

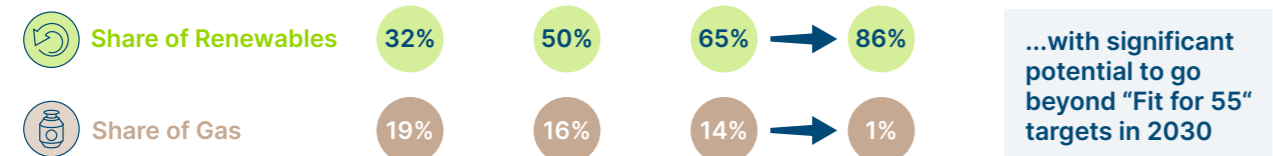
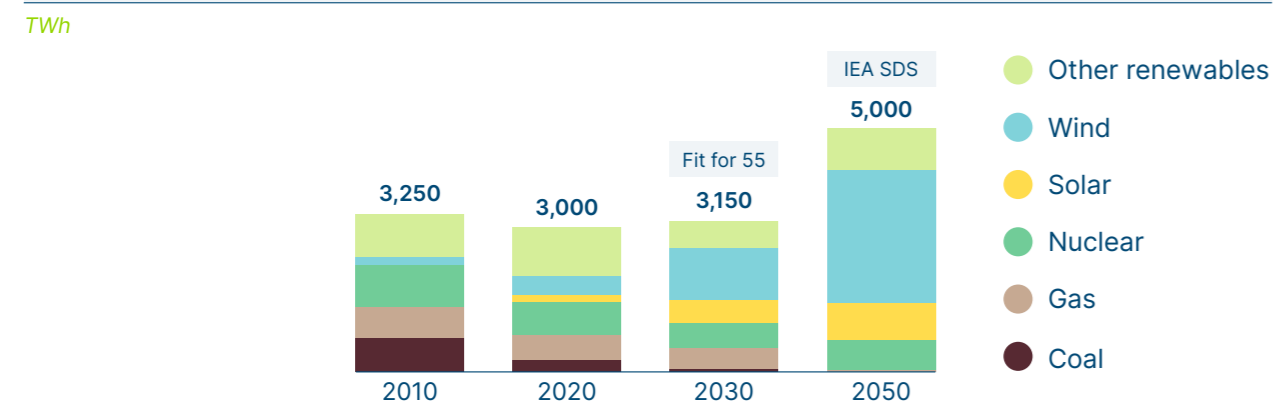
What you need to know about...



# How increased renewable deployment can deliver energy security

## What is the role of renewables in power generation?

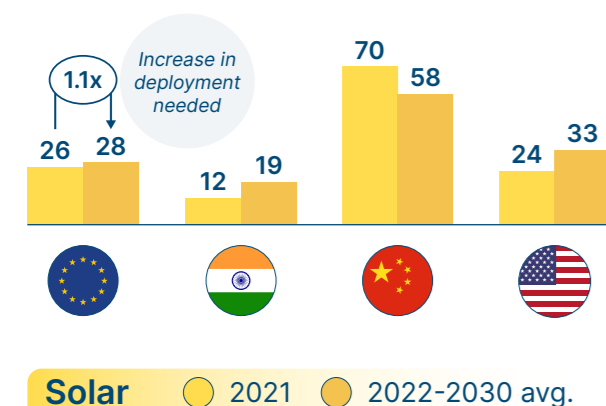
Renewables are growing in importance for power generation in Europe



## Is the deployment of renewables on track?

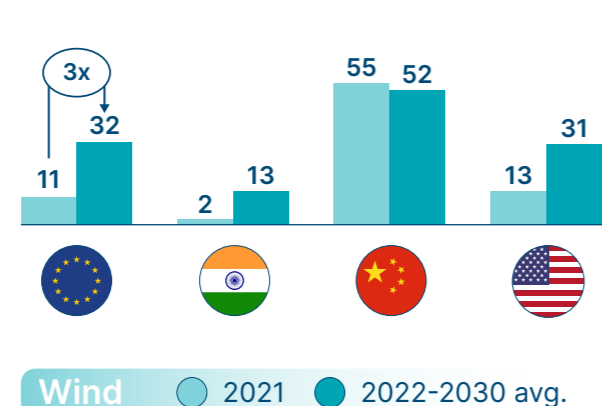
In the EU, solar is on track to meet 'Fit for 55' 2030 targets

Capacity additions in GW/yr required to meet ambitious 2030 regional decarbonisation targets



Wind installations must increase threefold

Capacity additions in GW/yr required to meet ambitious 2030 regional decarbonisation targets

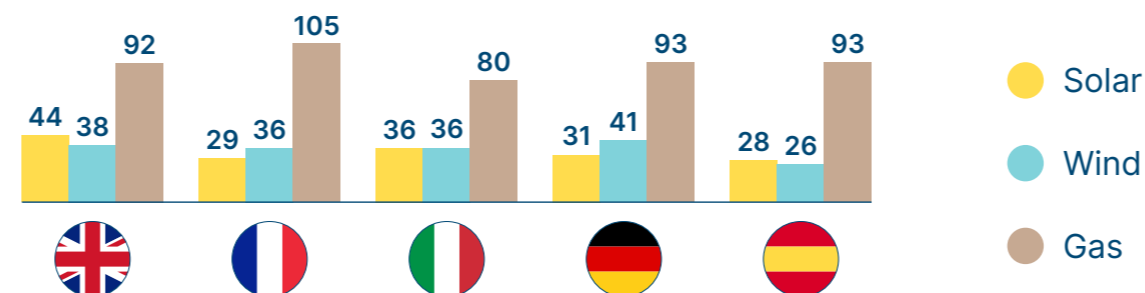


## Are zero-carbon renewables-based power systems feasible?

### 1 Wind and solar are now the lowest-cost source of power generation in Europe.

Generation costs for renewables have declined dramatically in the recent years, outcompeting fossil sources on cost in Europe, even if unsubsidised

Lowest-cost bulk generation cost, in €/MWh – including carbon pricing



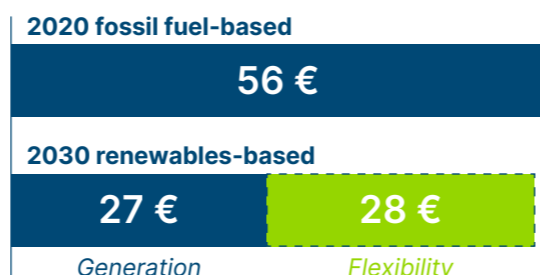
### 2 The variability of renewable generation can be managed at low-cost.

Wind and solar need to be balanced when the wind doesn't blow and the sun doesn't shine on a daily (hourly and day-to-night) and seasonal (e.g. winter heating) basis.

Many zero-carbon technologies can balance renewable-dominated systems, e.g. storage, complementary supply, network expansion and digitalisation & reactive demand.

Large volumes of renewables can and are being integrated into grids without increasing system costs.

All-in generation cost, €/MWh

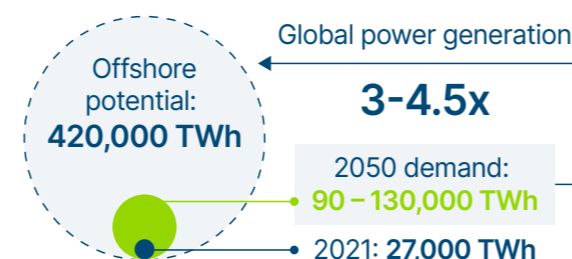


Options for balancing variable renewable generation

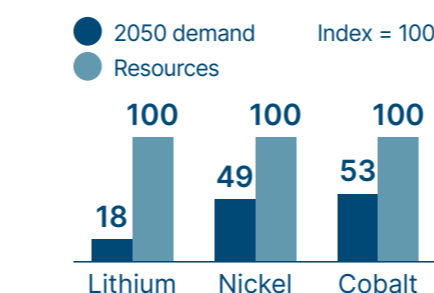
- Daily balancing** (~5-15% total generation)
  - Batteries
  - Pumped hydro
  - Demand management
- Seasonal balancing** (~10-25% total generation)
  - Regional interconnection
  - Wind / solar overbuild
  - Zero-carbon gas peak plants

### 3 There are sufficient renewable resources and materials globally to support the required growth in zero-carbon electricity generation.

Offshore wind potential 15x total current electricity demand



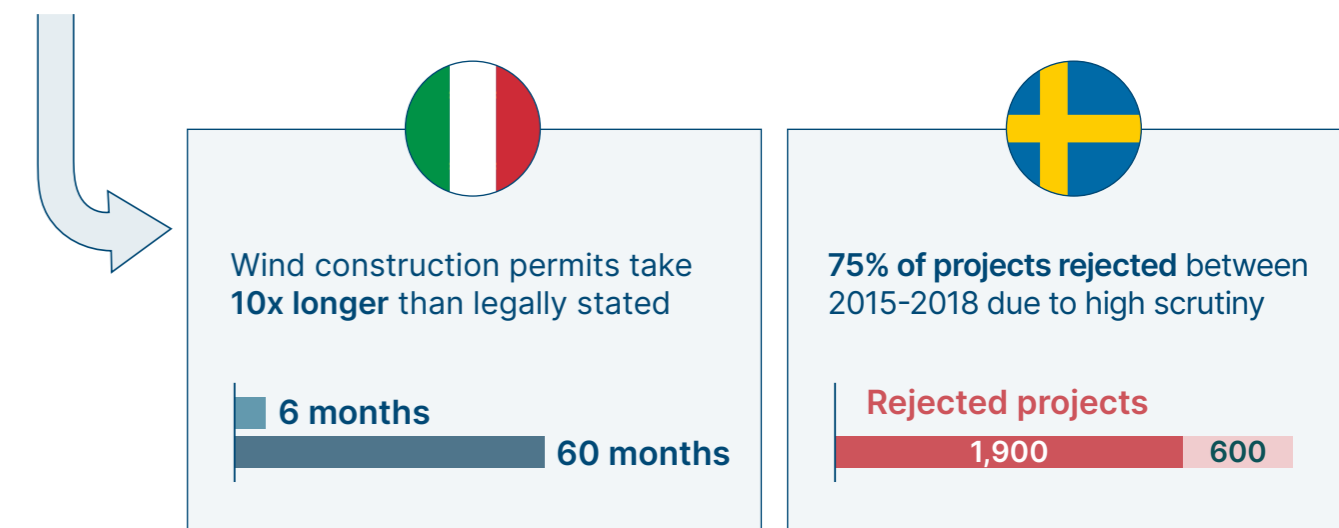
Cumulative demand for materials well within global resources



Key materials needed for the energy transition are highly abundant and global resources are large enough to meet most of future material requirements

## What are the bottlenecks for rapid scale up of renewables in Europe?

- Lack of ambitious targets for renewable deployment, backed by long-term contracts.
- Inadequate power market design, holding back storage and flexibility providers.
- Limited and slow extension and upgrade of power networks and interconnection.
- Slow development of supply chain infrastructure and necessary skills, as well as availability of key inputs/materials.
- Slow and complex planning, permitting and land acquisition requirements and processes.



## What needs to happen to unlock renewables?

	Set clear quantitative medium-term targets	<ul style="list-style-type: none"> <li>Increase EU and National quantitative targets for zero-carbon electricity in 2030 (e.g. wind and solar capacity, grid emissions intensity)</li> </ul>
	Provide incentives to scale renewables	<ul style="list-style-type: none"> <li>Adapt power market design (e.g. long-term contracts, reform short-term markets e.g. ancillary &amp; capacity markets)</li> <li>Organise annual auctions to source competitive new renewable capacity</li> </ul>
	Develop infrastructure and capabilities	<ul style="list-style-type: none"> <li>Expand network infrastructure &amp; set a regulatory framework for anticipatory investments in power networks</li> <li>Establish a clear plan for supply chain expansion and workforce training</li> </ul>
	Facilitate planning and permitting	<ul style="list-style-type: none"> <li>Define an integrated vision for power system and network design</li> <li>Accelerate planning, permitting and land acquisition</li> </ul>