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Becoming a leading anode material solutions provider to the fast-growing battery industry

20 June 2022. Nordea Battery Seminar

Stian Madshus, VP and General Manager Europe, Vianode

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NORGES SMARTESTE INDUSTRIBEDRIFT
Spesialprisen 2021

Established by Elkem –dedicated to strategic growth opportunities for advanced battery materials

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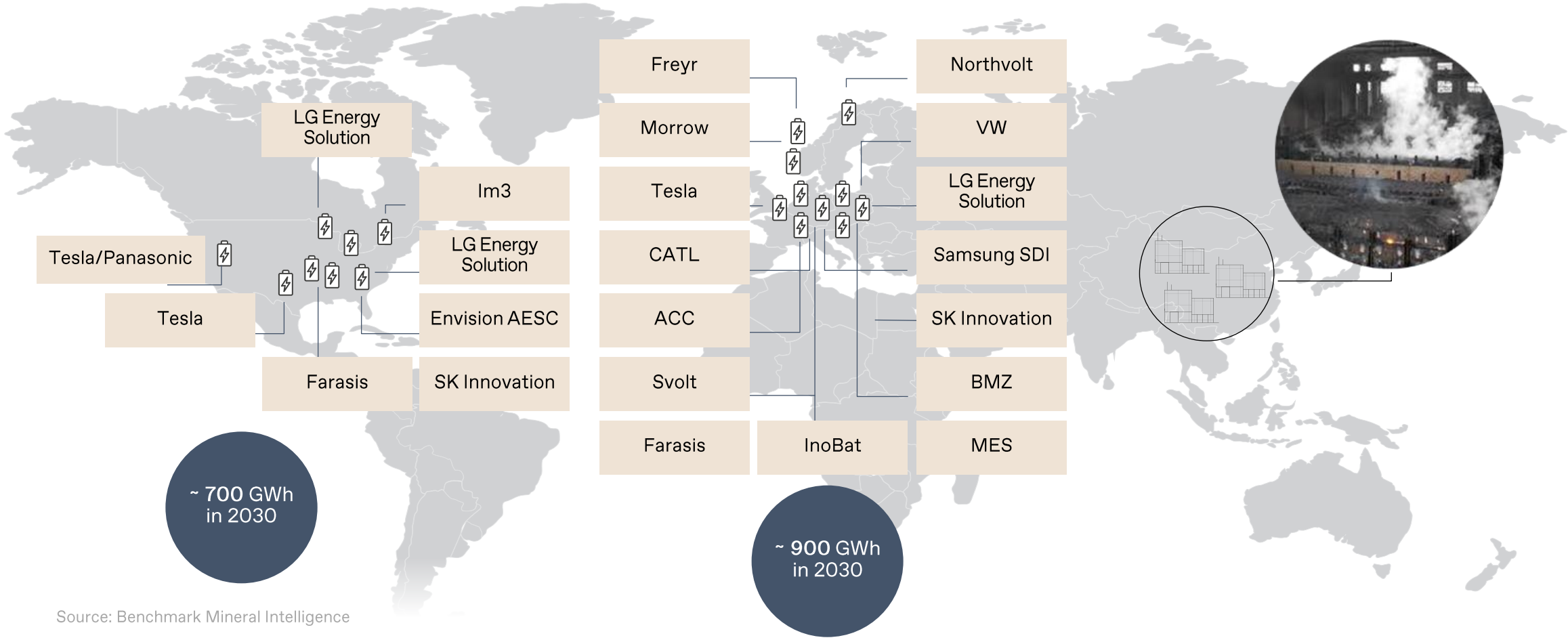
Massive plans for cell manufacturing capacity in Europe and North America ...but supply of critical battery anode materials dominated by Asian players

EU proposed regulation on sustainable batteries is a clear push for increased traceability, lower CO_2 footprint, more recycling



Source: Benchmark Mineral Intelligence

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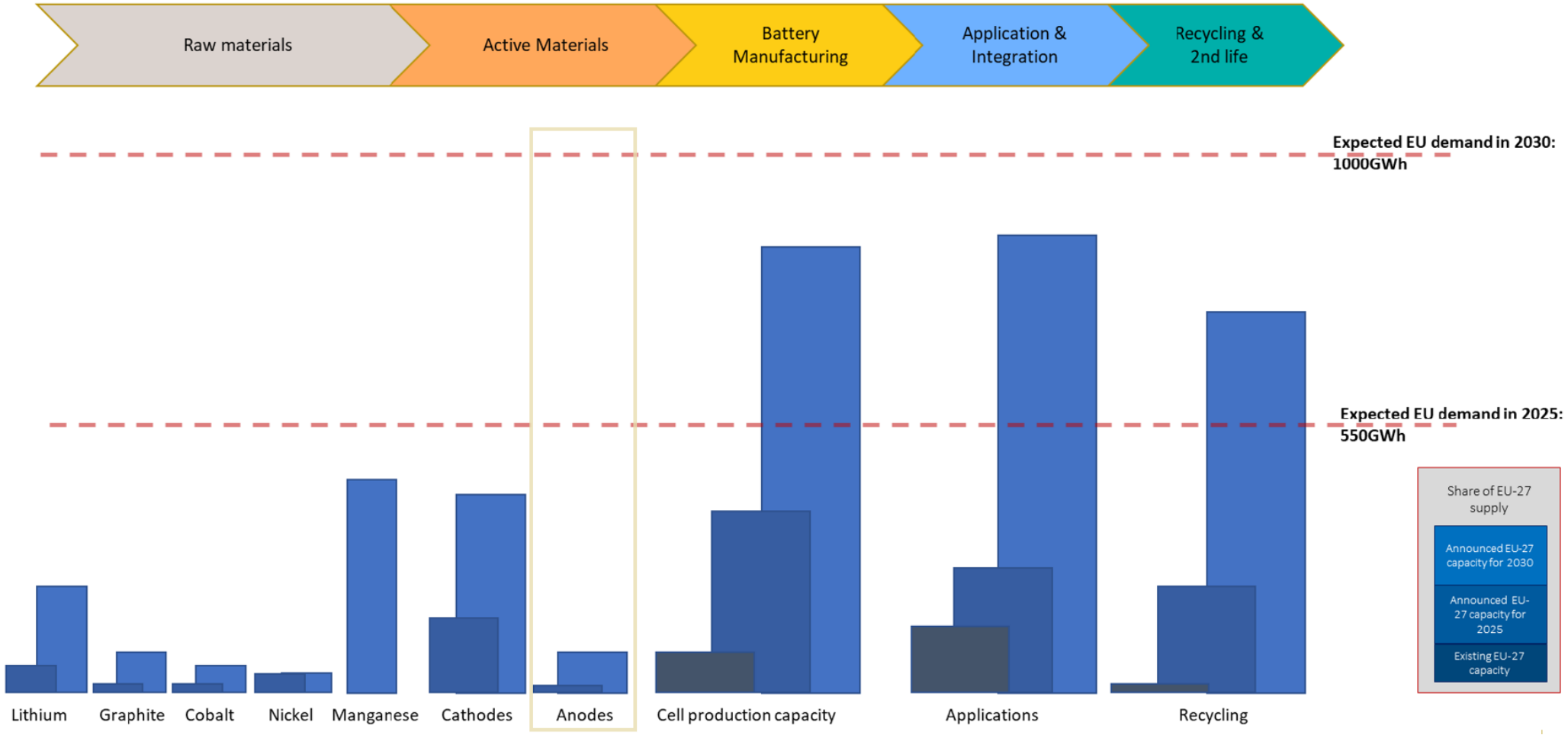
Significant graphite shortfall in Europe towards 2030



European Battery Alliance, InnoEnergy

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Automakers increasingly focused on a sustainable value chain

European Commission

Press release | 10 December 2020 | Brussels

Green Deal: Sustainable batteries for a circular and climate neutral economy

Tesla takes part in deal to take over controversial nickel mine in New Caledonia

Swedish battery manufacturer Northvolt receives a $14 billion order from VW

Jonathan Shieber @jjshieber / 1:30 PM GMT+1 • March 15, 2021

COAL | ELECTRIC POWER | METALS — 11 Sep 2020 | 13:18 UTC — New York

VW aims to increase battery supply chain transparency

"We don't want to compensate, we want to avoid. We don't want to buy CO2 certificates from other companies, we don't want to cause any emissions ourselves. Wherever energy cannot be saved, we use electricity from renewable sources"

Oliver Blume, chairman of the executive board of Porsche AG

Source: Porsche, Tesla, Volkswagen, Northvolt

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EU proposed regulations on sustainable batteries

Clear push for increased traceability, lower CO2 footprint, more recycling

10 Dec 2020

EU proposal

2022

Producer responsible for **End-Of-Life collection**

2023

Traceability, performance, and durability documentation

2024

Carbon footprint documentation

2025

Recycling efficiency **65 %**

2026

Digital **battery passport**

Max carbon footprint requirement

2027

Recycled content documentation

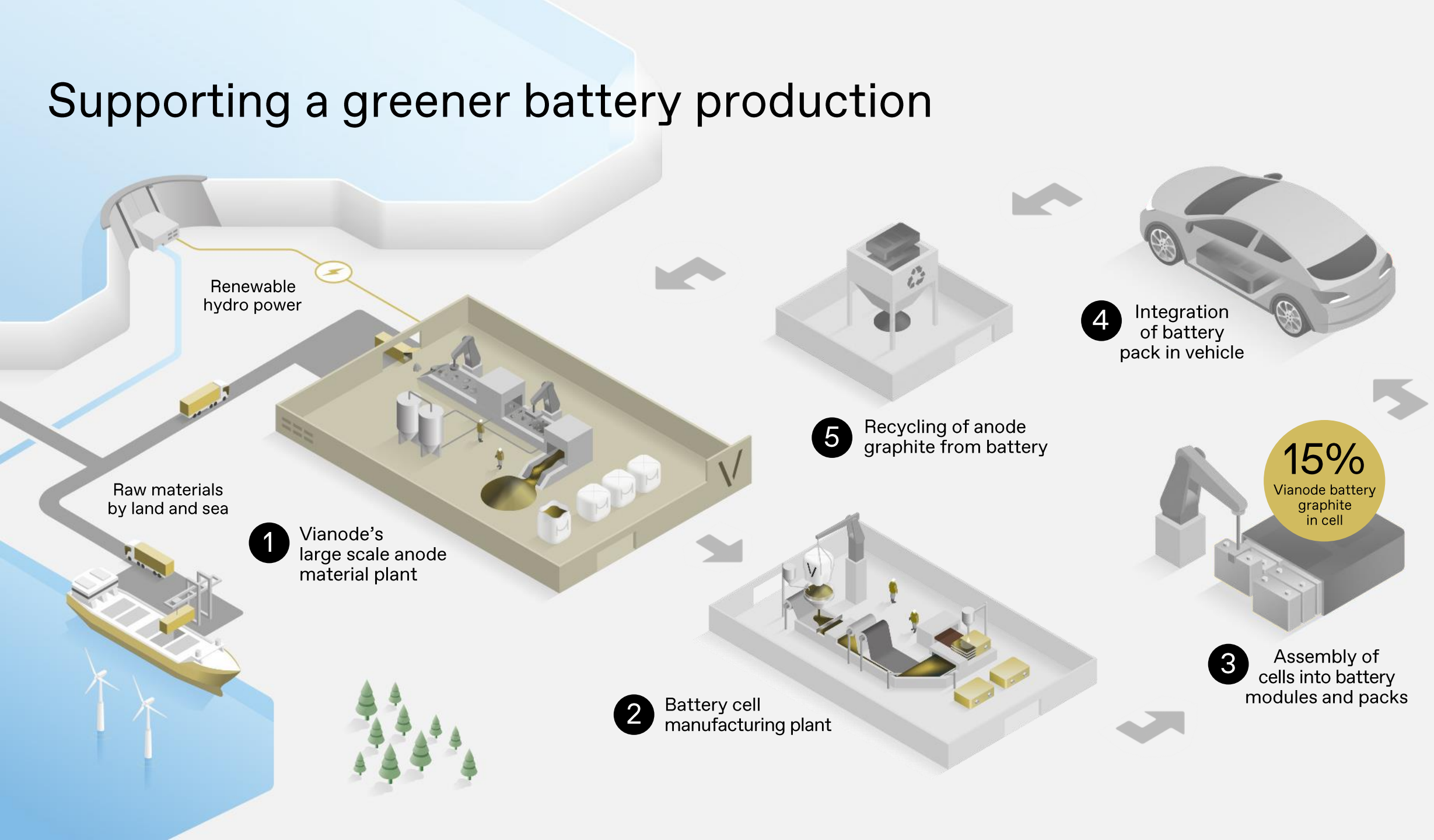
2030

Recycled content requirement

Recycling efficiency **70 %**

Source: Circular Energy Storage – Analysis of the new EU battery regulation

Supporting a greener battery production



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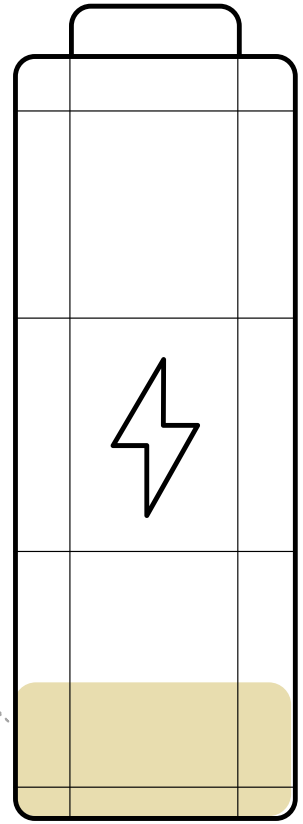
Improves properties in 1,000,000 electric vehicles

15%
Vianode graphite in cell



Increased range – reversible capacity and density

Faster charging – graphite structure, sizing and surface modification (coatings)

Long service life and recyclable – graphite structure

Increased safety – limited and controlled degradation mechanisms

ELON MUSK

"Our cells should be called nickel-graphite, because primarily the cathode is nickel and the anode side is graphite..."

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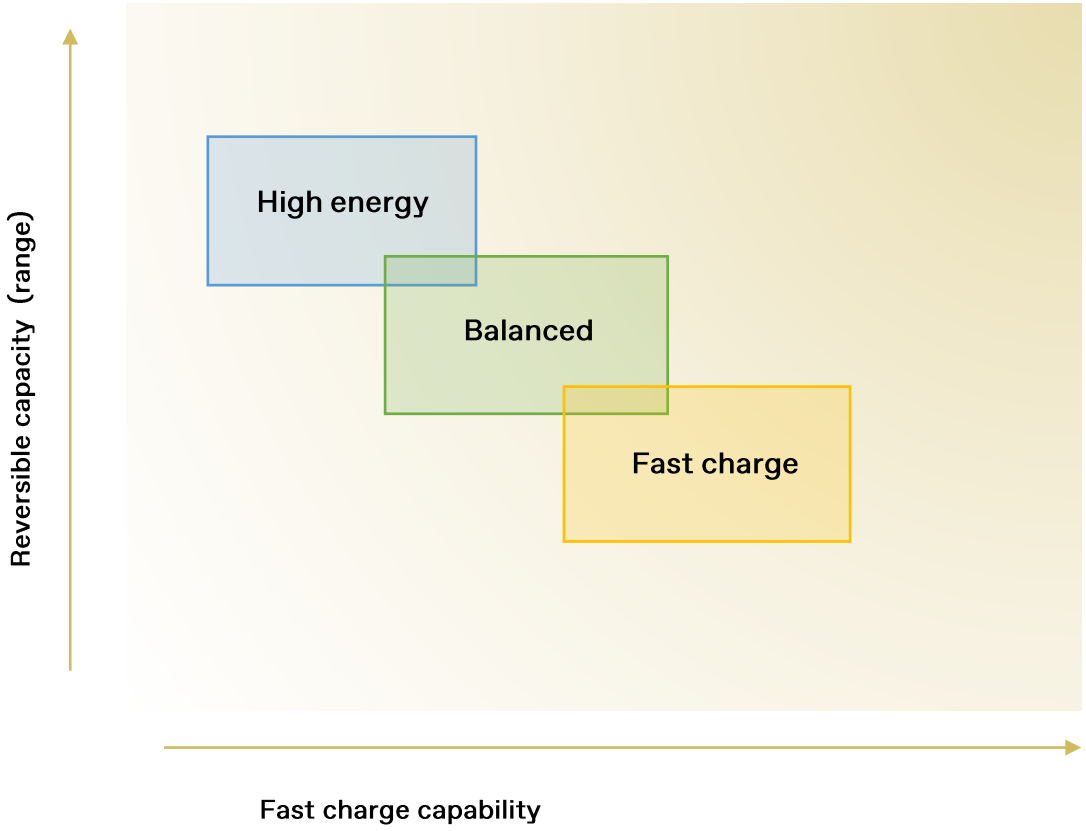
Engineered graphite materials combining high energy density with fast-charge capabilities

Main product families



Key characteristics

- ✓ **High energy density** with very good compressible density
- ✓ **Excellent fast charge performance** – capable of achieving high charge rate even at high electrode loading and densities
- ✓ **Good manufacturability** with very good adhesion
- ✓ **Long cycle life**
- ✓ **Customisable combinations** – products tailored for specific needs depending on customer requirements

Vianode offers a wide range of active anode materials for Li-ion batteries within EV and ESS

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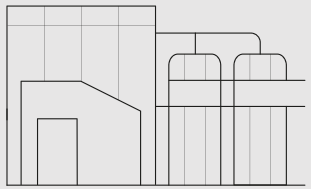
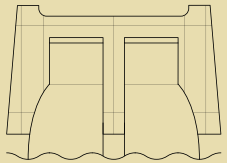
Vianode enables near zero emissions

CO_2 footprint reduction compared to the production process in today's market [1]

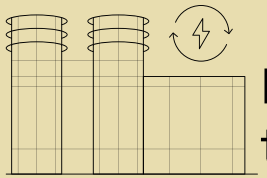


Emissions from Acheson furnaces

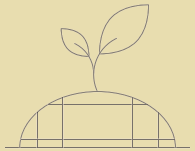


Clean hydro power

~ 90% reduction



Revolutionary technology



Vianode's cleaner processing

[1] Indirect CO2 emissions based on data from www.nve.no and www.iea.org

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Operational with industrial production

	Pilot	Industrial pilot*	Industrial site no. 1**
			
Capacity	5 tons per year	Up to 200 tons per year	50,000+ tons per year
Status	In operation	In operation from April 2021	In design and funding phase Phase 1 SOP: 2023 with Fast-Track
Description	All process steps. Small size industrial equipment.	All process steps. Industrial scale equipment.	Modular design for rapid expansion
Location	Kristiansand, Norway	Kristiansand, Norway	Herøya Industrial Park, Norway

*Project supported by Innovation Norway ** Project planning supported by ENOVA

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Becoming a leading solutions provider to the fast-growing battery industry

- Positioning to become a leading supplier of advanced materials in a multi-billion USD market
- Leveraging our 100+ years of experience in large-scale high-temperature processes
- Offering a full range of materials and services with a **dedicated and world-class team**

Vianode aims to be a solutions provider to the battery industry, meeting today's challenges and tomorrow's opportunities

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Empowering a greener life