Navigating Power Grid Scarcity

Hungarian experiences with RES integration

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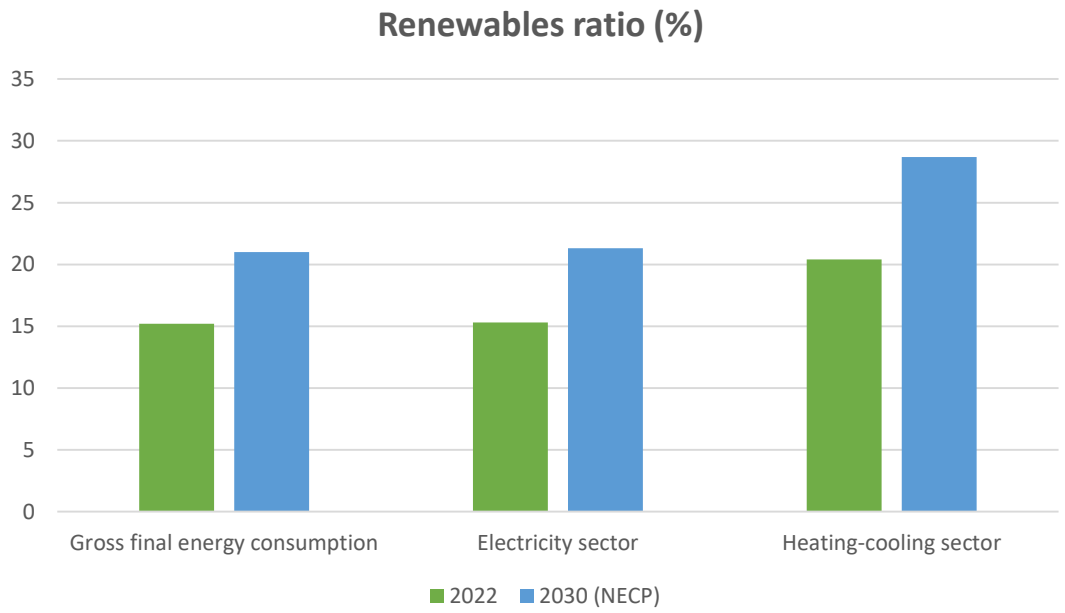
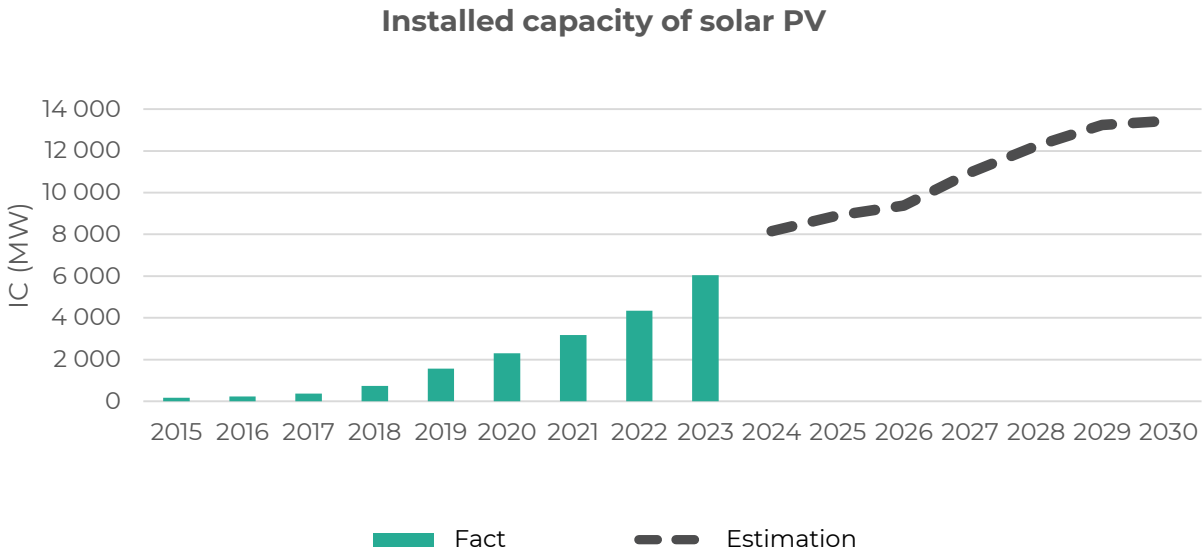
Background context on RES deployment and targets





System context: ~11 GW installed capacity **~7 GW** solar PV
Winter peak 7441 MW,
Summer peak: 6940 MW,
Average load between 3000-5500MW
National Energy and Climate Plan targets by 2030: 12 GW solar, 1 GW storage, 1 GW wind

Current/future issues caused by RES integration in Hungary

System level: connection capacity issues

- Long connection queues for renewable generation and storage connection requests

Distribution level: capacity and quality of supply issues

- PV feed-in limitation in certain areas
- Voltage issues, flickering
- Reverse flows

Overview of the tools for tackling RES integration problems

(RE)allocation of existing grid capacities	Better utilisation of existing grids	Creating new grid capacities
Shared connection/ hybridization/ colocation/ pooling	Priority lanes	Anticipatory planning
Setting up a congestion management platform	Cleaning the queue	RAA zones (as per RED III)
Alternative/flexible connection contracts	More transparency on the available capacities	
Grid enhancing technologies (GETs): DLR (Dynamic Line Rating at TSO level), IVR (Integrated Voltage Regulator at DSO level)	Better governance	

Legal background for flexible connections

- Origin of the provision: intended transposition of article 42 of the electricity directive.
- Currently under Section 35.§ (7) in Act LXXXVI of 2007 on Electricity: **TSOs and DSOs** shall be **allowed to limit the guaranteed connection capacity** or **to offer connections subject to operational limitations** in the accession protocol, in order to ensure **economic efficiency** regarding new **power plants** - including consumer equipment - or **electricity storage facilities**. These are considered **flexible connection agreements**. Where the investor **bears all costs** of network reinforcement related to ensuring unlimited connection, **no limitation of guaranteed connection capacity or operational limitation may be stipulated** in the connection agreement.
- Summary:
  - both for TSOs and DSOs
  - only for power plants and storage
  - only for reasons of economic efficiency
  - no limitations, if connection charge is fully paid up
  - detailed rules laid down in supply codes

Flexible connection agreements applied

DSOs	TSOs
Pursuant to the distribution code, some DSOs already apply FCAs under VET in the following setups: • **N-1 situations (historical)** • **N-1 situations in case of the fault of certain network elements** • **N-0 situations with time block limitations**	**No ‚proper' FCAs under VET 35 (7)** because of the provision laying down that there shall be no limitation if the connection charge is fully paid up. However, there are **two alternatives until network build-out (but only for aFRR ready non-vRES):** • **The ‚complementer' connections:** until network build-out, the newly connected capacity is limited in certain time-blocks • **Hybrid or shared connections:** a new asset might be put behind an already existing connection point without additional network connection capacity (e.g. storage+PV)

Results: faster connection lead times.
Next steps: EMD implementation of flexible connection agreements.

Summary and next steps

- Several implementation tasks: RED III: RAAs, EMD: flexible connection agreements, connection information provision…
- National amendment of connection capacity allocation rules until the end of the year
- New tariff period
- Increased attention to the set-up of market-based flexibility procurement for DSOs

The Regulator’s work is forever ongoing!

THANK YOU FOR YOUR ATTENTION!

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