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Batteries: First Last and Always

Patrik Johansson

VR Distinguished Professor on “Next Generation Batteries” 2022-2031

ÅABC

BATTERY 2030+

STandUP | 2025-09-24

The European Batteries R&I community

Horizon Europe => 220 M€ to the BATT4EU Partnership
Battery 2030+ CSA3 coordinates some of these projects

The vision for BATTERY 2030+ is to invent the batteries of the future, providing European industry with disruptive technologies and a competitive edge across the full value chain, that will enable Europe to take the lead in battery science and technology

Battery 2030+ works together with
Batteries Europe, BEPA, EBA 250 and IPCEI

Energising
The European Batteries
R&I Community

Batteries Europe

BATTERY 2030+

IPCEI BATTERIES

BEPA
Batteries European Partnership Association

Battery Functionality

SALAMANDER

phoenix

HEALING BAT

SAFELOOP

INERRANT

SAGELi

Battery Interface

OPINCHARGE

UltraBat

OPERA

Accelerated Materials Discovery

FULL-MAP

Manufacturability

BatCAT Battery Cell Assembly Twin

BATtwin

Raw materials & Recycling

RENOVATE

Revitalise

REUSE

Li4LIFE

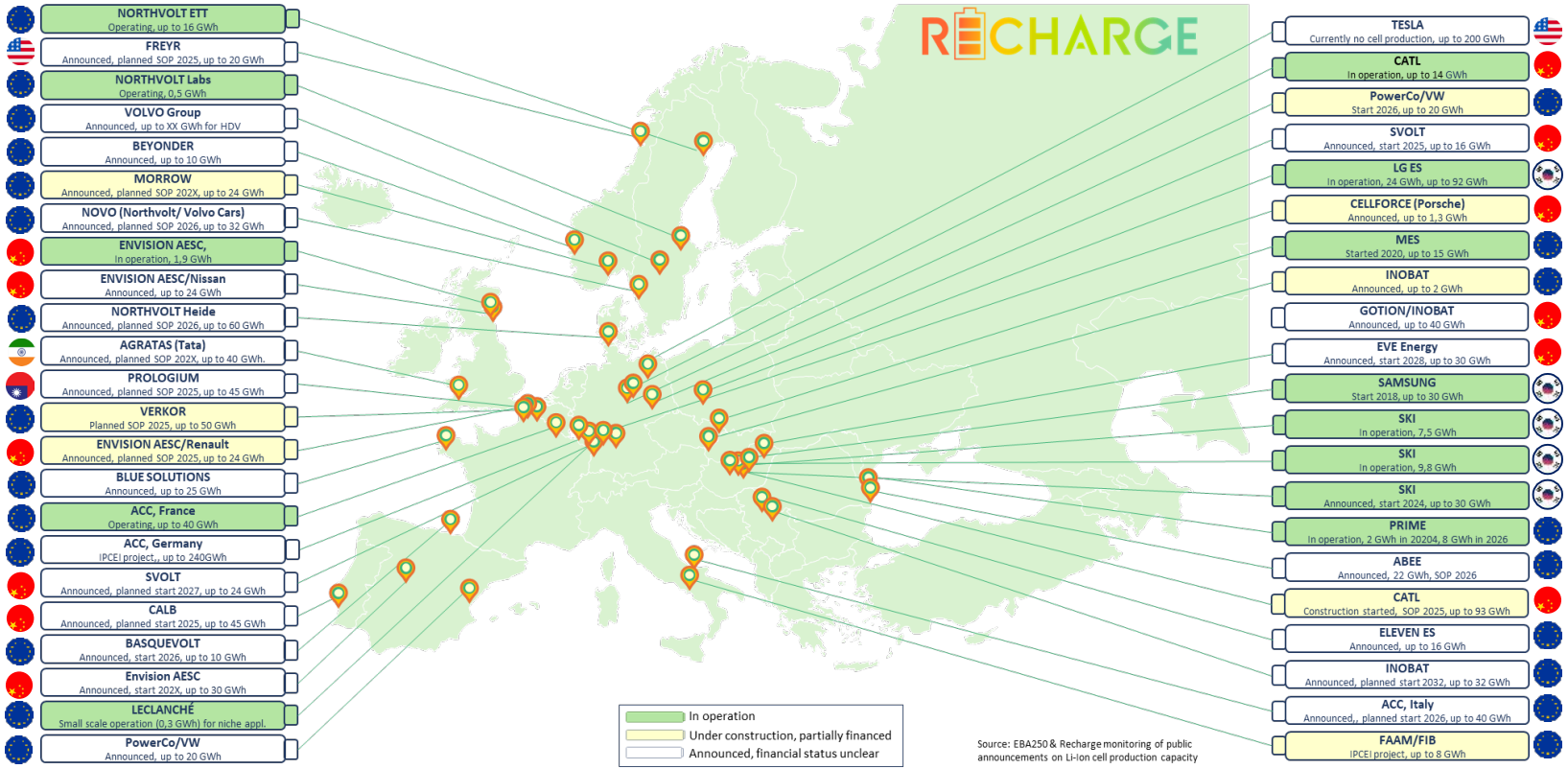
STREAMS

CICERO

Draghi report on EU Competitiveness, Sept 2024

- There are some technologies, like solar panels, where foreign producers are too far ahead and attempting to capture production in Europe will only set back decarbonisation. Even if those countries are using subsidies, we should let foreign taxpayers finance cheaper installation of clean energy in Europe.
- There are other sectors, however, where we are open to using foreign technology and to increasing inward investment.
- There are still other sectors, like **batteries**, where we do not want to be fully dependent on foreign technology for strategic reasons, and so it is key to keep the know-how in Europe. Determining strategic value should take place according to rigorous criteria which avoid protecting vested interests.

Battery Cell Production Sites in Europe – 2024 …



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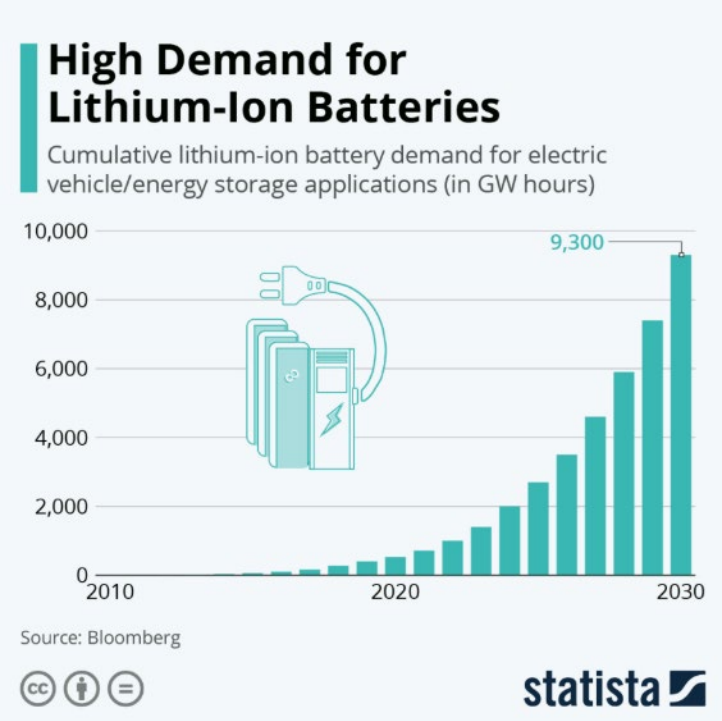
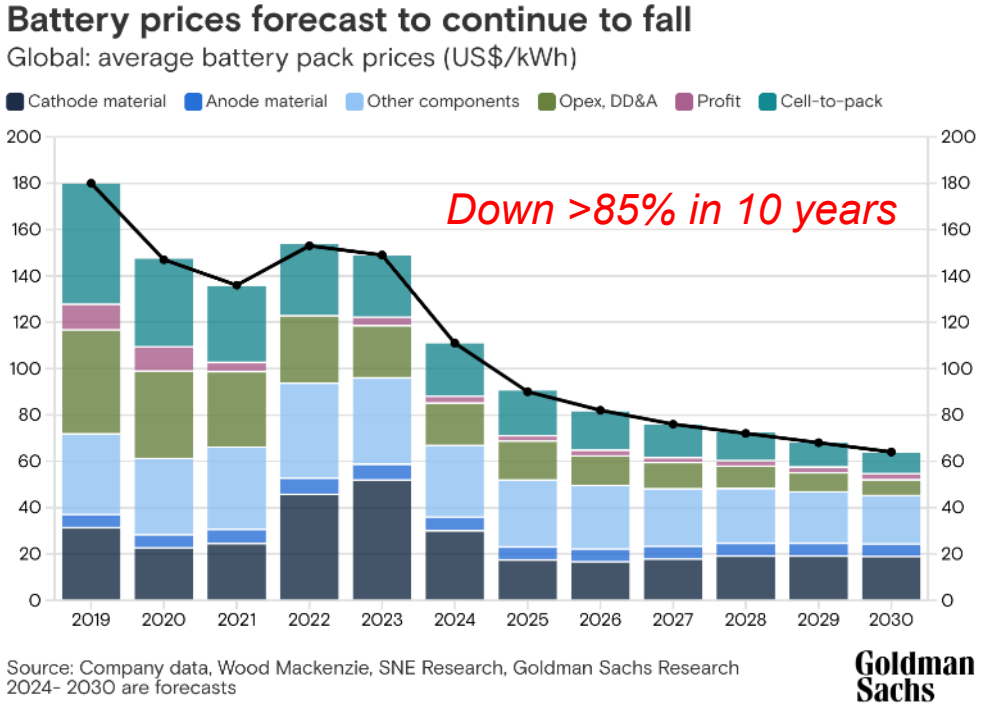
Demand & Cost of Batteries





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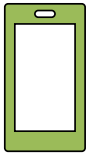
Electrify everything? Yes!

Size

Wh



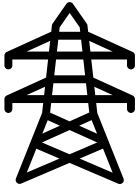
Energy

kWh

Energy

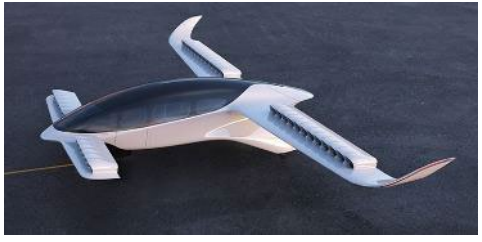
Safety

MWh



Cost

Sustainability



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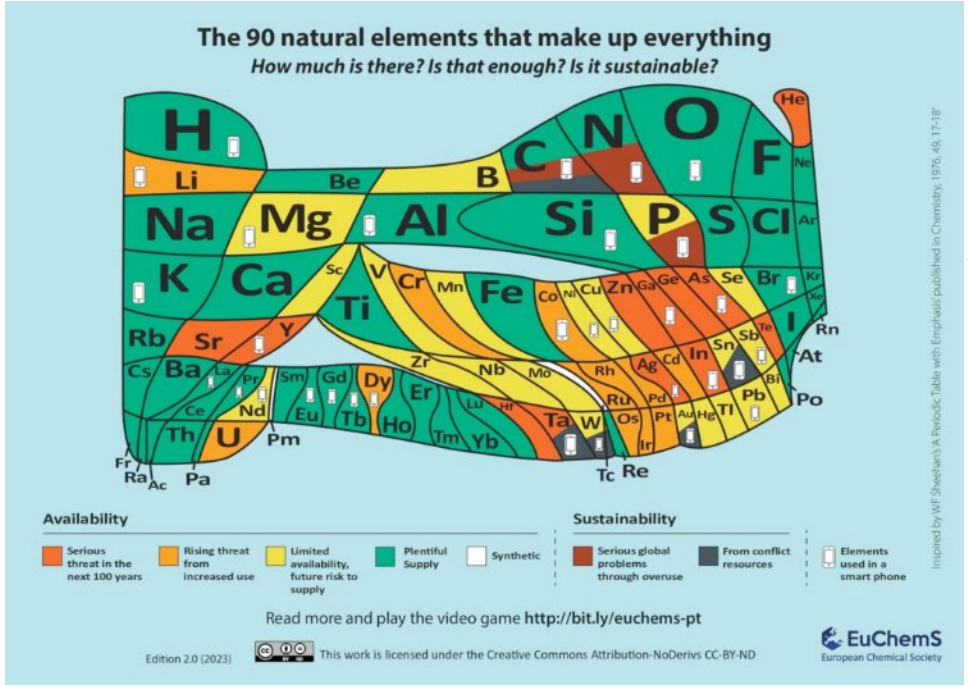
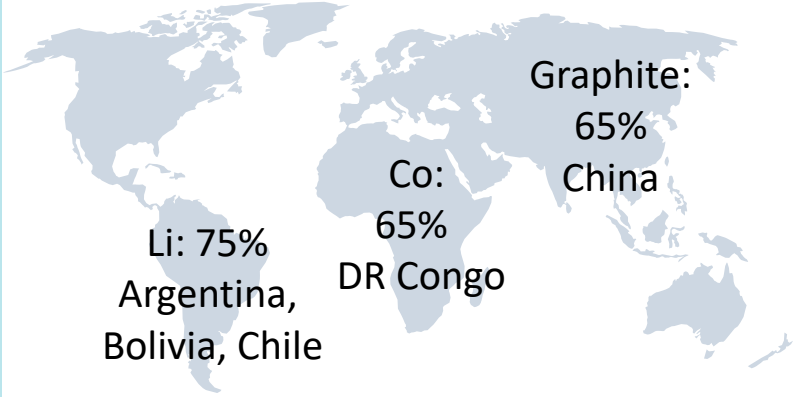
Sustainable Development?



Today's most "modern" LIB: NMC 811
CAM: 80% **Nickel**, 10% **Manganese** 10% **Cobolt**
+ Li, Graphite, Cu, *etc.*



Material flows = Risks

Transport of batteries = Costs

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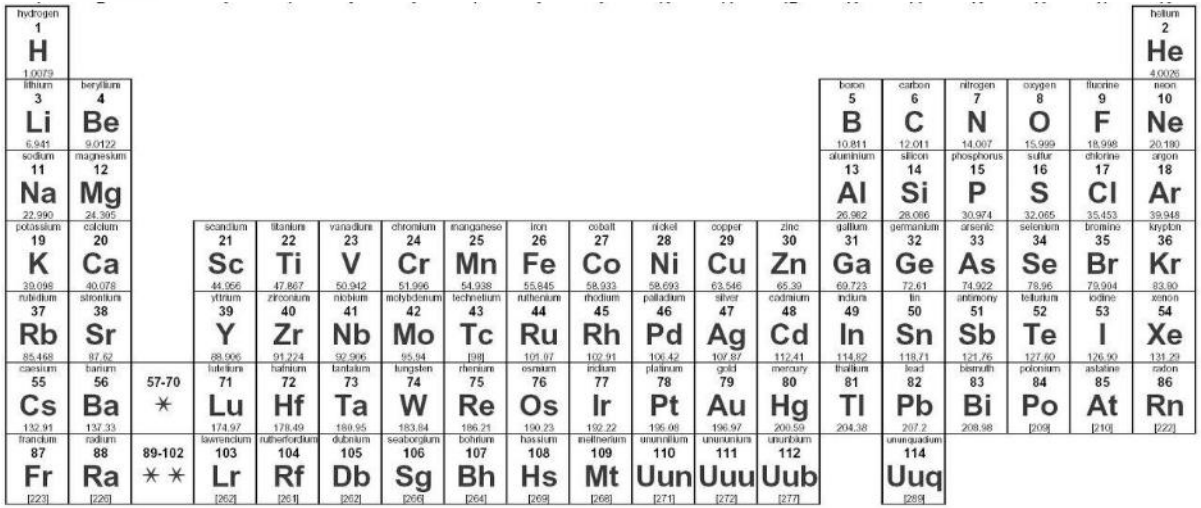
What can and should we do?!



H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	57-70 *	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	89-102 * *	Lr	Rf	Db	Sg	Bh	Hs	Mt	Uun	Uuu	Uub		Uuq				

*Lanthanide series	La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb
* *Actinide series	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No

Skip Li

=> Na, Mg, Ca, Al,...

Skip Co, Ni

=> $LiFePO_4$

Skip graphite

=> Li metal

NGBs!

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Three R&D&I buzzing trends

1. Solid-state batteries – SSBs, ASSBs, semi-solid, ... – when?? Now??
2. AI supported/performed R&D – incl. HTS, digital twins, robotics, ...
3. Electrolytes (and other ”non-active” materials) – increased awareness

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Three take-aways

1. Europe & Sweden must go for ***quality/excellence***,
   but ***quantity*** is also needed – even in R&D&I

2. Put ***application-inspired research***, but technology agnostic approaches,
   in focus – Battery 2030+ and Alistore-ERI as role models

3. There is hope for Europe – ***don't despair***. Situation today >> 10 years ago

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Thank you for your attention!

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