

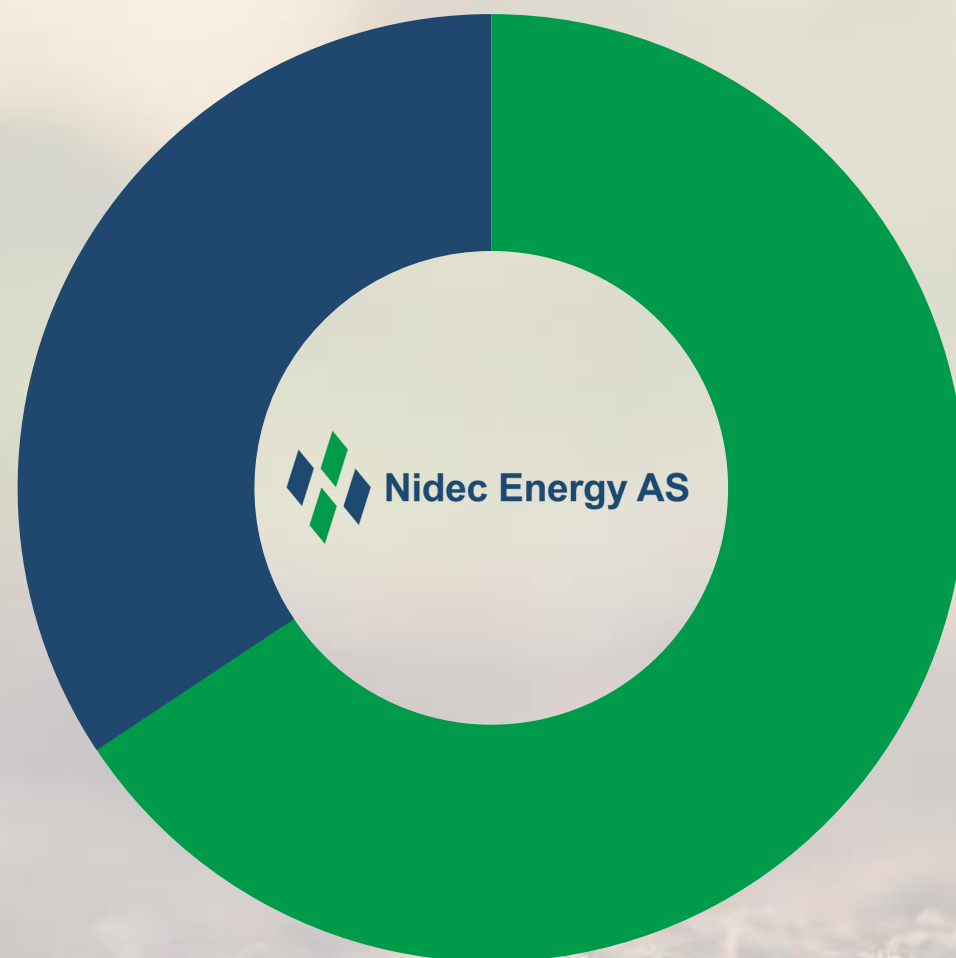
Nidec Energy starts with
a **vision** and a **dream**

Long Duration Battery Energy Storage

April 25th 2024
Lina Emilsson. COO



Who We Are ?



Date of Incorporation: 2022
Main players: Nidec Corporation (66.7%)
FREYR Battery (33.3%)
Locations: Headquarters in Oslo, Norway. R&D in Angouleme, France
Joint venture objective: Innovative low-carbon battery solutions

The company will be serving utilities, energy providers, grid operators, independent power producers, system integrators, developers and private investors looking to install battery energy storage systems.
The batteries will use Freyr's innovative cell technology.

Long Duration Energy Storage

A fully decarbonised electricity system will need substantial energy storage

- Across a range of timescales
- Adapting to proliferation of renewable energy sources

UK is currently a net importer of gas for heating and power

- Storage enables self-sufficient energy supply
- Insulation against global shocks in the energy market
- Opportunity to export

UK currently has a relatively small amount of low-carbon energy storage deployed

- Mostly pumped hydro, storage capacity 26.7 GWh
- Growing capacity of BESS, 2.6 GWh across 161 sites

In Europe today mostly Ancillary Services with 1h / 2h battery duration



HOUSE OF LORDS

Science and Technology Committee

1st Report of Session 2023–24

Long-duration energy storage: get on with it

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HL Paper 68

- **Definitions**
 - “medium-duration energy storage” between 4 and 24 hours, up to a few days at most
 - “long-duration energy storage” multiple days, to weeks, months or even years
- **For the first time, global warming has exceeded 1.5C across an entire year**
 - Maintain energy security and reach Net Zero
 - Allow more of UK’s renewable electricity to be used by avoiding curtailment when excess supply occurs
- **Targets:**
 - cheaper, Net Zero electricity allowing the UK to combat climate change
 - a strong domestic energy storage industry
 - an economy insulated from dependence on volatile energy markets and imported fossil fuels
- **New forms of energy storage are crucial**
 - For long duration storage, hydrogen is currently the front-runner. Disadvantages: low round-trip efficiency (RTE) of 30–40%
 - New battery technologies:
 - iron air batteries
 - flow batteries
 - lithium-air batteries
 - Metal anode batteries

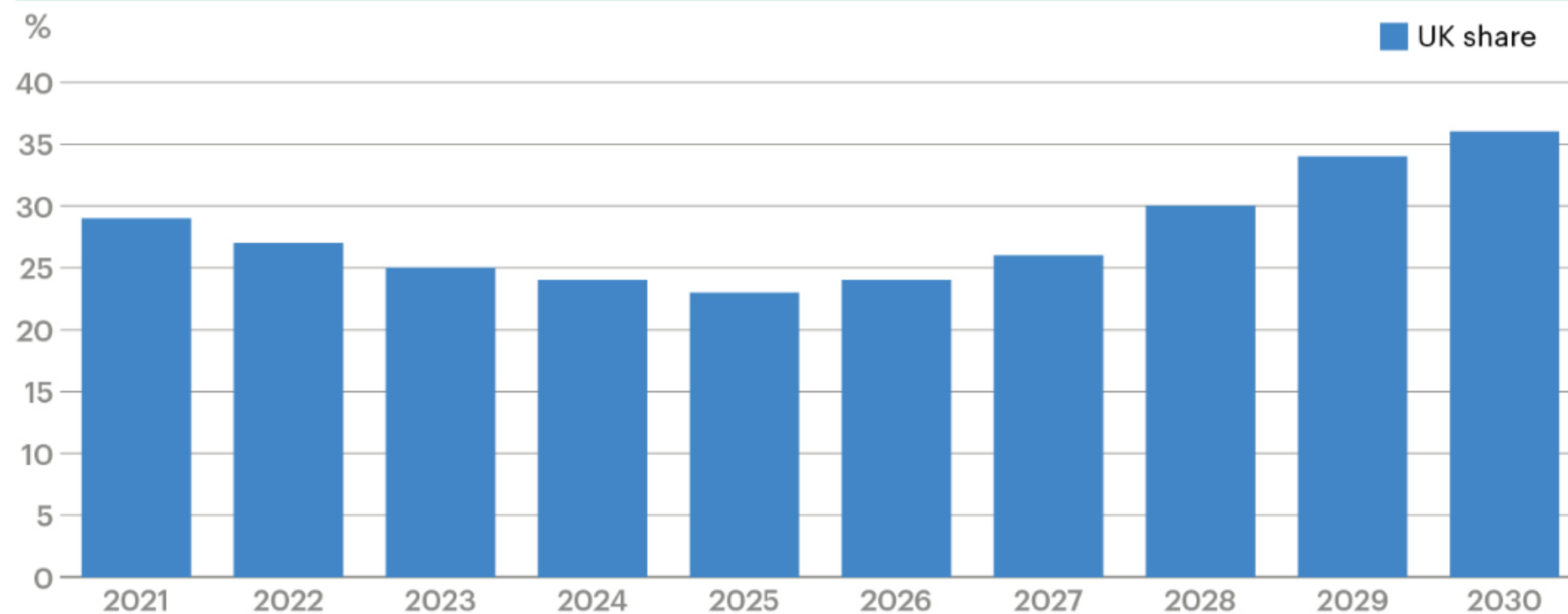
UK’s Battery Energy Storage



- Exponential growth in the coming years to reach estimated 24 gigawatts (GW) capacity by the end of the decade.
- Investments of up to \$20 billion
- UK will account for almost 9% of all global capacity installations as number four in the table behind China, US and Germany.

Commercially operated storage is operated by frequently buying and selling energy. Strategic energy reserves need a different business model, ensuring availability when most needed, e.g. crisis

UK to maintain largest share of EU's storage capacity through 2020's



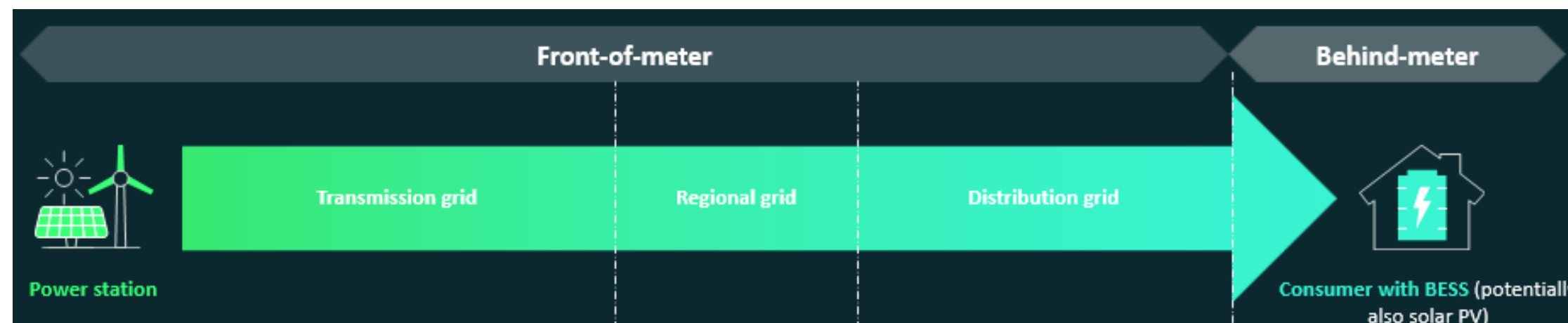
Source: ICIS

Source: Rystad Energy

UK's Battery Energy Storage

Why energy storage is needed

Capacity	Flexible Capacity	Energy trading	Grid stability	Addressing grid constraints
<p>Long duration storage for resilience and dispatchable energy.</p> <p>Crisis reserve, protection from international fluctuations and dependency on fossil fuels.</p> <p>Back-up power for blackouts, UPS solutions etc</p>	<p>Optimising and capitalising on renewable sources by balancing variability in supply and demand.</p> <p>Capability to quickly respond to sudden increase in demand where power generation sources cannot ramp up and down as quickly. Fast recovery and adaptability</p> <p>Off-grid / micro-grids</p>	<p>Arbitrage trading, charging and storing energy at low price times and selling at high price times.</p> <p>Useful for domestic application as well, considering front of meter and behind the meter</p>	<p>Connecting ever increasing renewable sources to the grid destabilises it. Critical to have voltage control and frequency regulation to achieve a stable and secure grid and reduce risks of grid failures and disruption</p> <p>Short cycles for ancillary services and renewables integration</p>	<p>Resolving congestion problems when the grid and transmission lines cannot accommodate peak supply of renewable energy.</p> <p>Ensures ability to transmit energy from power generation locations to other areas of high demand and utilise the full energy production with no curtailments</p> <p>Defer infrastructure investment</p>



C-Rate Evolution AMERICA+EMEA Annual capacity addition per c-Rate

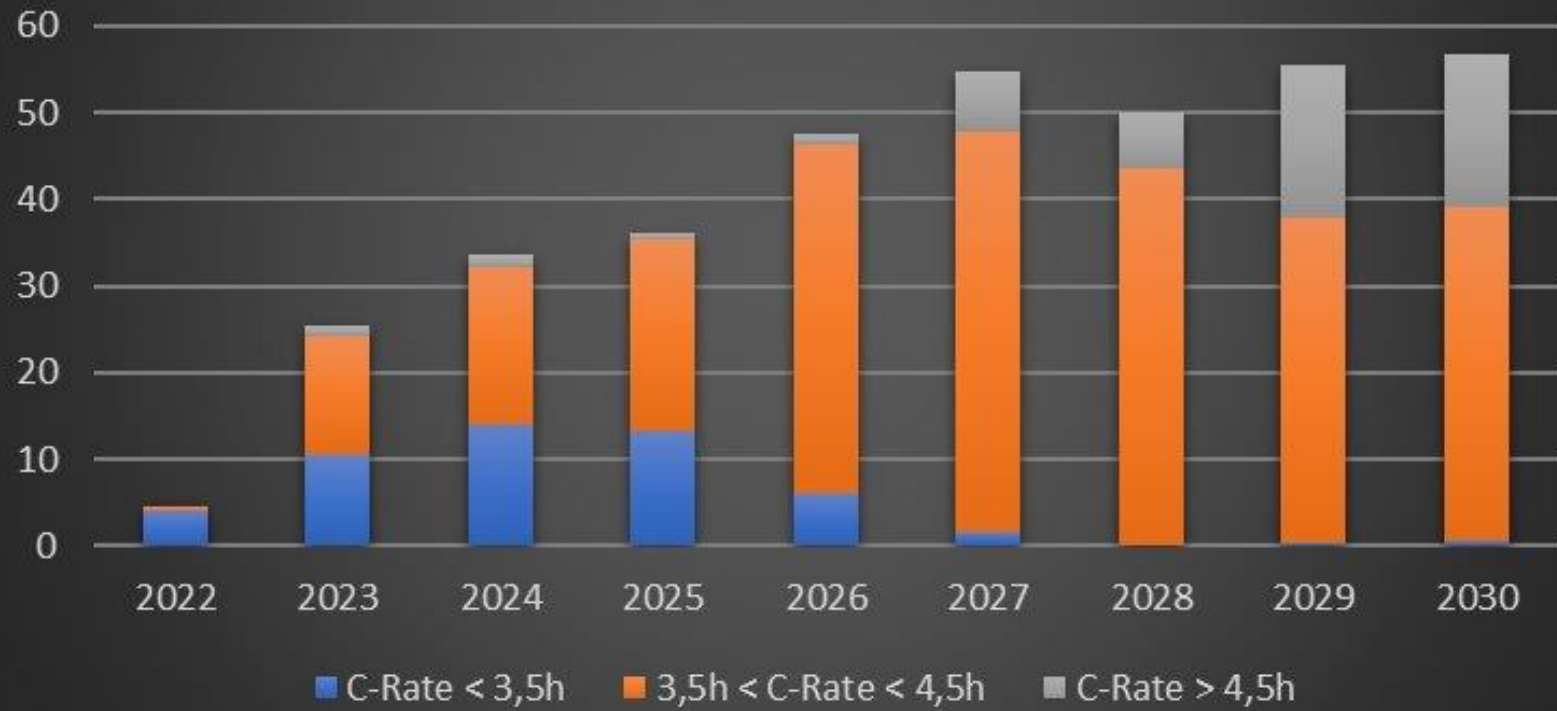


**Capacity addition
by duration**

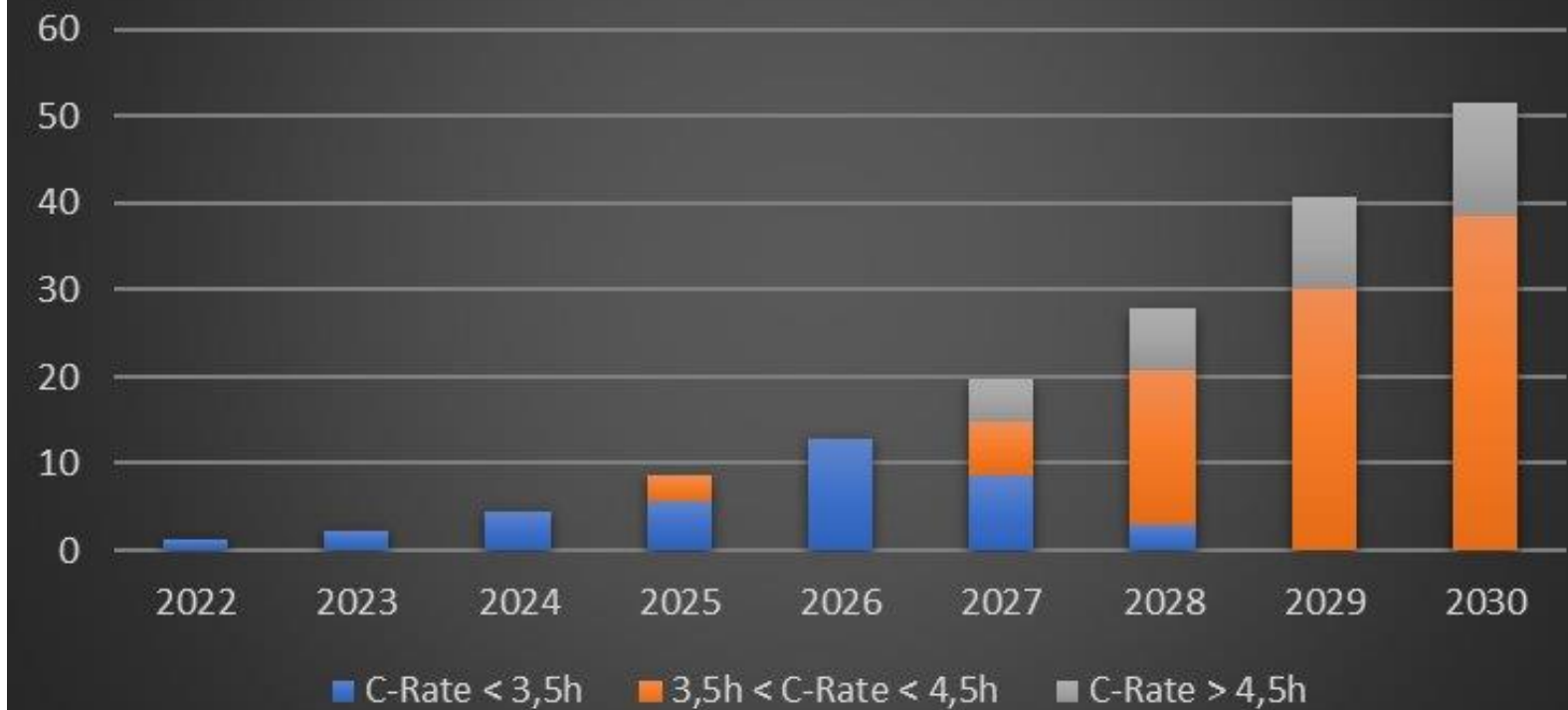
Source: BloombergNEF

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C-Rate Evolution AMERICA Annual capacity addition per c-Rate

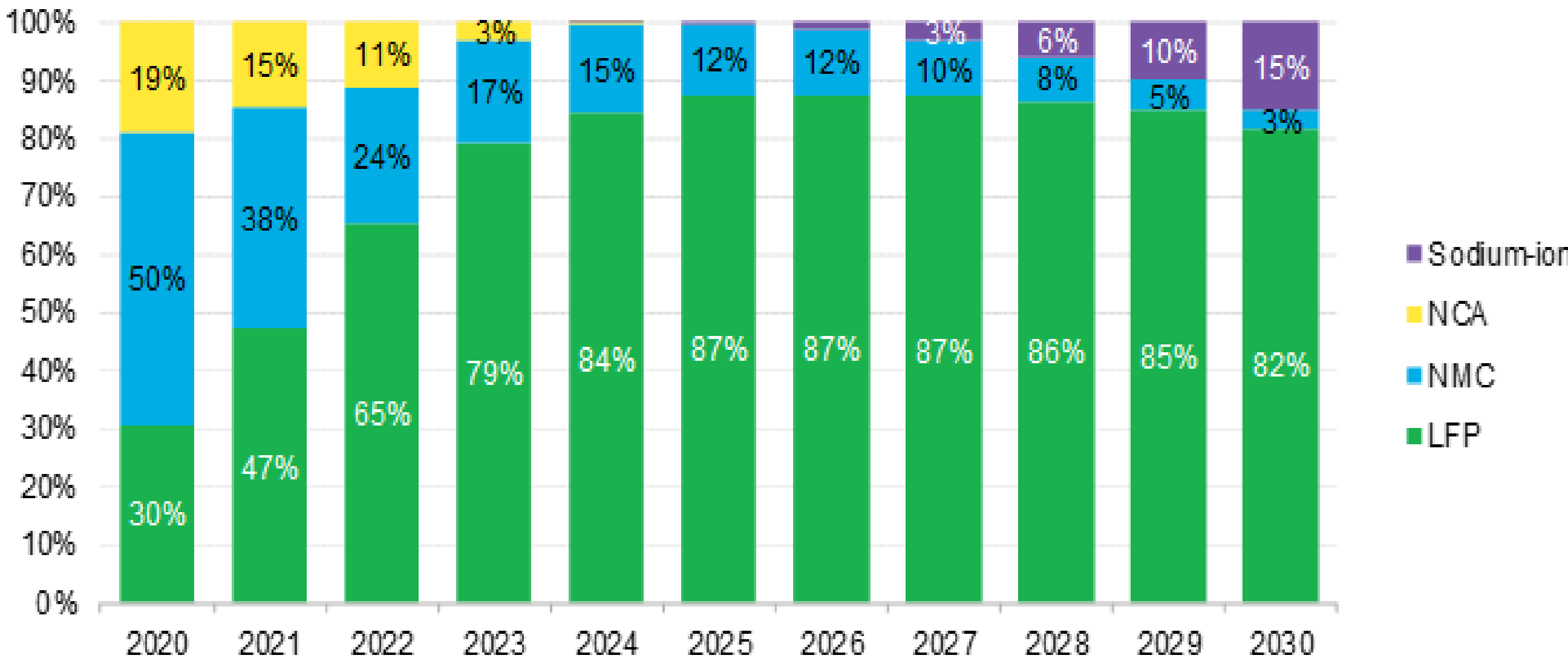


C-Rate Evolution EMEA Annual capacity addition per c-Rate



Capacity in America and EMEA

Source: BloombergNEF

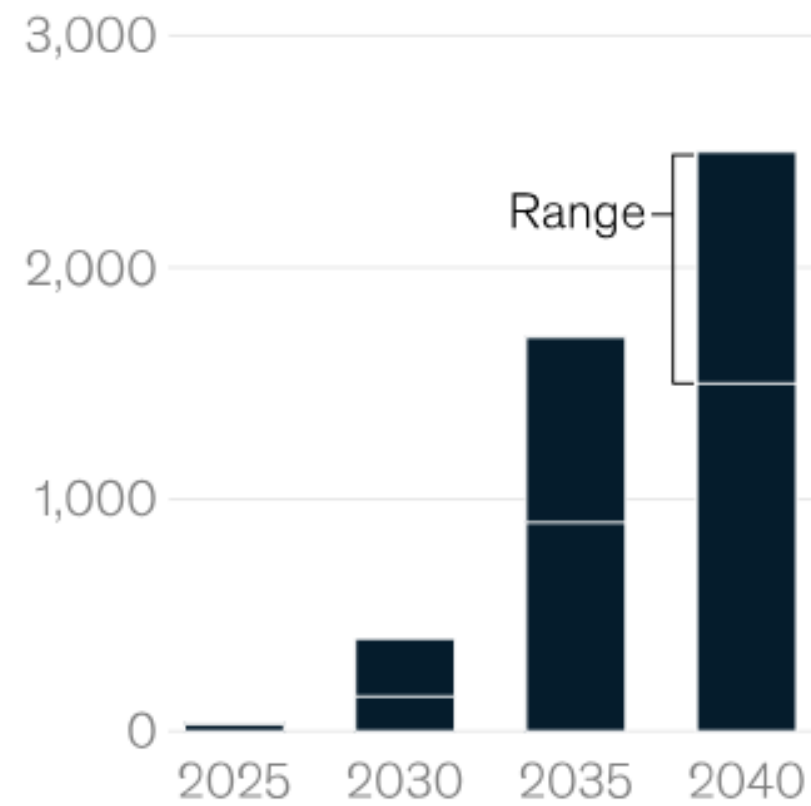


Battery Energy Storage outlook per chemistry

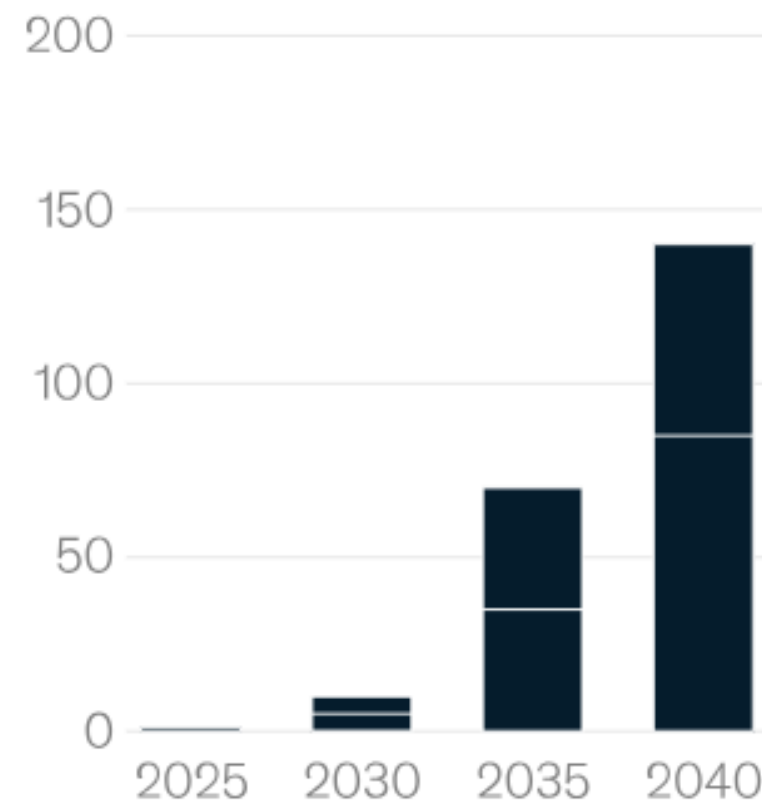
Source: BloombergNEF

Estimated ranges of global LDES total addressable market

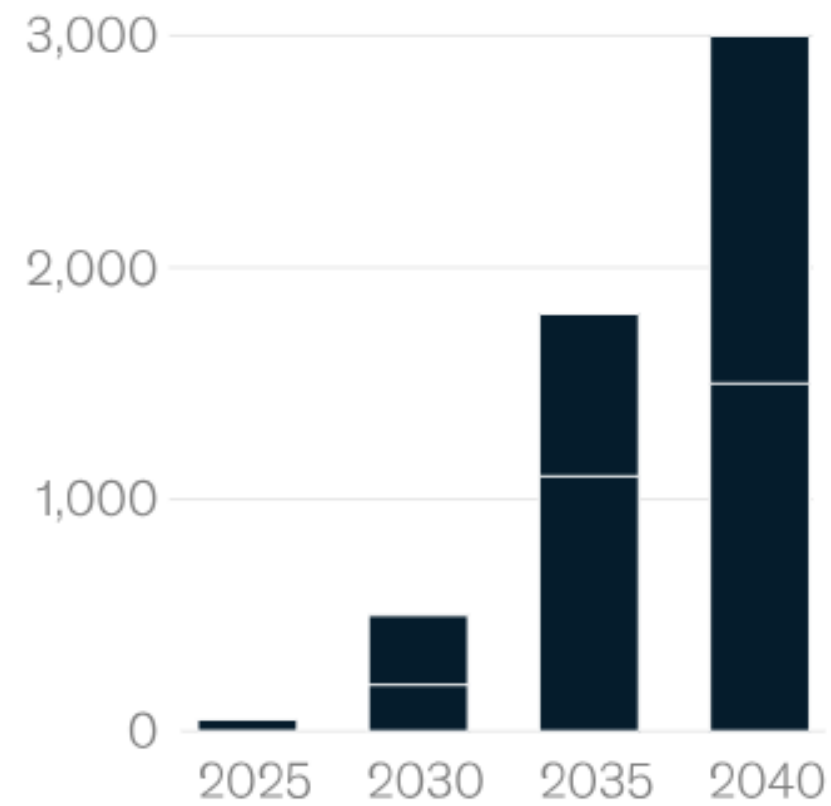
Cumulative installed power capacity, gigawatts



Cumulative installed energy capacity, terawatt-hours



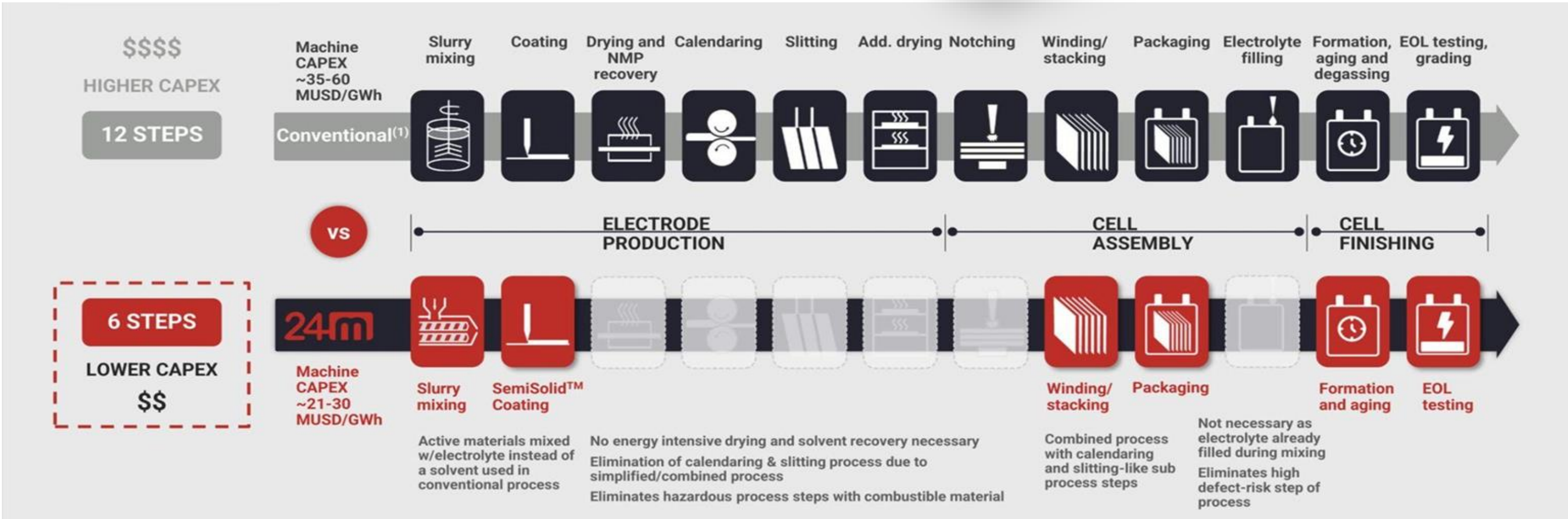
Cumulative capex investment, \$ billion



LDES Globally

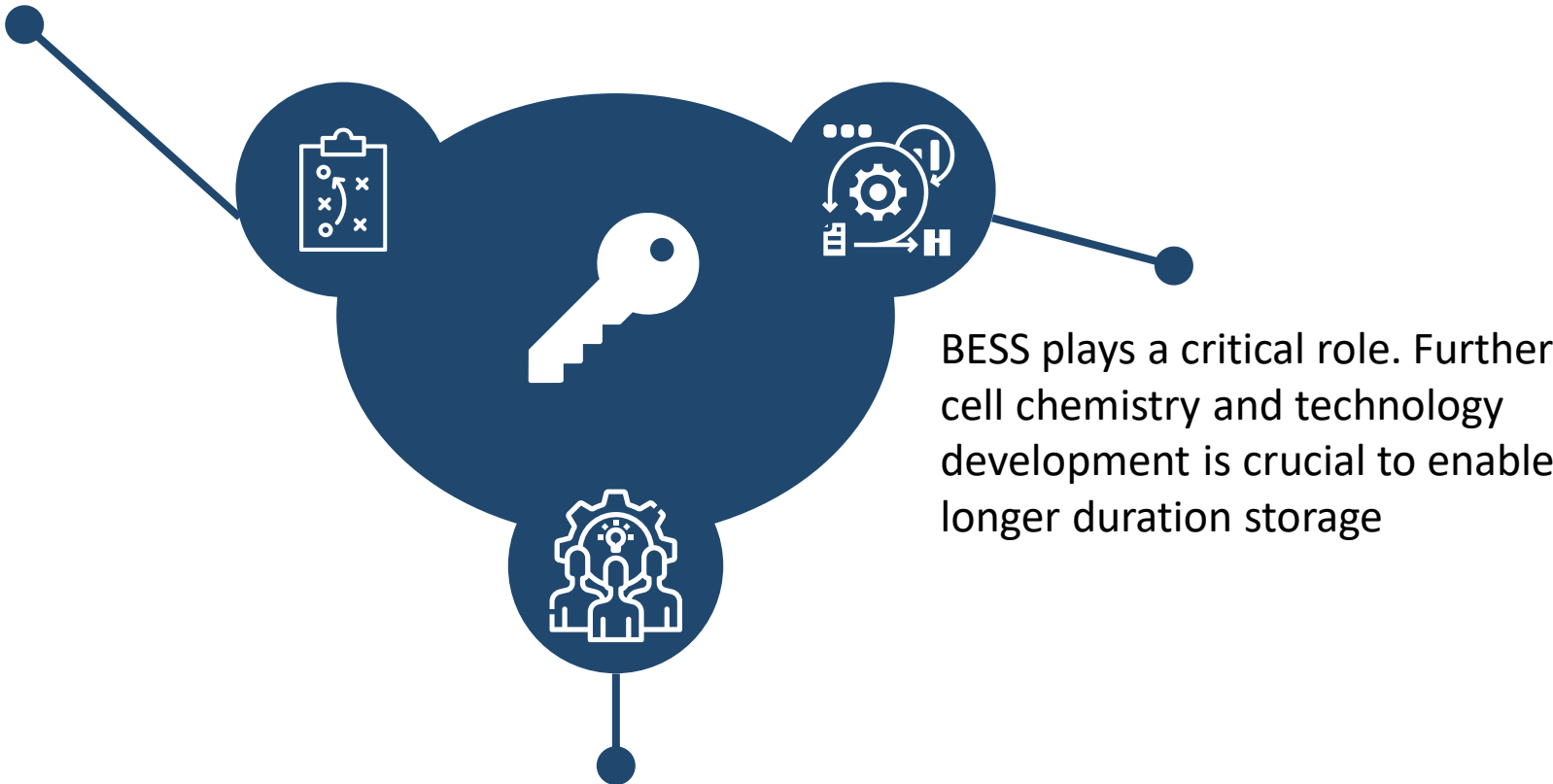
Source: McKinsey

Long duration cell technology Freyr license of 24m



Key Takeaways

Not one size fits all : A fully decarbonised electricity system will need substantial energy storage across short, medium and long duration to support a complete transition to renewable energy sources



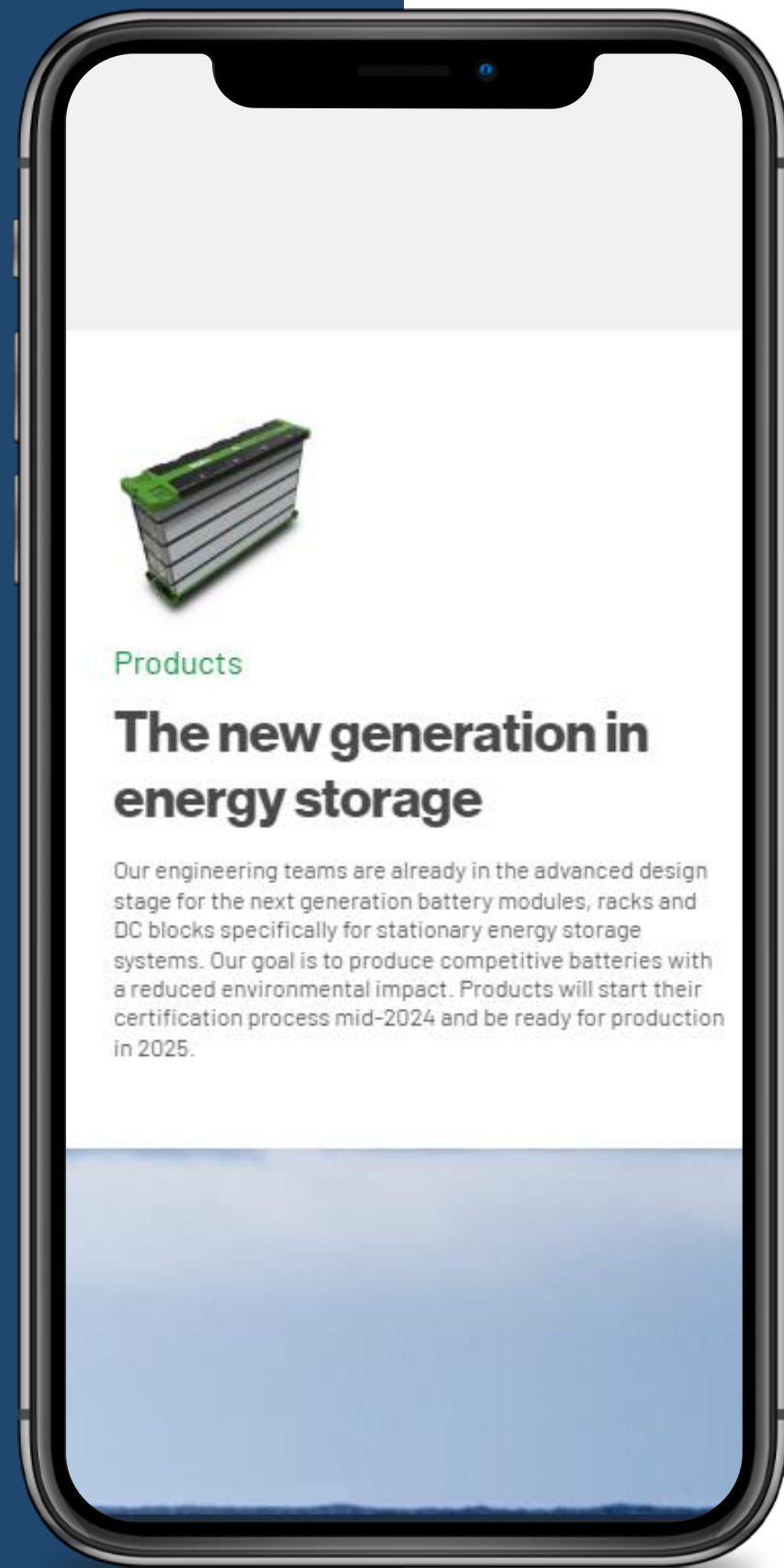
BESS plays a critical role. Further cell chemistry and technology development is crucial to enable longer duration storage

Reliability and capacity on demand. Protection against crises and international fluctuations.

STOP BURNING STUFF!



Nidec energy starts with a vision and a dream



Nidec Energy is all about sustainability. Our products, processes and solutions will all contribute to building a better, greener planet for future generations

Throughout our value chain we are working with all stakeholders to build a strong business that delivers on environmental and social commitments to support international efforts and standards to reduce Green House Gas Emissions and ensure a fair and equitable environment for all participants.

Lina Emilsson

lina.emilsson@nidec-energy.com

07818 216430



Q&A

Thank You!.



www.nidec-energy.com

**NIDEC ENERGY,
WHERE INNOVATION
MEETS SUSTAINABILITY.**