, and resilience (ability to get system back up)



Environment

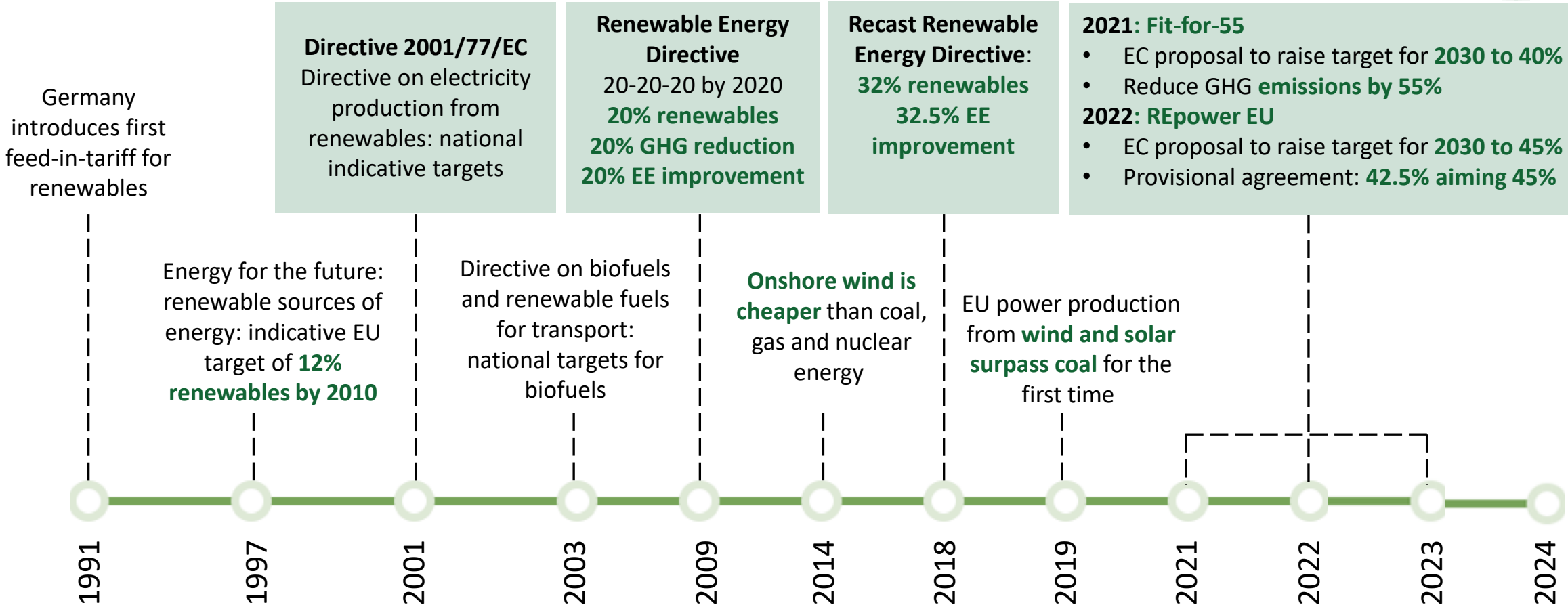
- Two major policies promoting decarbonisation: **carbon pricing and renewable subsidies**
- Tale of **policy commitment**, **innovation** and **external factors** accelerating RES penetration and decarbonization

Cost

- Four different packages enforcing competition since 1996 (management and accounting unbundling =>legal unbundling and TPA =>ownership unbundling =>supplier freedom of choice =>enhanced cross-border flows)
- The cost of financing the energy transition must be sustainable and just in order to support more equitable outcomes for all customers

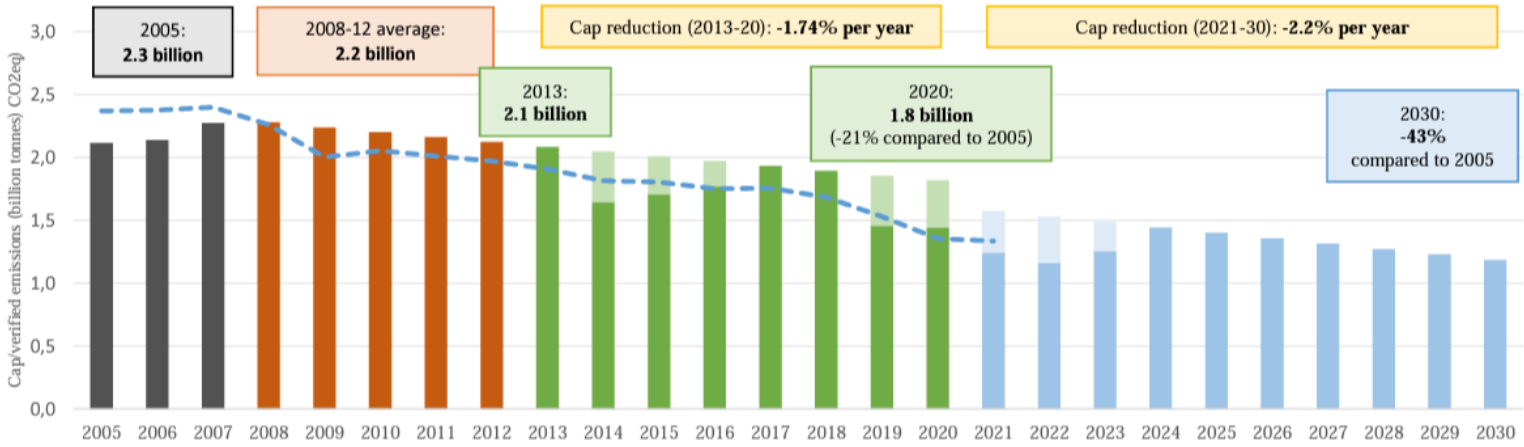
Source: RAP presentation

Transition in the EU



Capping emissions: EU Emissions Trading System

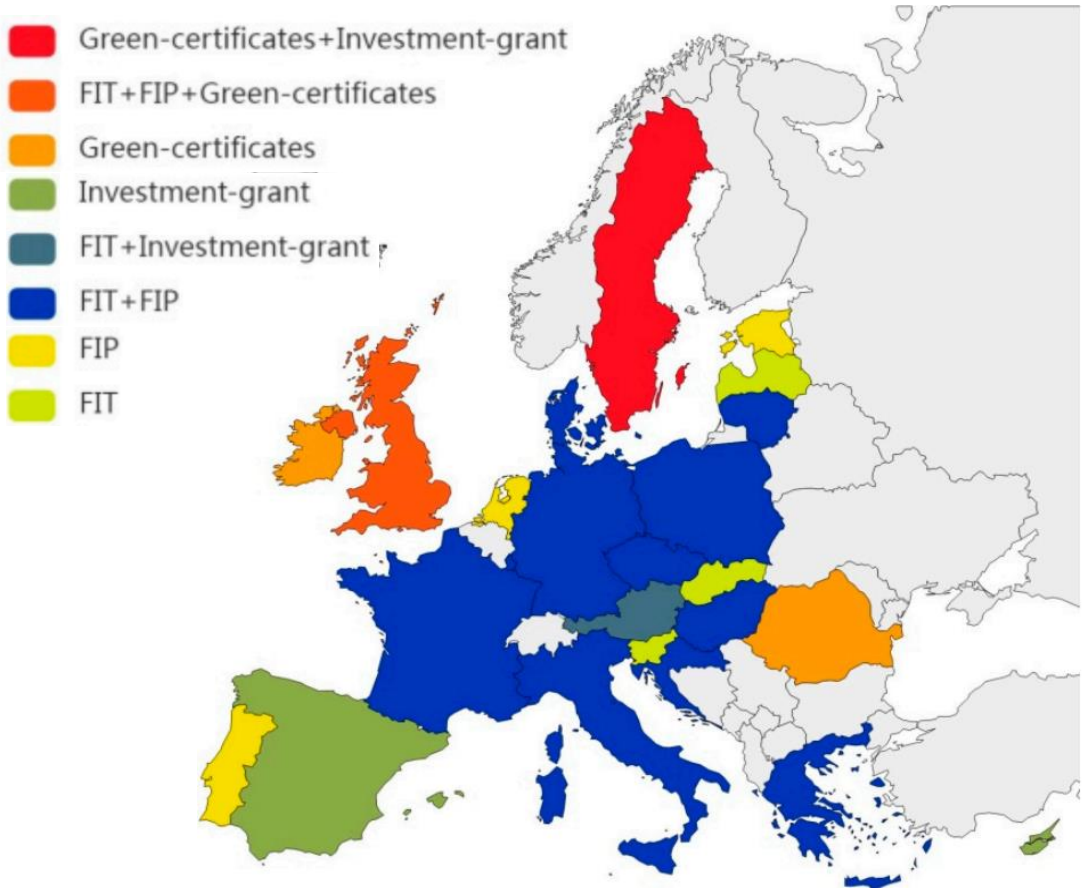
- The EU ETS is a cornerstone of the EU's policy to combat climate change
- In line with the “Polluter pays” principle, it puts a carbon price on emissions from Electricity and heat generation, energy-intensive industry and aviation in Europe;
- By market forces, EU ETS creates incentives to reduce emissions where it costs least to do so + generates revenues to invest in climate action and energy transformation
- Emissions down 34.6% since 2005 and more than EUR 100 billion auction revenues distributed to MS
- 2030 target 43% for ETS system. EU Commission proposal for 2030: 61% to contribute to the European Green Deal, tightening the cap on emissions



RES support

- 4 main support schemes:
  1. Feed-in Tariff (including CfDs)
  2. Feed-in Premiums
  3. Green Certificate
  4. Prosumer regulation

- FiT and FiP can be set administratively or through competitive procedures (auctions).
- EU countries presented annual plans for RE auctions.



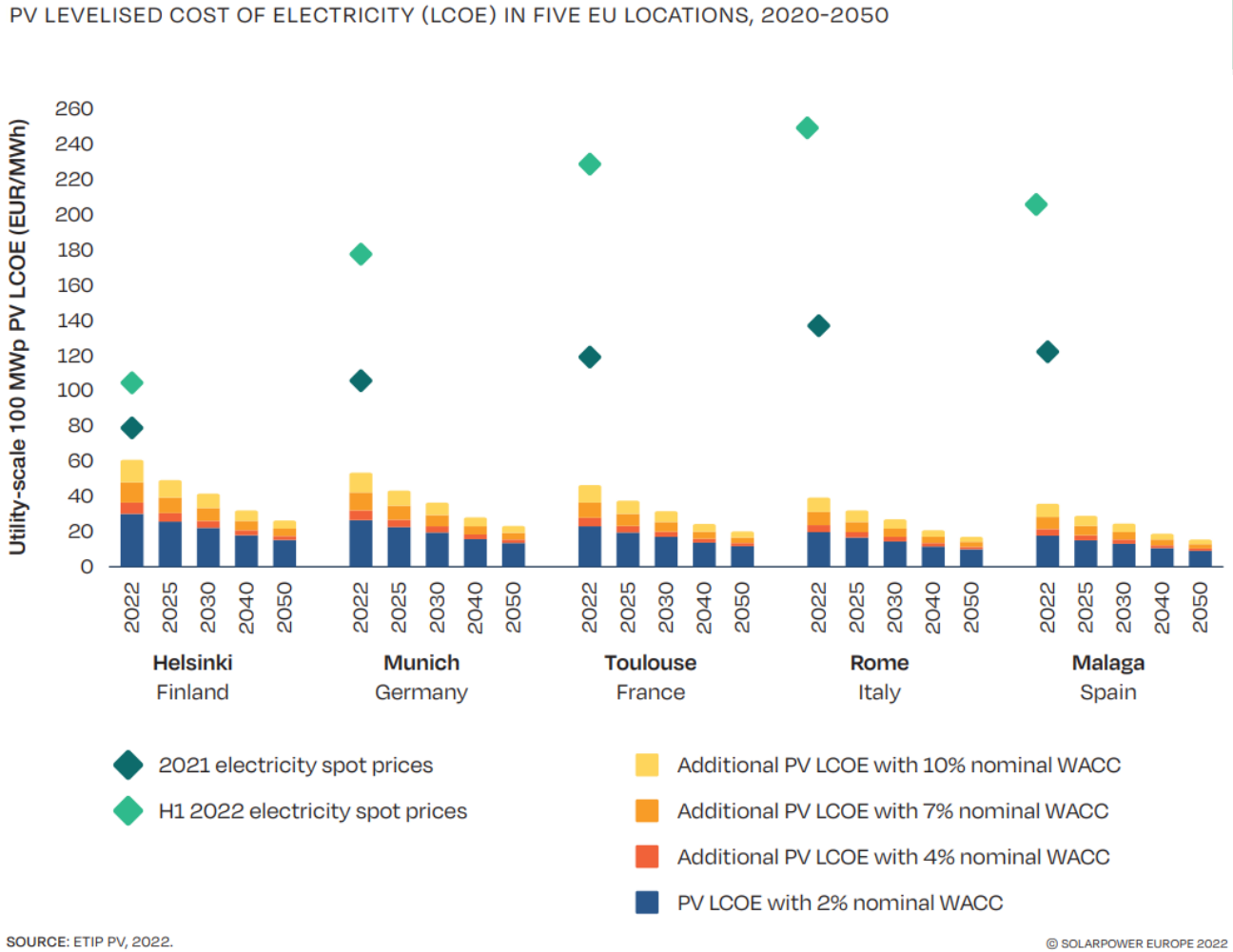
Pineiro-Villaverde, G.; García-Álvarez, M.T. Impact of Clean Energy Policies on Electricity Sector Carbon Emissions in the EU-28. Energies 2022, 15, 1040. https://doi.org/10.3390/ en15031040

Applied RES support schemes

Feed-in Tariffs	The predominant approach – administratively set electricity price that is paid to RES producers for each unit of energy produced and injected into the grid.
Feed-in Premium	FIP – eligible renewable energy generators are paid a premium price, which is a payment in addition to the wholesale market price.
Green Certificate	A green certificate scheme provides RES technologies with an additional income to the market revenue by selling previously awarded certificates to an obliged party.
Prosumer Regulation	Different prosumer support schemes, allow self-producers from renewable energy to self-consume and to inject excess energy to the grid, with or without a compensation.

Low Prices of Renewables – Solar PV

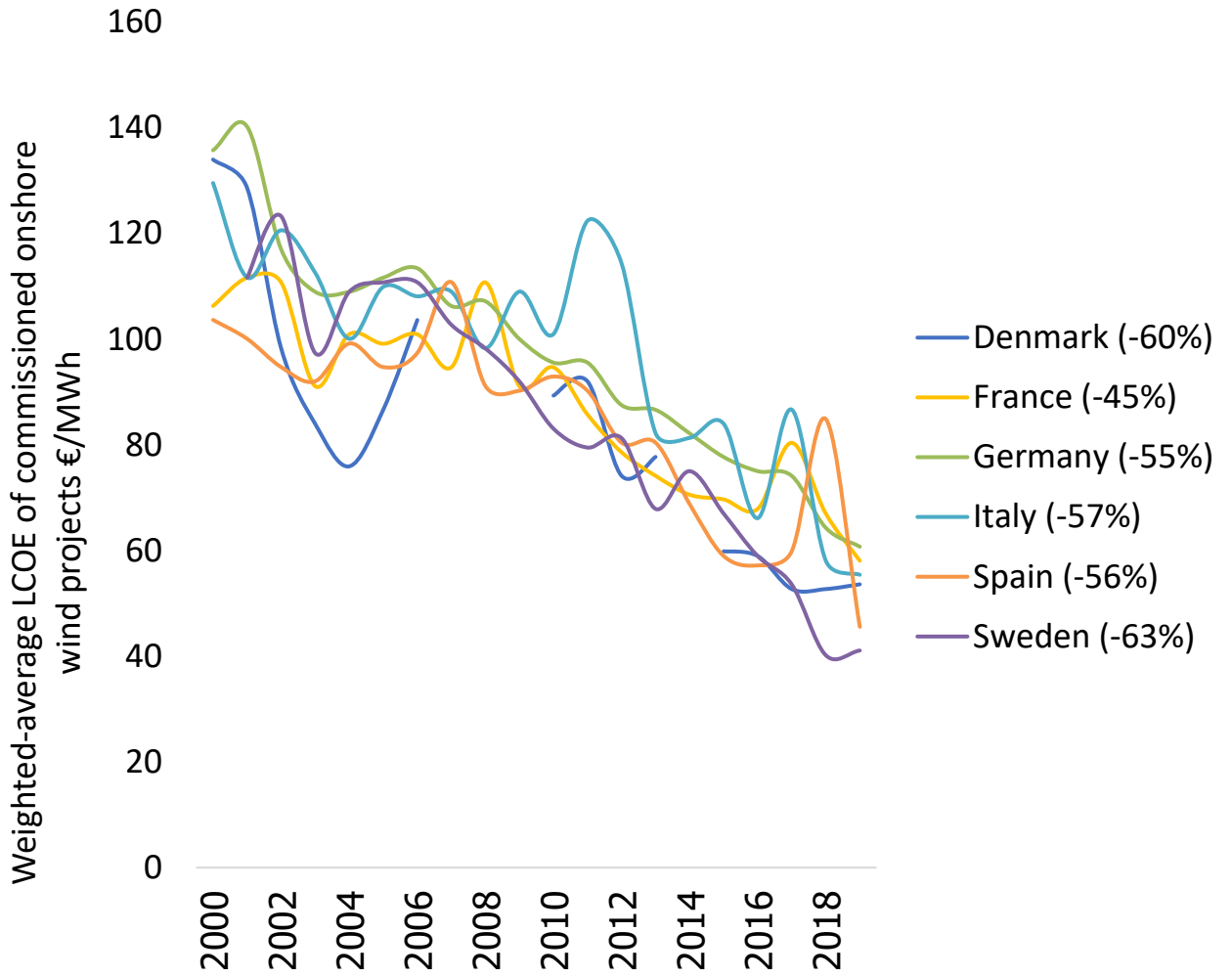
- The global weighted-average total installed cost of utility-scale solar PV fell by **85%** between 2010 and 2020.
- Solar PV module prices have fallen by **93%** since 2010.
- **Module efficiency** has improved and manufacturing has increasingly scaled-up and been optimized.
- Significant reductions in **balance of system costs.**
- Technology improvements that have **reduced system losses** have played a small but important role.
- **Use of trackers and bifacial modules** – which increase yields for a given resource – has also had an impact.



EU Market Outlook for Solar Power (solarpowereurope.org)

Low Prices of Renewables – Wind

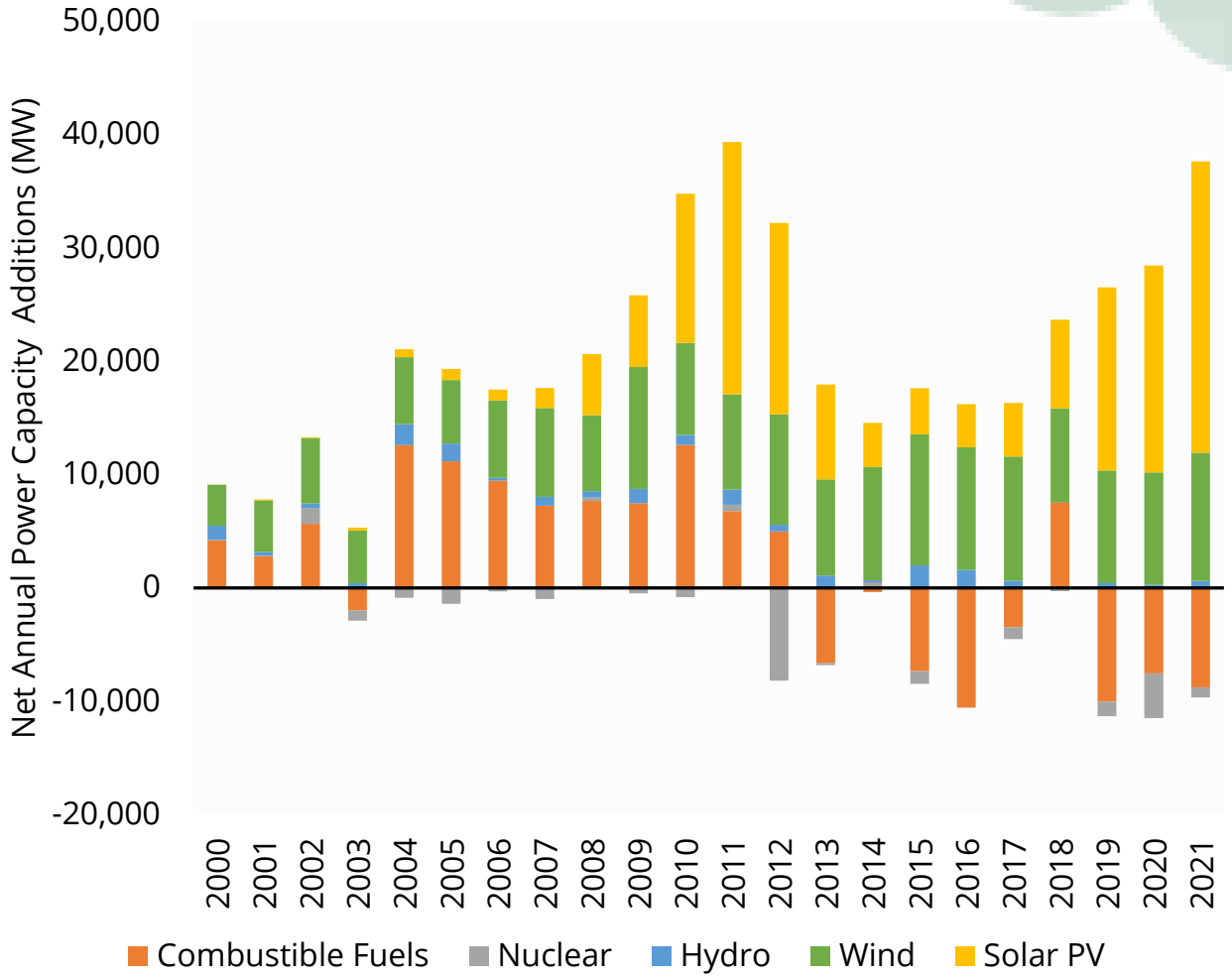
- **Turbine technology improvements:** Increased turbine sizes, optimization of turbine and site configuration led to increased energy yields, reduced O&M costs per unit of capacity.
- **Economies of scale:** Costs of manufacturing, installation and O&M costs.
- **O&M costs**: Digital technologies + reliability of new turbines + new practices and higher competition.
- **Vertical integration** of companies in the supply chain, regional supply chain hubs
- **Competitive procurement:** The shift from feed-in-tariff support schemes to competitive auctions.
- **Cost of capital** reduced cost of capital for the period following the 2008 financial crisis up to the recent years



IRENA (2020), Renewable Power Generation Costs in 2019, International Renewable Energy Agency, Abu Dhabi.

Renewable Power installations Uptake

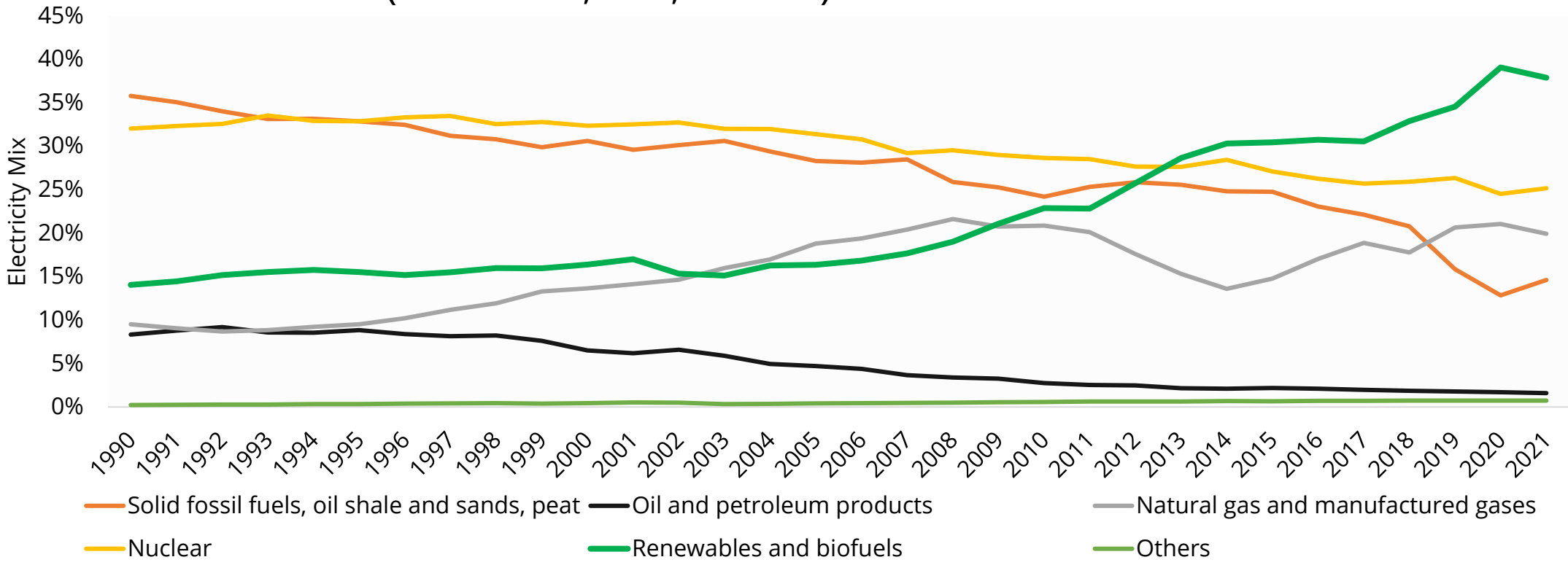
- 2014 – decline in PV demand - elimination of Feed-in Tariffs and Financial incentives in Germany, Italy, Greece, and Romania.
- 2018 – Solar PV renaissance - due to low costs and implementation of auctions for utility-scale projects.
- 2010 - 2021 – Many Fossil Fuel and Nuclear plants shut down due to country environmental pledges.



Eurostat, Energy Statistics, 2023

European Renewable Energy Uptake

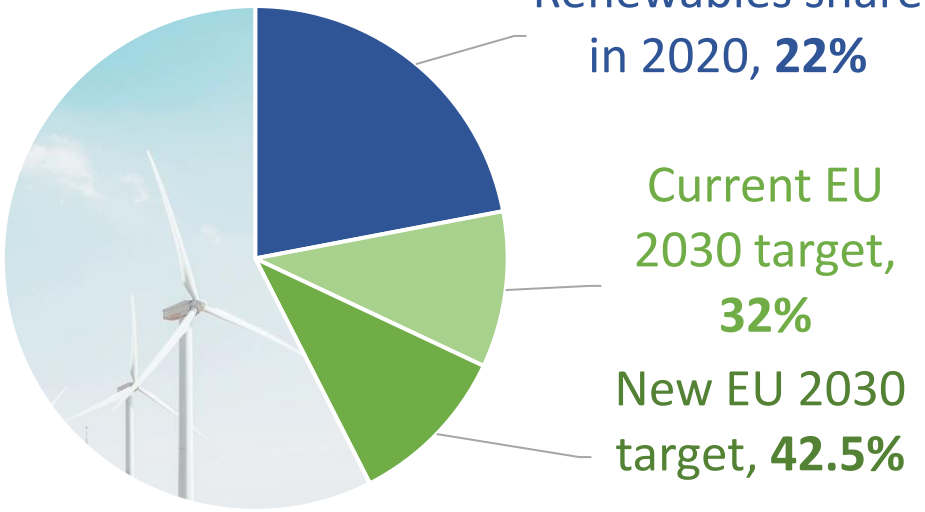
In 2020, more **electricity** was generated from **Renewables** than from all **Fossil Fuels** (Solid fuels, Gas, and Oil) combined.

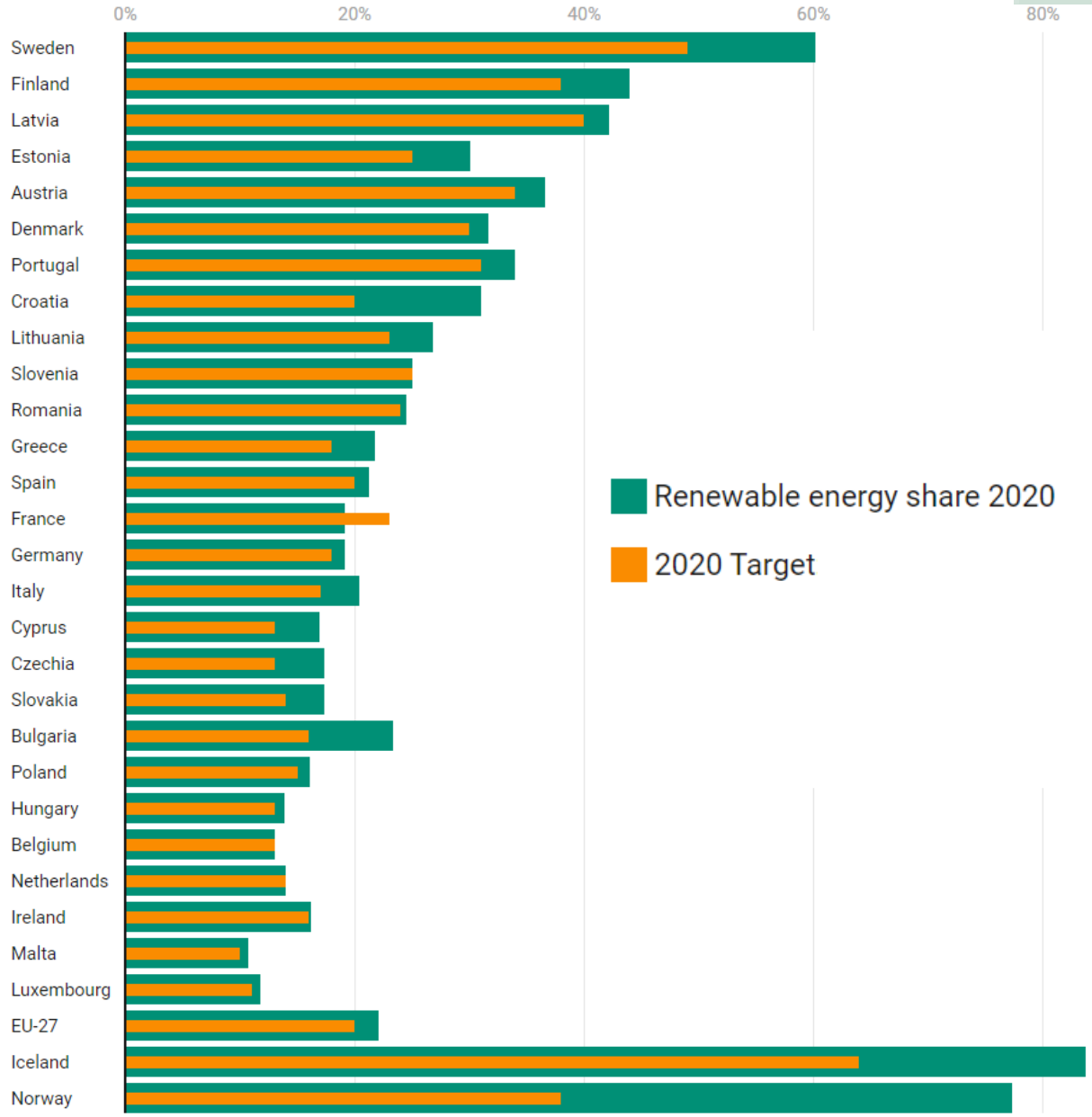


Eurostat, Energy Statistics, 2023

Share of Renewables in Gross Final Energy Consumption

- The EU overachieved its target in 2020 with a 22% share of gross final energy consumption from renewable sources.

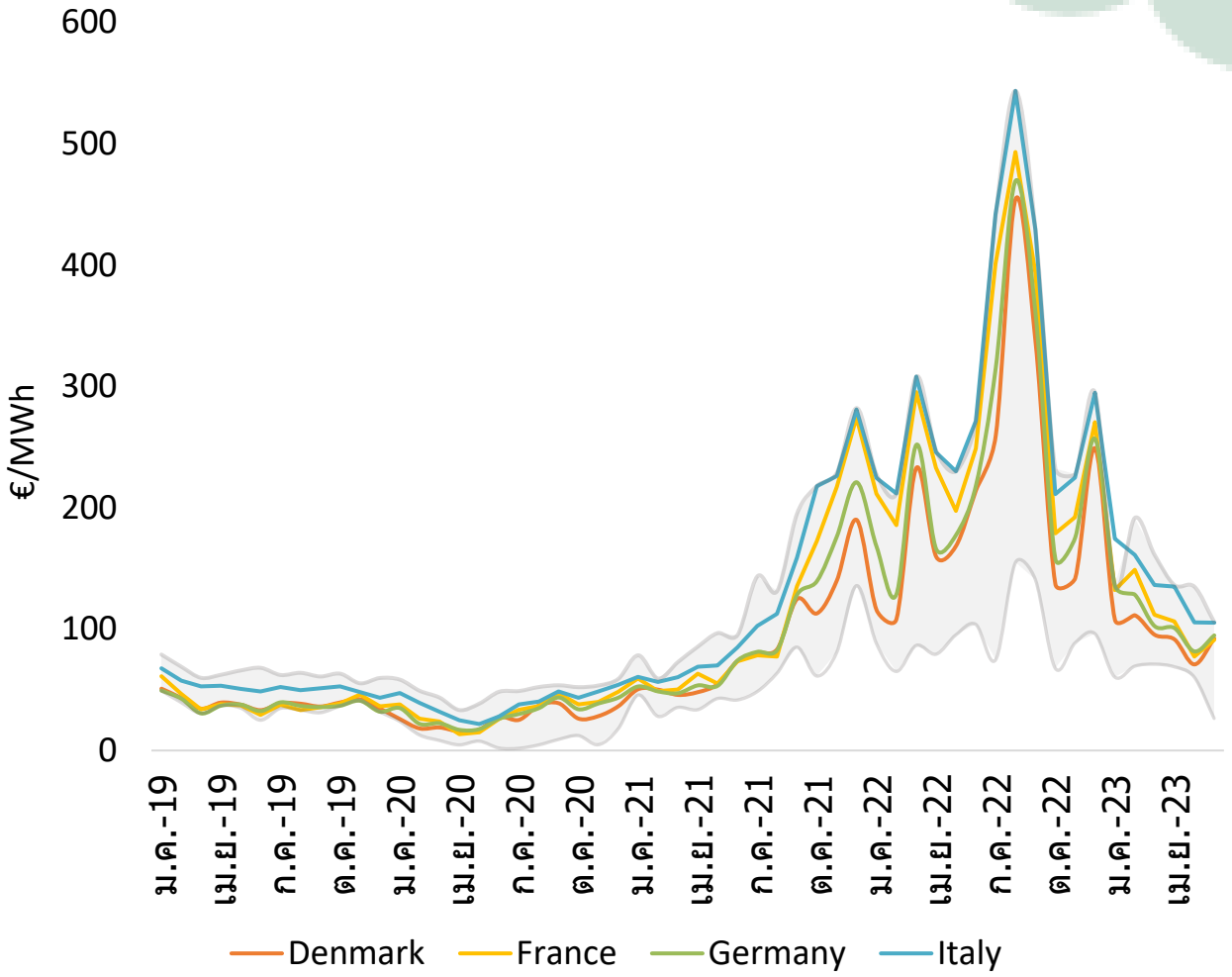




The ‘perfect storm’

The ‘perfect storm’

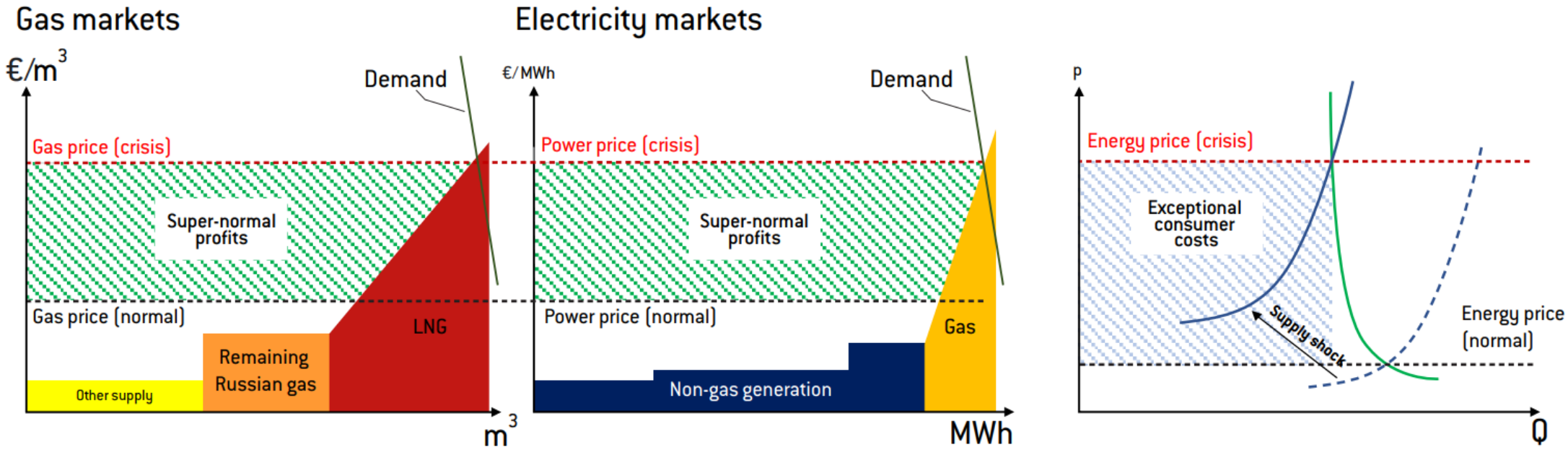
- **Unprecedented sustained high prices** after the summer of 2021
- **Low RES production** in the North Sea
- **Post-covid lockdown recovery** (increase in demand), increase in global LNG demand
- **Low natural gas storage** levels in Europe
- Russia seeking to gain political leverage in Europe
  - **Curtailing Gas supplies**
  - Exposing customers to higher energy bills



Source: ENTSO-e

How the Ukrainian war led to high electricity prices

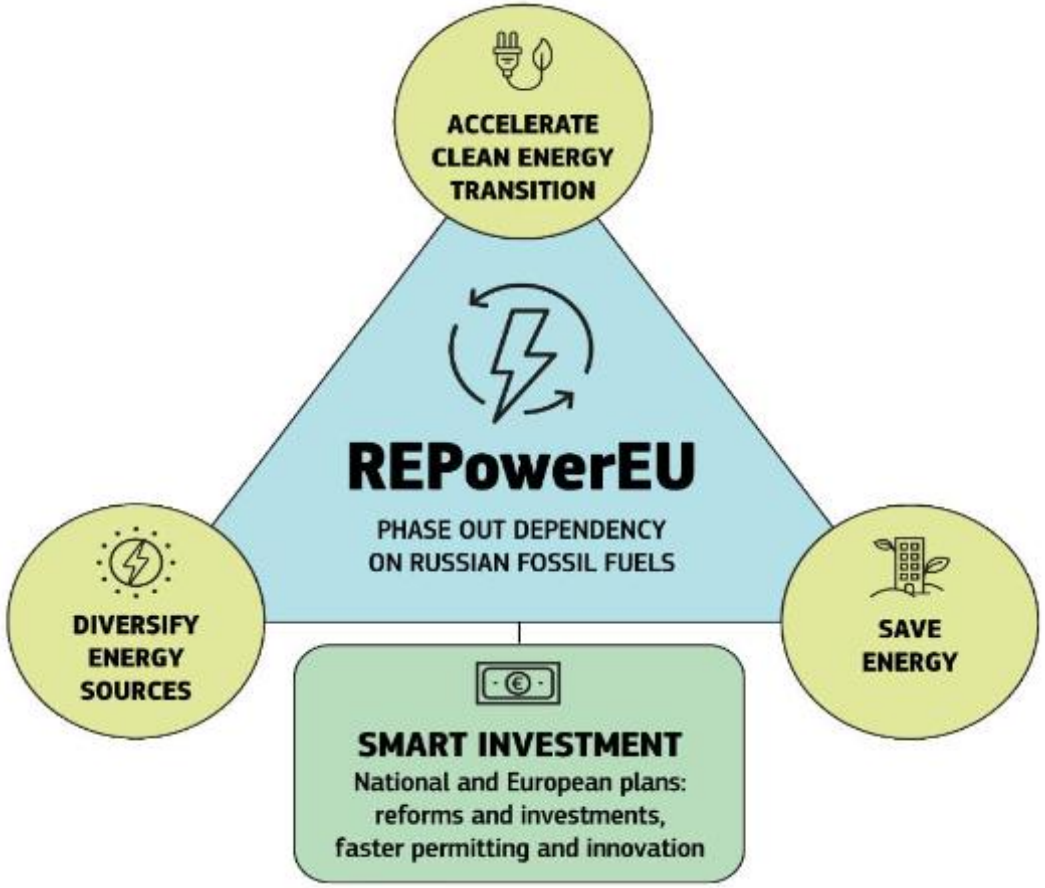
Pay-as-cleared implies that the last power plant that is needed to meet demand (often gas) sets the price for all transactions (marginal pricing).



Source: Bruegel, An assessment of Europe's options for addressing the crisis in energy markets

REpowerEU

- Reduce dependence on Russian fossil fuels
  - **Focus on energy savings** – more ambitious energy efficiency targets (from 9% to 13%)
  - **Increase RES target** (from 40% to 45%)
  - **Increase investments** (EUR 210 billion up to 2027 in power grids, diversify LNG and pipeline gas, energy efficiency, heat pumps)
  - **Common purchase** of gas and LNG, requirements on storage, coordinated demand-reduction plans
  - New legislation for **faster permitting of renewables**
  - **Projections** suggest all countries expected to meet target 2030 target with all but four countries doing so before 2027

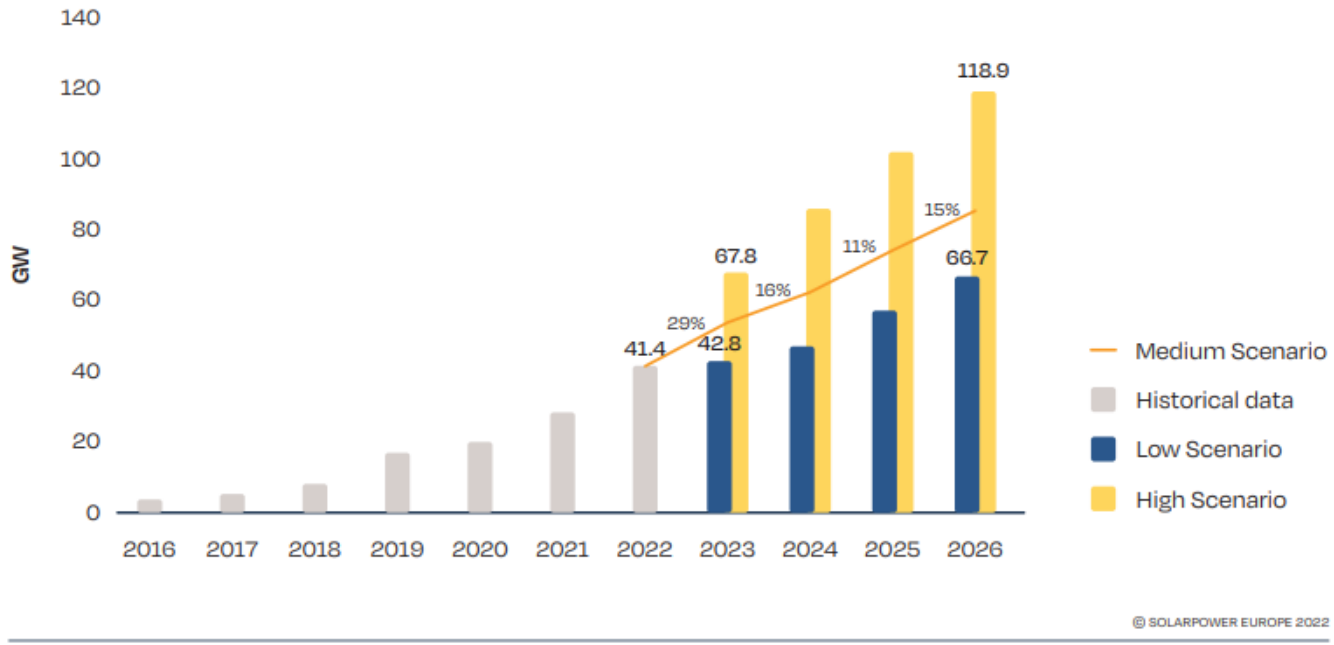


Source: EC, Solarpower Europe

Bright days for solar

- The **projected solar market size of 920 GW** by 2030, in the medium scenario, overshoots REpowerEU's plan of 750 GW (SolarPower Europe)
- Some of the EU Member States have already reached their 2030 solar targets with all but four of them reaching their targets by 2027.
- Challenge:
  - Declining value of solar power
  - Transmission grid constraints
  - Cost of capital

FIGURE 6 EU27 ANNUAL SOLAR PV MARKET SCENARIOS 2023-2026



Source: Energy charts – info, Julien Jomaux Substack post

Policy considerations for sustainable integration of RES

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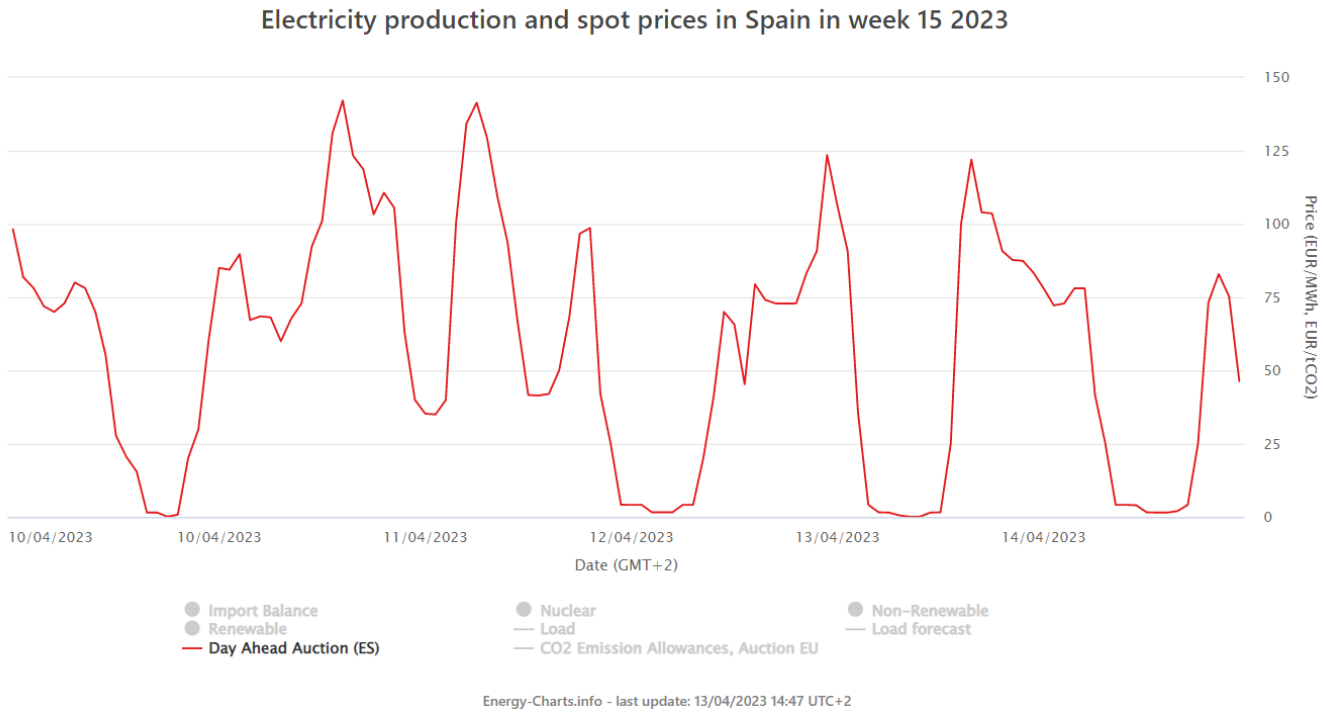
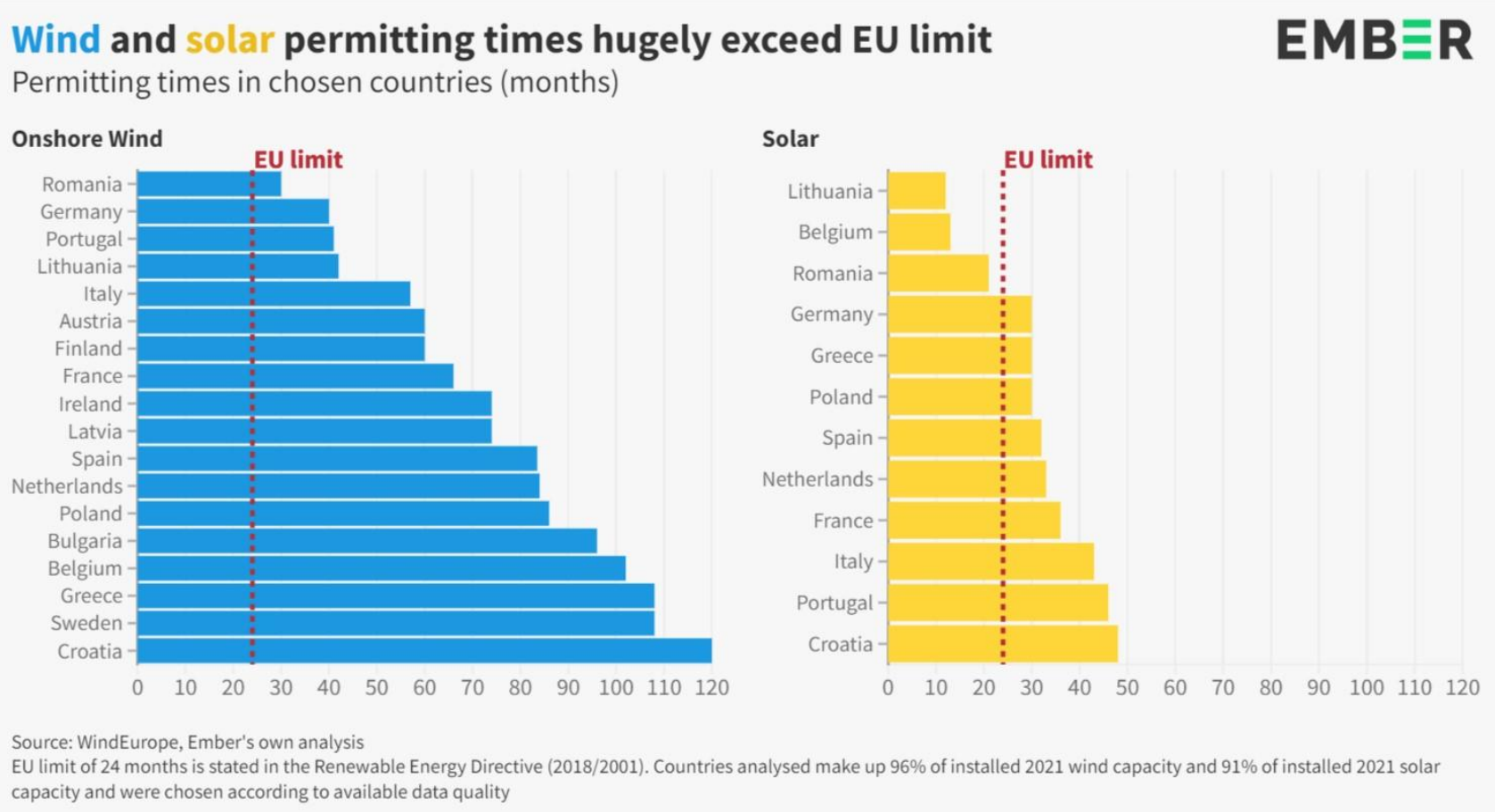
Value of solar and support schemes

- Overcapacity => lowered prices during solar production (Case study Spain – prices lower than 5 EUR/MWh for 8 hour straight on 13 14 April).
- Revenue predictability key for bankability
- EU proposal March 2023: CfD for publicly supported projects. Two issues:
  - No incentives to shift production
  - Financing the gap between the CfD price and market value burden on customers



Source: Energy charts – info, Julien Jomaux Substack post

Permitting issues



https://ember-climate.org/insights/research/europes-race-for-wind-and-solar/

Grid Congestion

Transparent: Transport capacity available

Limited transport capacity available

No transport capacity available for the time being pending the outcome of the congestion management study

No transport capacity available: congestion management cannot be applied

With congestion management:

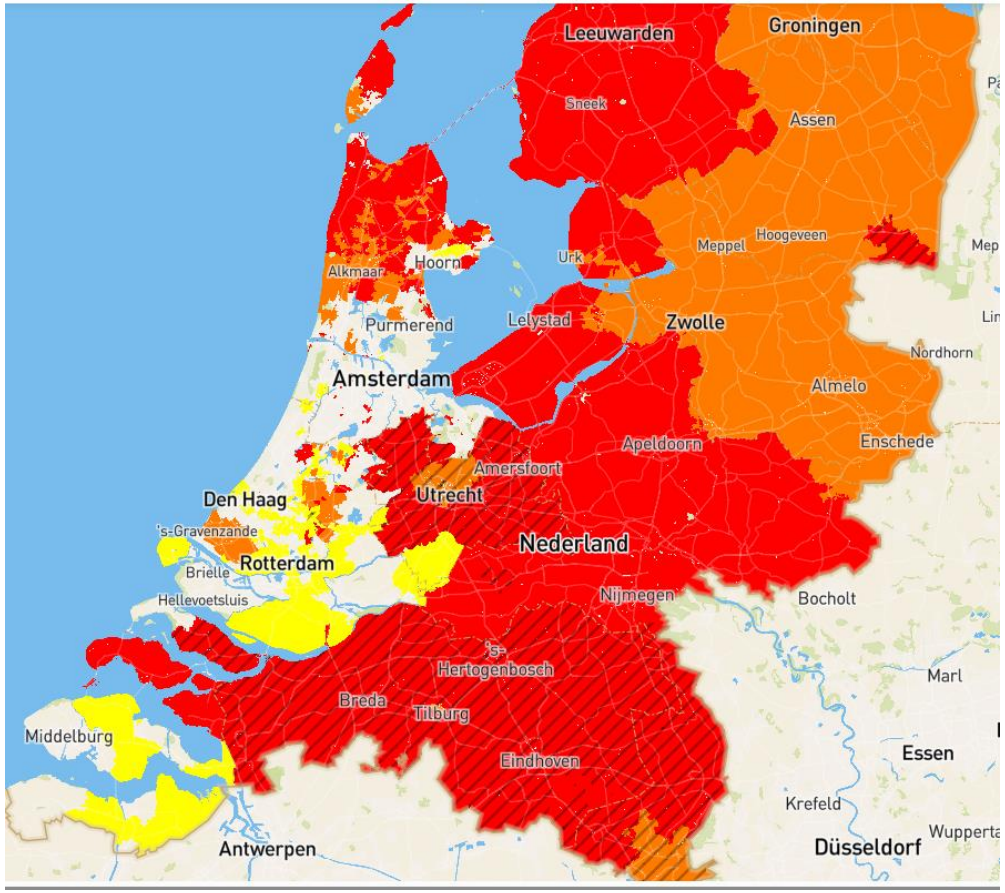
Transport capacity available based on the application of congestion management

Limited transport capacity available based on the application of congestion management

No transport capacity available for the time being pending the distribution of the released power over the queue based on congestion management.

No transport capacity available: the limits for the application of congestion management have been reached

Available grid connection capacities in the Netherlands



https://capaciteitskaart.netbeheernederland.nl/

Flexibility as a key enabler of the transition

- All sources of flexibility required to enable the energy transition
  - **Supply side flexibility** – Dispatchable and flexible low carbon and zero carbon generation sources;
  - **Demand-side flexibility** – incentives for industry and households to provide demand-side flexibility
  - **Local flexibility markets** – DER can participate in platforms which centralize local flexibility offers to relieve congestions and grid bottlenecks
  - **Storage** – address implementation barriers to pumped storage, batteries, heat storage;
  - **Enabling grid access** – increased investments in transmission and distribution grids, increased investments in interconnectors

Thank you!

Ardian Berisha

Economic Regulation Expert

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