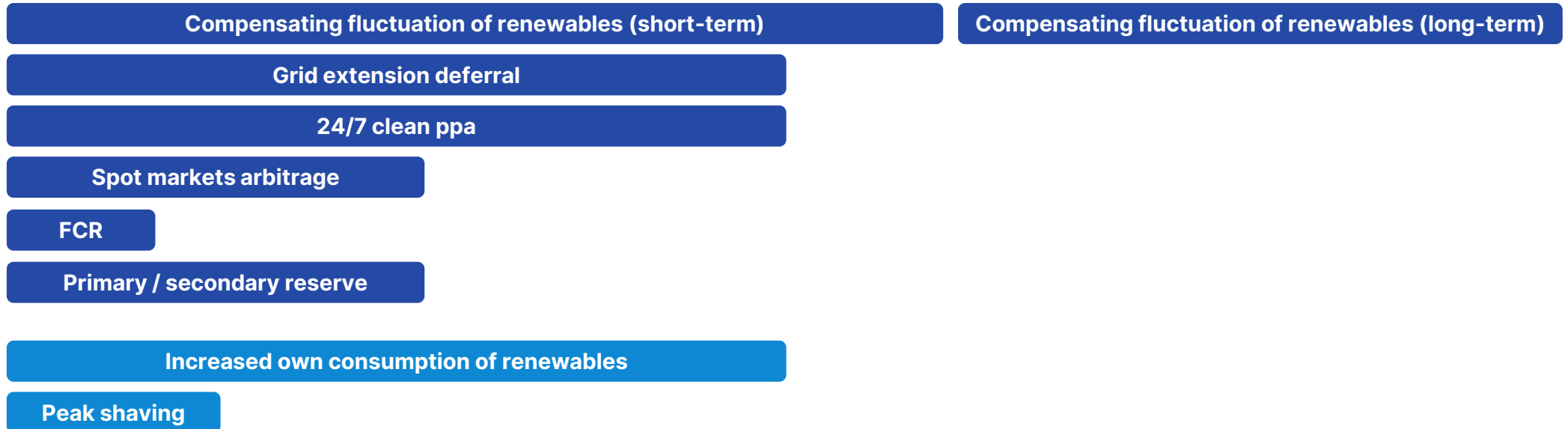




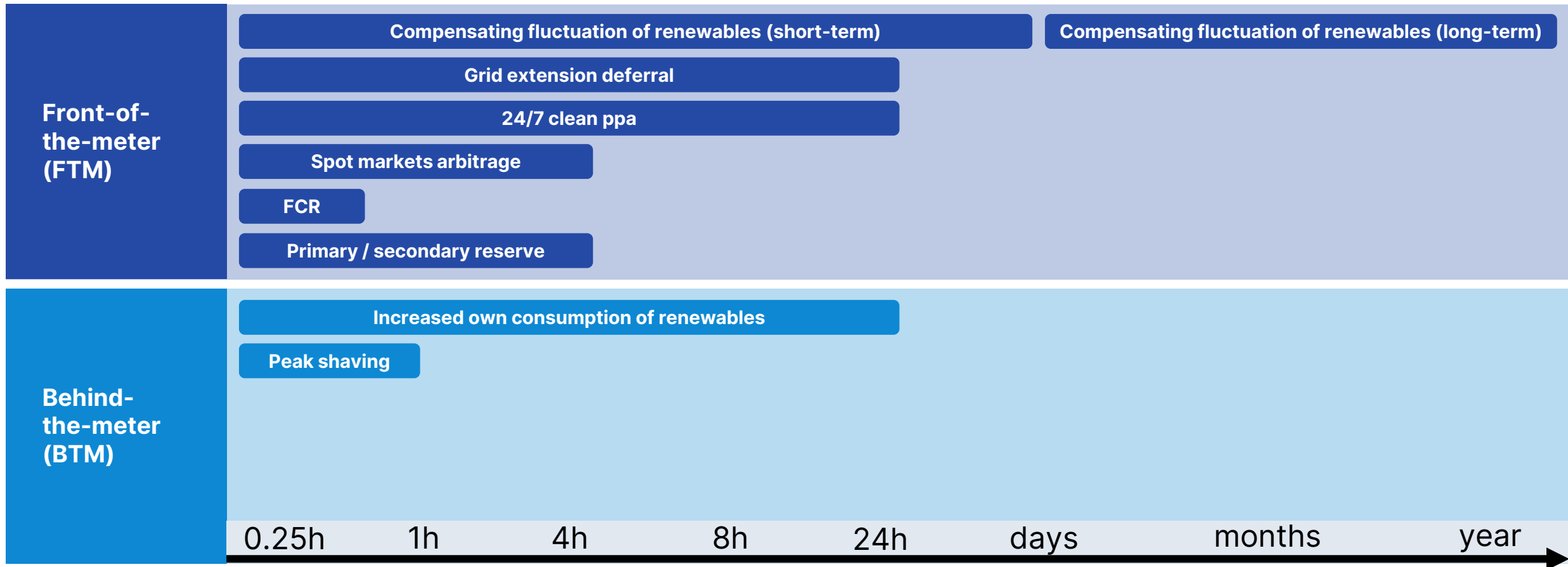
Business Cases for Flow Batteries

IFBF 2025

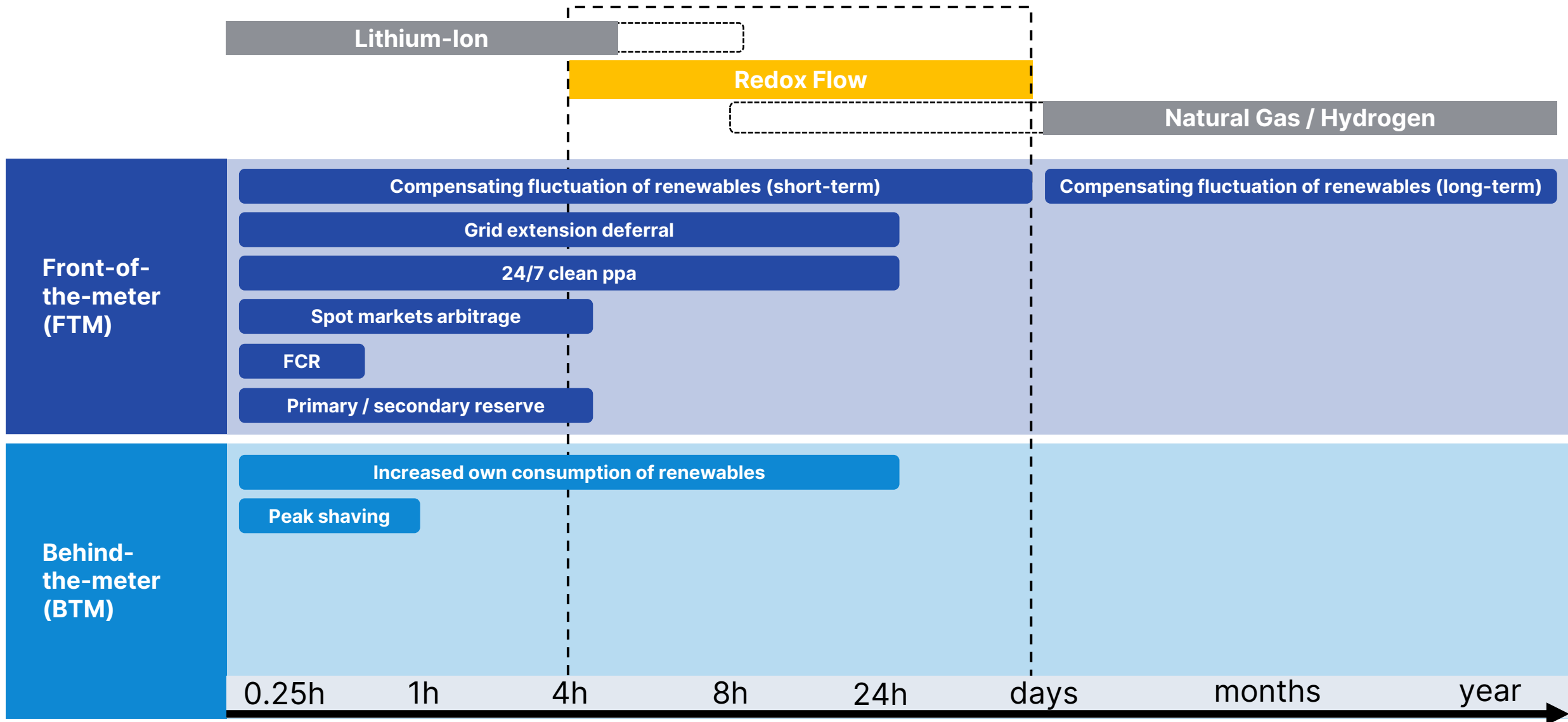
Overview: Business cases for flow batteries



Overview: Business cases for flow batteries



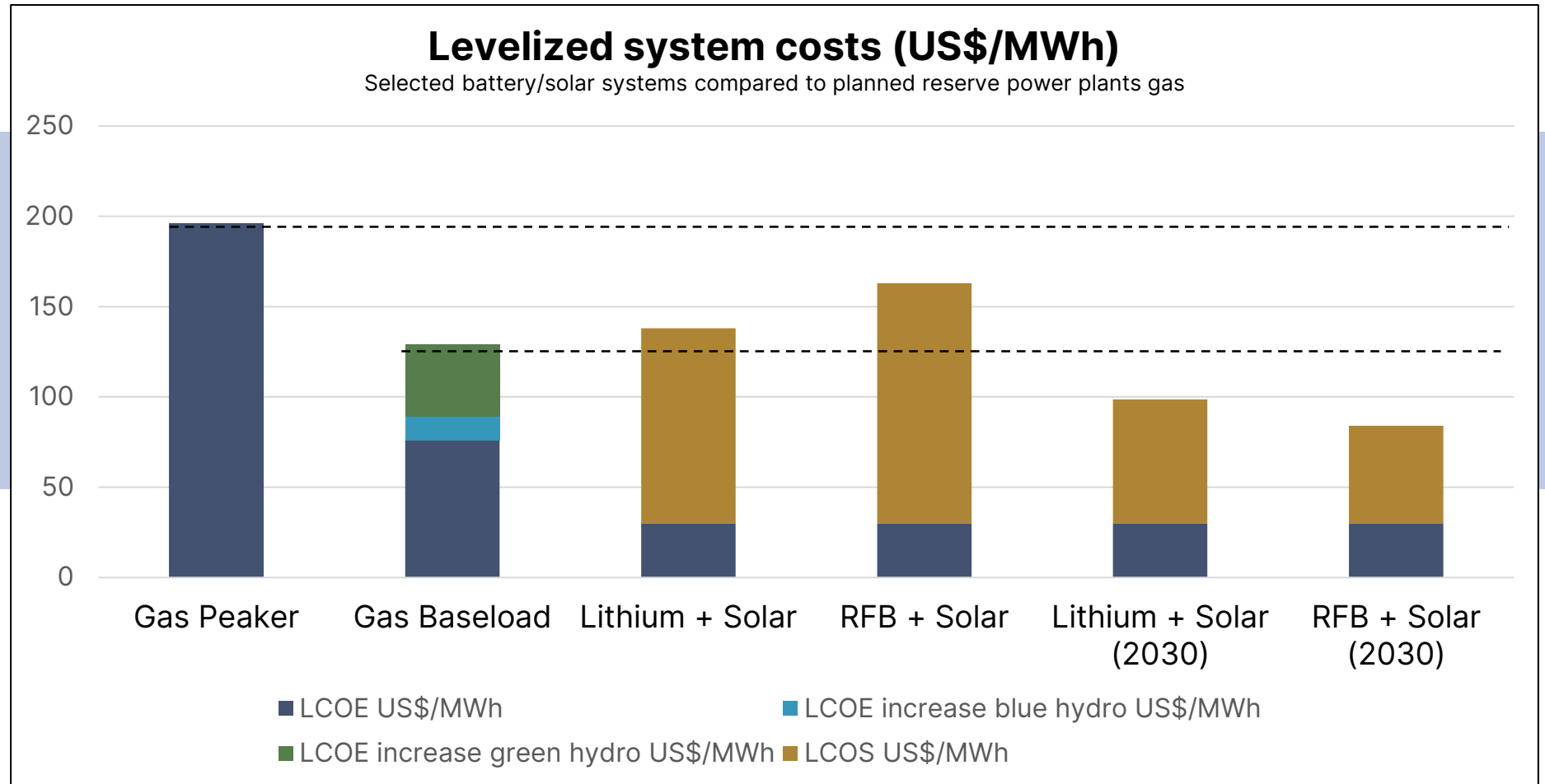
Overview: Business cases for flow batteries



Co-location of flow batteries with gas power plants

Front-of-the-meter (FTM)


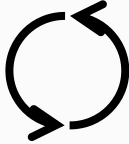


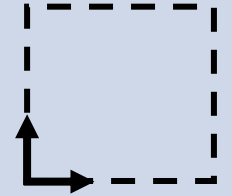

Behind-the-meter (BTM)



- "Achieving the Promise of Low-Cost Long Duration Energy Storage", Department of Energy (USA), 2024, https://www.energy.gov/sites/default/files/2024-08/Achieving%20the%20Promise%20of%20Low-Cost%20Long%20Duration%20Energy%20Storage_FINAL_08052024.pdf
- Lazard's levelized cost of energy analysis v15 and Lazard's levelized costs of storage analysis v4.0

What are the drivers and influences?

Lever I: Technical USPs leading to commercial USPs

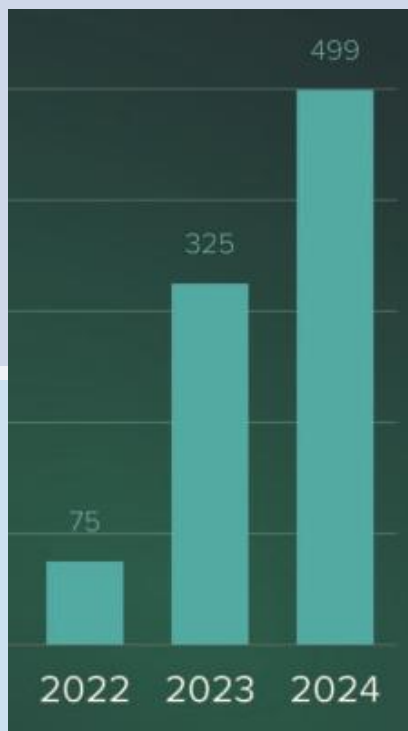
| |  Non-flammability |  Long Lifetime (20+ yrs) >15000 cycles |  Easy Recycling |  Ressources/ Supply chain |
|---------------------------------|--------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Front-of-the-meter (FTM) |  High kWh/m ² | Low levelized costs of storage (LCOS) | Regulations (battery regulation), lower costs | Reliability, strategic independence |
| Behind-the-meter (BTM) |  Insurance | 20 years lifetime, recycling | - | Reliability |

Lever II: Revenues

Front-of-the-meter (FTM)

Behind-the-meter (BTM)

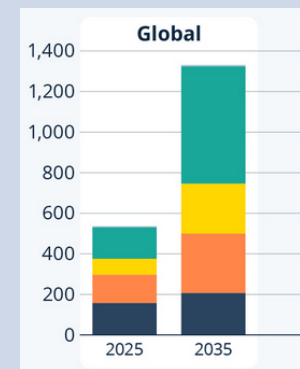
Negative electricity prices



End user electricity costs (incl. grid fees)



Data centers, 24/7 clean ppa



Policies

Tenders, capacity markets, emission costs

Incentives for BTM storage: e.g. variable grid fees

Lever II: Costs

Hardware

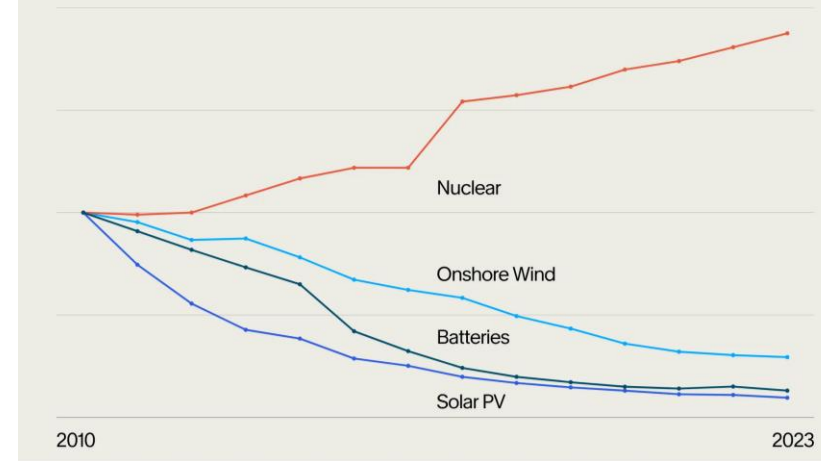
- Standardization, Learning curves

Electrolytes

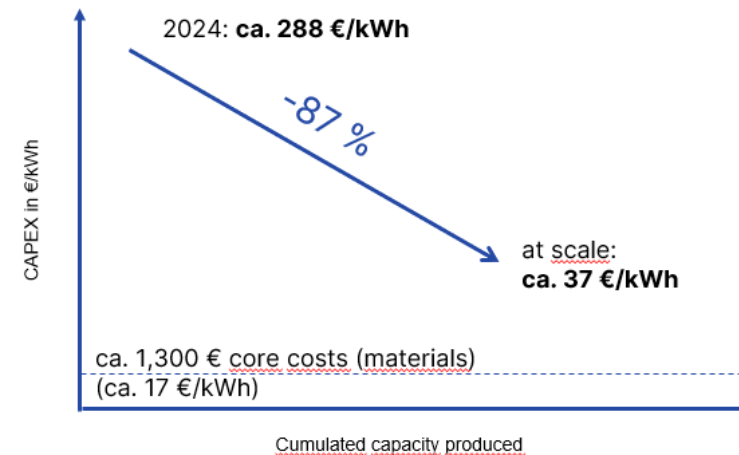
- Leasing of Vanadium electrolytes
- New electrolytes: organics, iron, ...

Wright's Law

Technology costs normalised to baseline year (2010)



10 kW / 80 kWh DC module w/o electrolyte



Flow Batteries Europe // VANEVO GmbH



(Ex-)Chair of business development committee

Goals: Understand and present business cases for flow batteries

VANEVO

- Stacks and DC redox flow modules
- 1 sealing instead of 160!
- Electrolyte-agnostic



**VANEVO's
5kW
stack**



**VANEVO's
10kW/40kWh DC
module**

