# The role of energy storage in our path to net-zero

Hungarian Battery Day
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# EASE members

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# Europe is Moving Away from Centralised Energy Generation

## Driven by Decarbonisation Goals → *Accelerated* by REPowerEU

***Centralised Dispatchable Generation***

Increase and decrease production based on demand

'Energy Transition'

**Today's Climate Goals:**

***2030***

- ✓ 40% RES → **45% RES** proposed **REPowerEU***
  - ✓ >1200 GW in 2030 wind+solar → X3 today's capacity
- ✓ 55% GHG reduction

***Net Zero by 2050***

***Decentralised Variable Generation***

Reliant on weather → need flexible, dispatchable back-up to fill the gaps



*EUROPEAN COMMISSION, COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE EUROPEAN COUNCIL, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS REPowerEU Plan. (2022).

# What does This Mean for the Energy System Today?

## Ambitious Goals raise Challenges for the grid

### Key Challenges:

1. Grid support and resilience
2. Rising curtailment
3. Reliance on fossil fuels to fill the gaps, often gas peakers
4. Need to shift energy over days, weeks, seasons

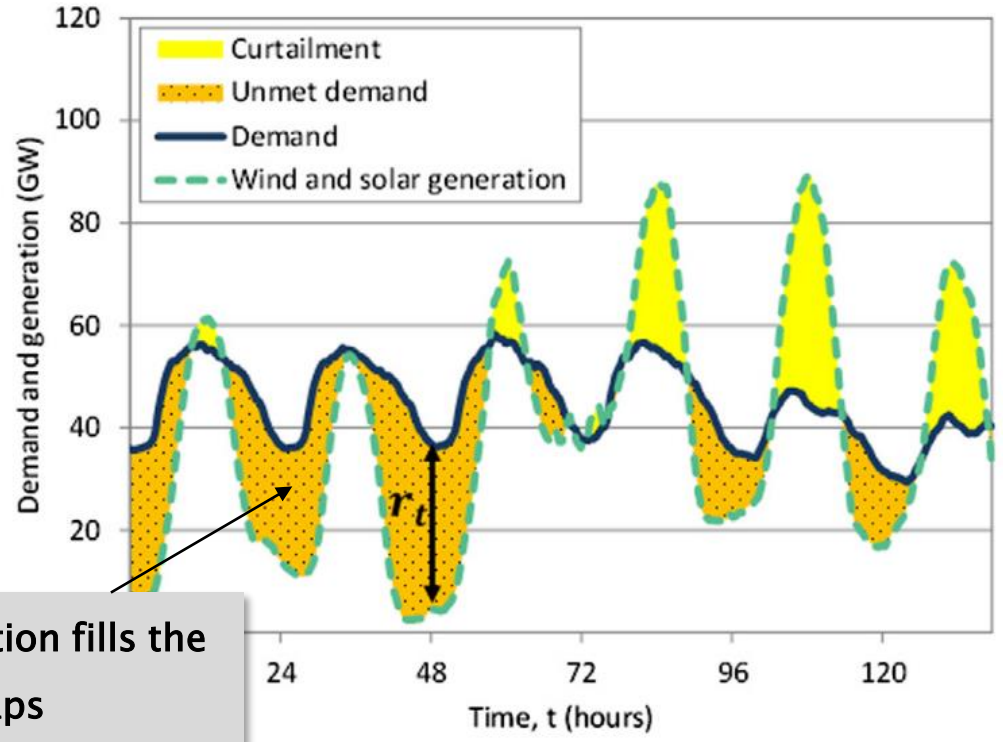
*Already seeing these challenges today…*

# Key Challenges in the Energy System Today

## Reliance on fossil fuels to fill the gaps

### Daily timescale

- ✓ Balance variability of wind and solar production e.g. day/night cycle of solar
- ✓ Meet peak demand periods




**Fossil fuel generation fills the unmet demand gaps**

**Fig. 2.** Example of curtailment and residual demand in a power system.



Source: Zappa, W.et al. Renew. Sustain. Energy Rev. 94, 1192–1216 (2018).

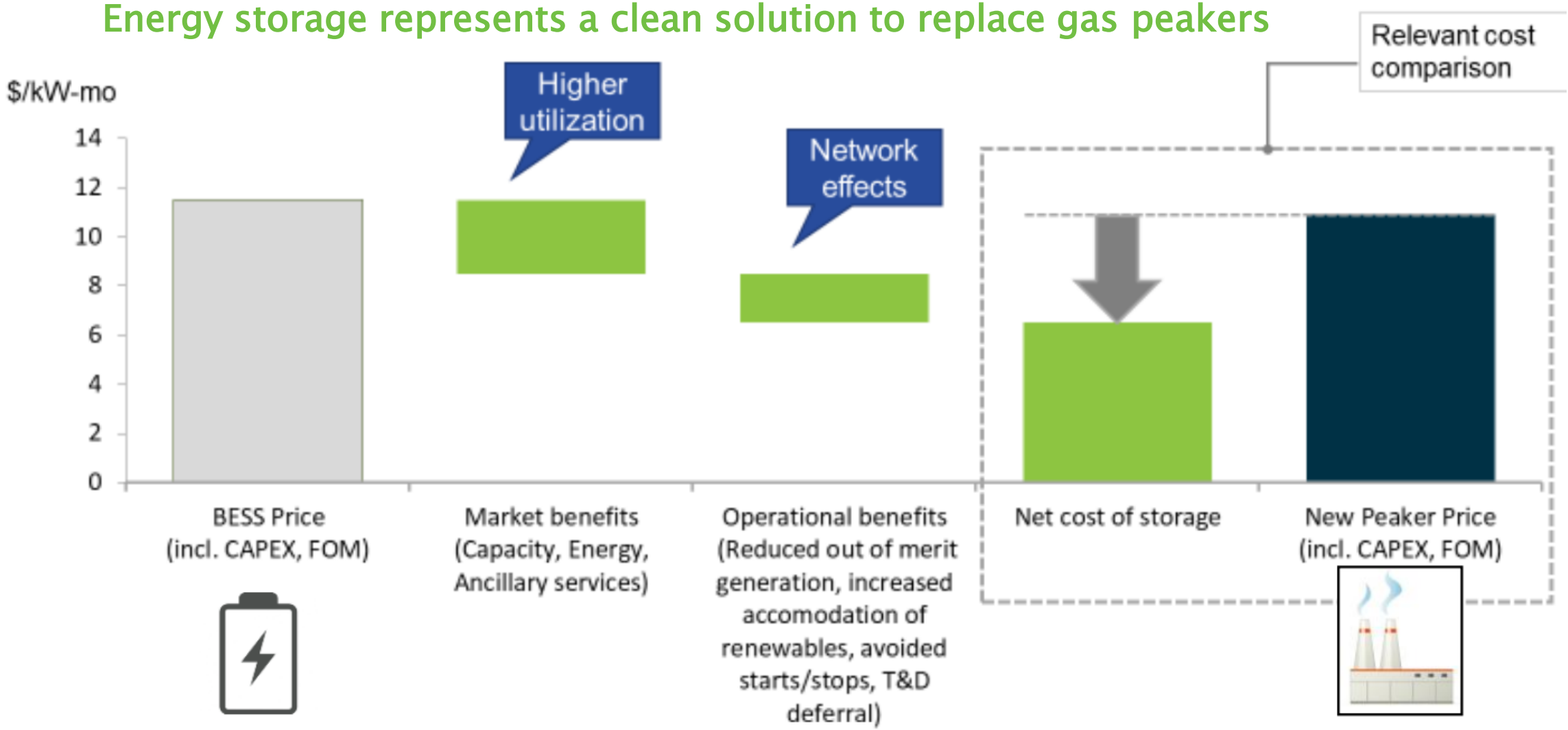
# Energy Storage vs. Gas Peakers

## Energy storage represents a clean solution to replace gas peakers

- Traditionally, **peaking plants** have been used to provide flexibility to the grid, but they are very costly to operate and are idle 90% or more of the time.
- **Energy storage** is cleaner, more flexible, and "always on". It provides these benefits:
  - ✓ Available 24/7 and synchronised to the grid, it generates more network value through system services
  - ✓ No start up or shut down costs
  - ✓ Prevents curtailment and reduces network costs by absorbing extra renewable generation
  - ✓ No emissions, water, noise, fuel
  - ✓ Able to dispatch energy in milliseconds (less MW needed to balance)

# Energy Storage vs. Gas Peakers

## Energy storage represents a clean solution to replace gas peakers

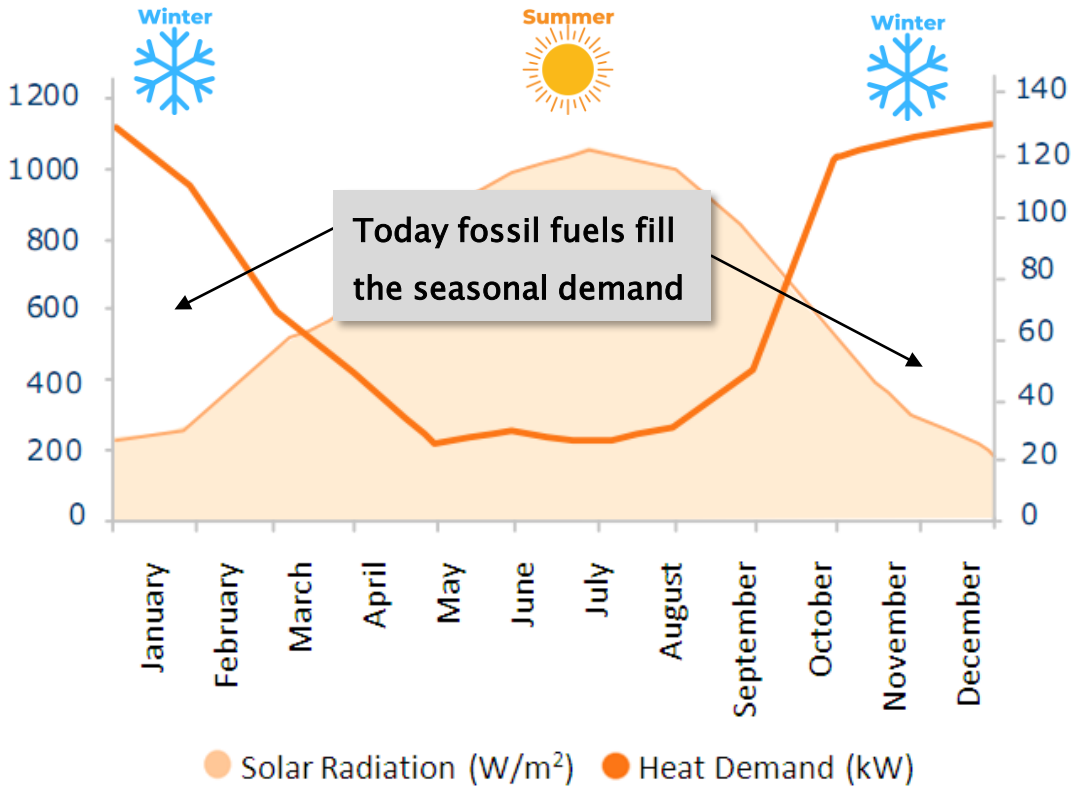


# Key Challenges in the Energy System Today

## Reliance on fossil fuels to fill the gaps

### Seasonal timescale (longer durations)

- ✓ Traditionally fossil fuels meet seasonal demand especially heating
- ✓ Need a **clean, dispatchable energy backup** supply to meet longer duration needs






Source: https://www.icax.co.uk/Heat_Recycling.html

# Two Types of Flexibility From Energy Storage

## Energy Storage

### 1. System Flexibility

→ one-directional
System flexibility

**Electricity flows in one direction** and is not given back to the system as electricity – it is converted into another energy carrier.

**E.g.:** Power-to-heat, Power-to-gas, V1G etc...

### 2. Energy Shifting

⇄ bi-directional
Energy Shifting

**shifting electricity** storing at times of surplus and giving electricity back to the system at times of deficit across different timescales (seconds, hours, days, weeks seasons) – to 'fill the gaps'

**E.g.** Batteries, flow batteries, V2G, Flywheels, PHS, CAES, LAES, Supercapacitors, Gravity storage, Thermal energy storage (P2H2P) etc .....

# Energy Storage Offers a Solution to Key Challenges

## Providing Flexibility and Energy shifting

### Key Challenges:

1. Grid support and resilience
2. Rising curtai
3. Reliance on
   gas peakers
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### Solutions with *Energy Storage*:

- ✓ Provide fasted response grid support
  servic
- ✓ toring excess
  e used when
  needed
- ✓ **Provides a clean, dispatchable backup energy supply,** reducing the need for fossil generators i.e. Natural gas
- ✓ **Energy shifting** over different timescales

***How much energy storage?***

# Energy Storage Targets

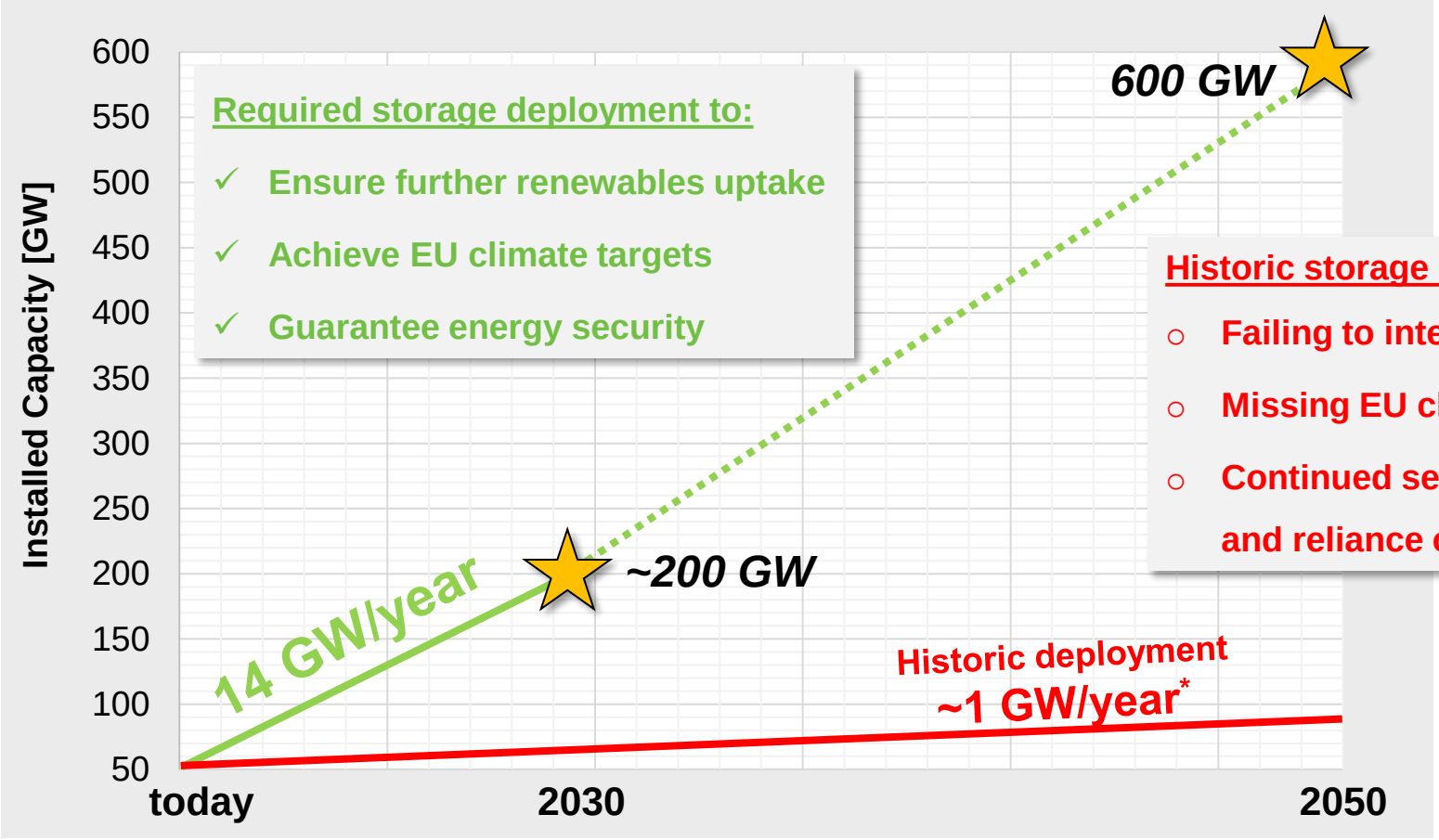
## Already existing targets for Energy Storage 2030 & 2050

- Present-day regional targets existing in the US can inspire EU-wide targets
  - ✓ Energy Storage targets of 1. 325 MW by 2020 were thus enacted in 2010 in California
  - ✓ More recently, the New York State has defined a deployment goal of 3,000 MW of additional storage by 2030

- National-wide ES targets are starting to appear in the EU
  - ✓ Spain, which is already targeting 74% renewables in the power sector by 2030, has long-term storage goals of 20 GW by 2030 and 30 GW by 2050

# Energy Storage Estimates 2030 and 2050

## Compared to Historic Market Deployment




*https://www.iea.org/reports/energy-storage

# How can we reach these targets?

## Measures that need to be taken

- ✓ Set European energy storage targets for 2030 and 2050
- ✓ Eliminate double taxation and harmonise taxation at EU level
- ✓ Signal scarcity with appropriate prices while compensating grid supportive behaviour
- ✓ Tender specific curtailment minimisation products and allow for CCfD
- ✓ Ensure the permitting process for co-located (ES and renewable energy) infrastructure is efficient, short, and simple

# Talk to us.

We're ready to answer your questions.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