

northvolt

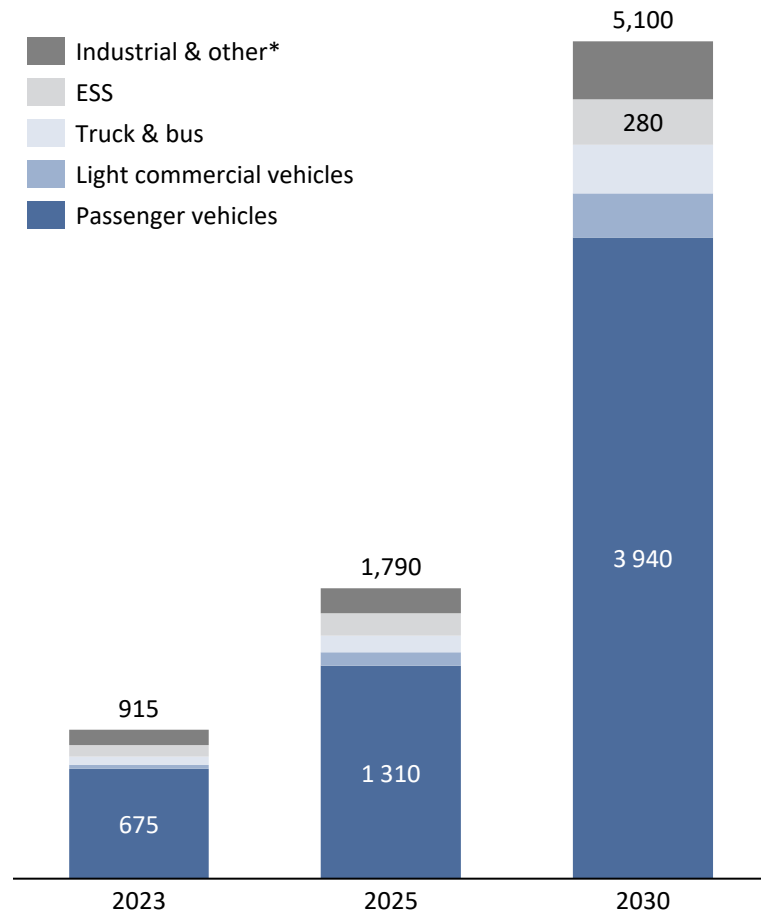
Batteries – the scale up challenge

2023-07-09



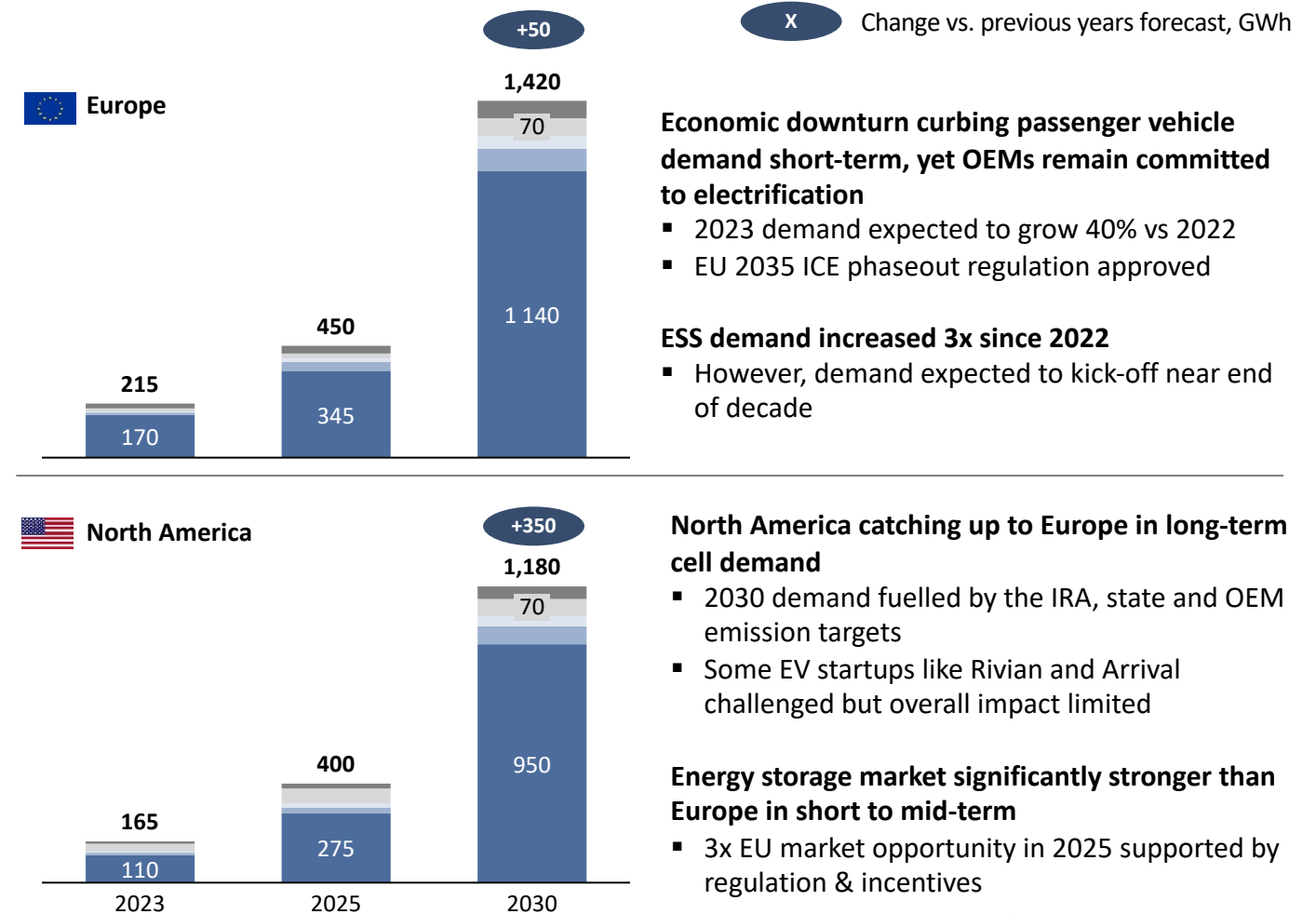
Battery demand continue to grow (most in North America)

Global cell demand, in GWh



*Includes power tools, agriculture, construction, material handling, mining
Sources: P3, BNEF

Regional cell demand, in GWh



Economic downturn curbing passenger vehicle demand short-term, yet OEMs remain committed to electrification

- 2023 demand expected to grow 40% vs 2022
- EU 2035 ICE phaseout regulation approved

ESS demand increased 3x since 2022

- However, demand expected to kick-off near end of decade

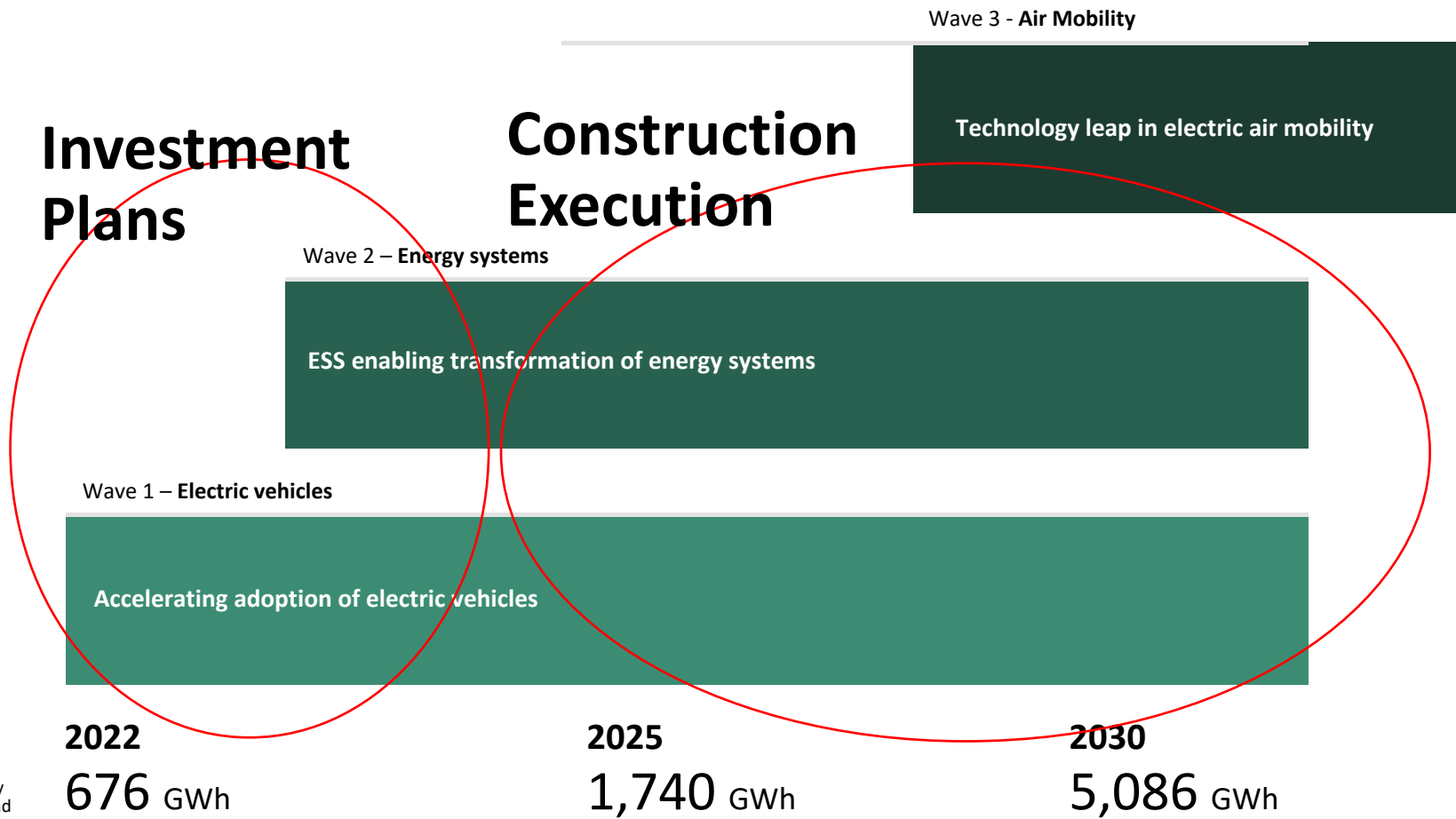
North America catching up to Europe in long-term cell demand

- 2030 demand fuelled by the IRA, state and OEM emission targets
- Some EV startups like Rivian and Arrival challenged but overall impact limited

Energy storage market significantly stronger than Europe in short to mid-term

- 3x EU market opportunity in 2025 supported by regulation & incentives

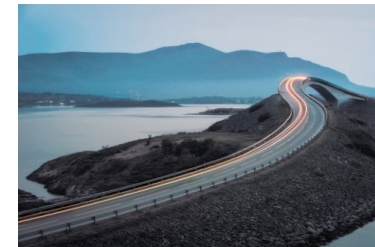
Waves of electrification



Li-metal & Si



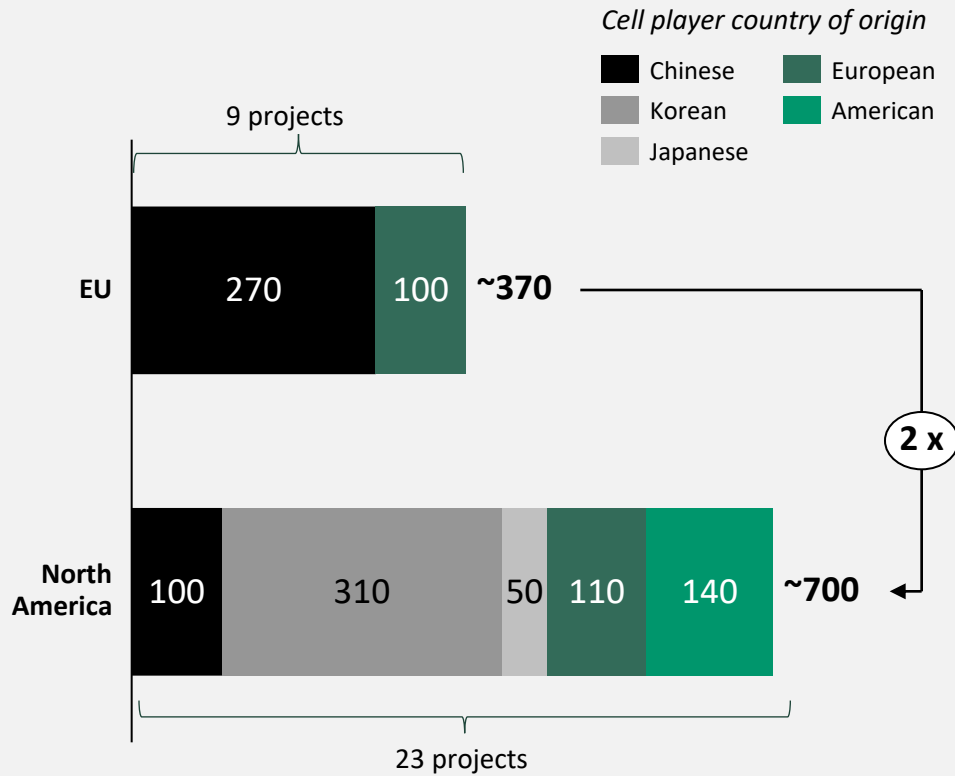
NMC Li-ion, LFP,
Sodium-ion



NMC Li-ion, LFP

IRA impact

Announced cell supply since Jan-2022*, GWh



Key insights

- Battery momentum shifted to North America driven by IRA
- **North America:** Driven by Korean players, mainly in JV structures.
- **Europe:** Focus for the Chinese – more to come.
- **Europe:** Main European competitors are PowerCo and ACC.

European announcements

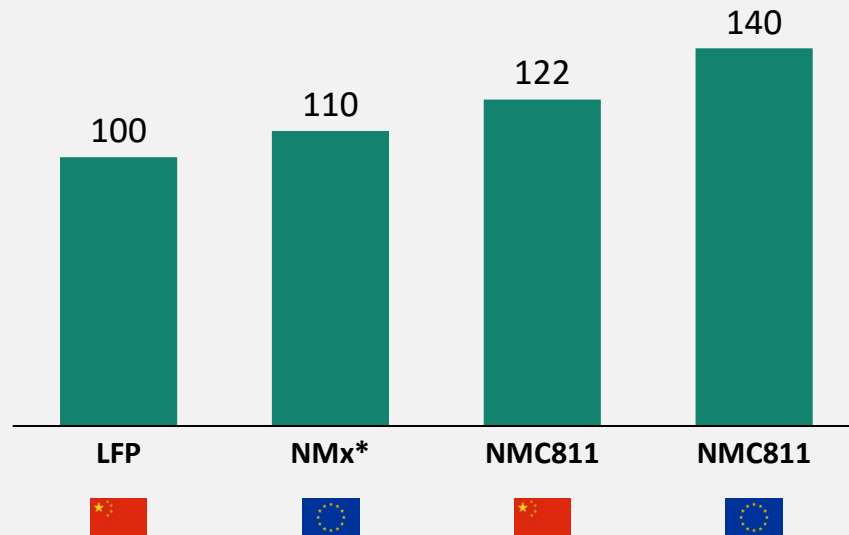
CATL	Gotion	CALB
100 GWh	20 GWh	45 GWh
Envision AESC	ACC	PowerCo
50 GWh	56 GWh	40 GWh

North America announcements

LG Energy Solution	SAMSUNG	SAMSUNG SDI	SK
190 GWh	70 GWh	40 GWh	
TESLA	Envision AESC	PowerCo	
100 GWh	60 GWh	90 GWh	

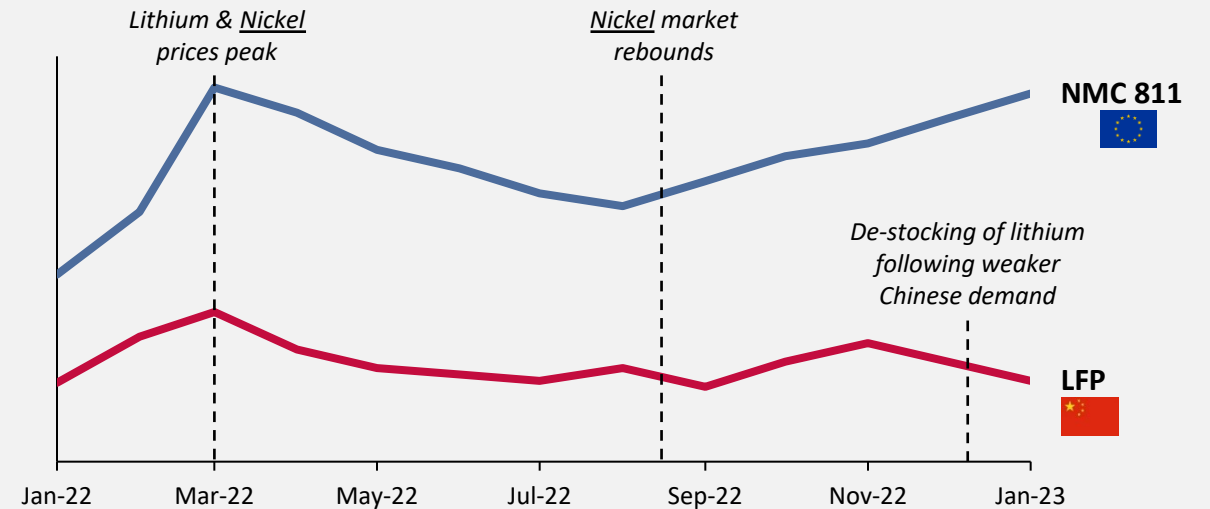
Product volume development driven by raw material costs!

Cell prices Jan 2023, Index (LFP = 100 at 93 \$/kWh)



Lithium	✓ Relatively higher exposure	✓	✓	✓
Nickel	✗	✓	✓	✓
Cobalt	✗	✗ Very small shares	✓	✓

Cell price development in 2022, \$/kWh



- **Lithium prices heavily impact cost of both NMC & LFP**, as the main cost driver in the raw material base.
- **High nickel prices drives spread between NMC and LFP**, as seen since late-2021, making LFP more cost competitive (like-for-like).
- **NMx removes exposure to (expensive) cobalt material and reduces impact from movements in the nickel market.**
- **LFP is produced in China**, where vertical integration in the lithium value chain partly decouples & helps offset price movements from the underlying material.

Raw materials: Several drivers leading to market & price bifurcation with resulting volatility

Raw material bifurcation, Nickel high-level example

