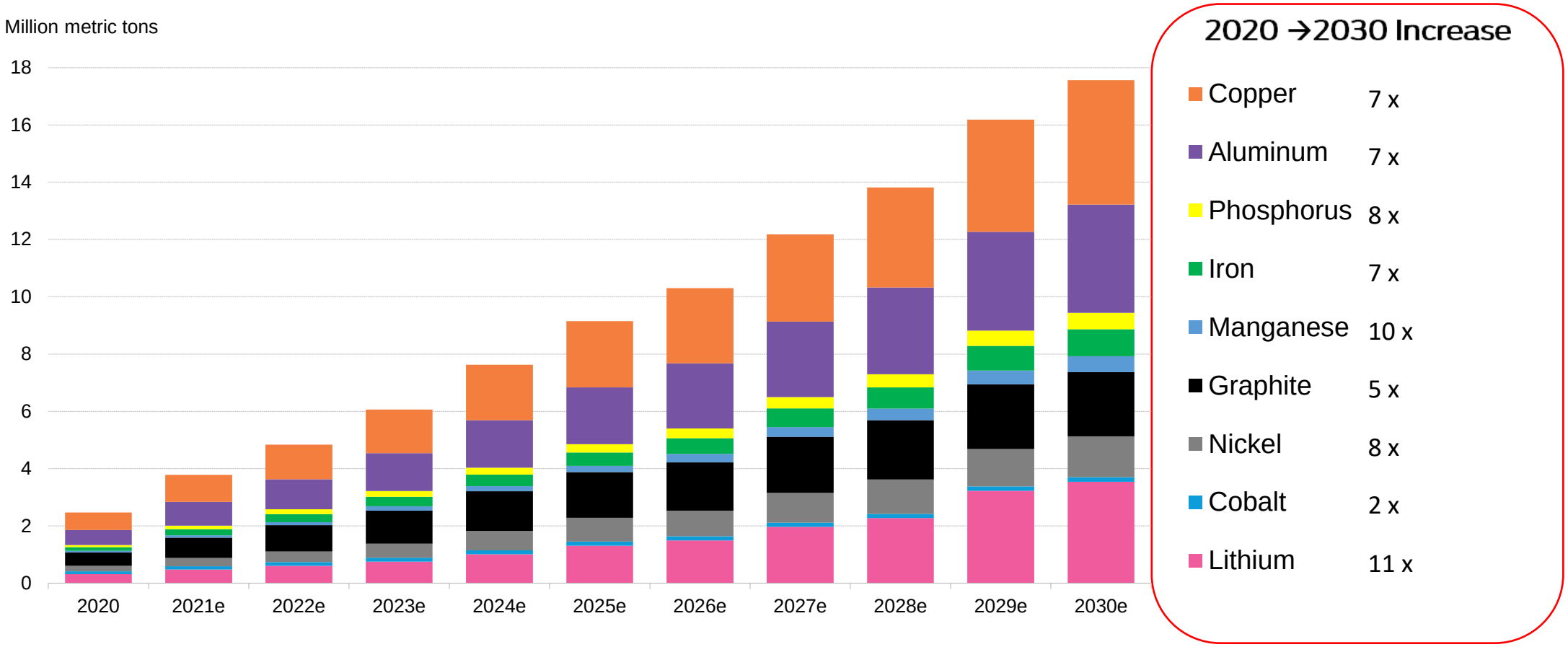


BlueOvalSK Battery Park in brief:

- Glendale, central Kentucky
- Investment: $5.8 billion
- A 1,500-acre campus
- 5,000 jobs
- Production (from 2025):
  BlueOvalSK batteries (86 GWh annually - two sister 43 GWh plants)

BlueOval SK
Battery Park
Kentucky

Soaring Demands for Cells and Battery Materials

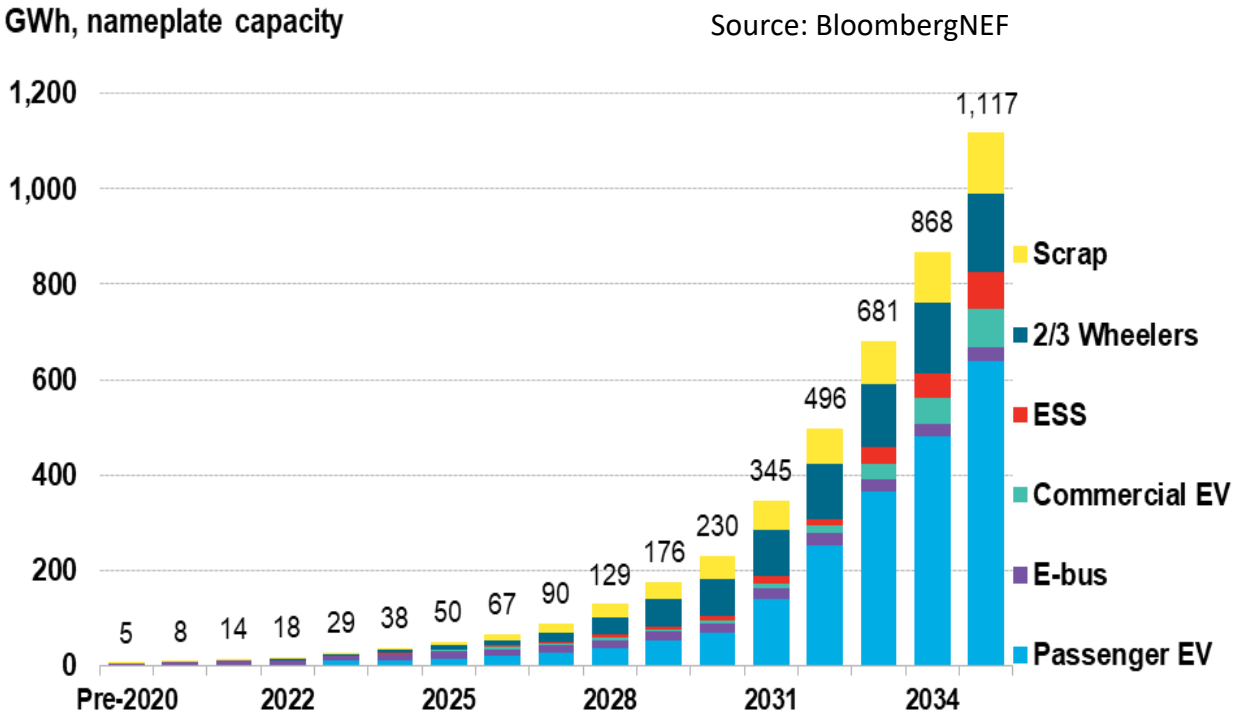


Source: BNEF July 2022

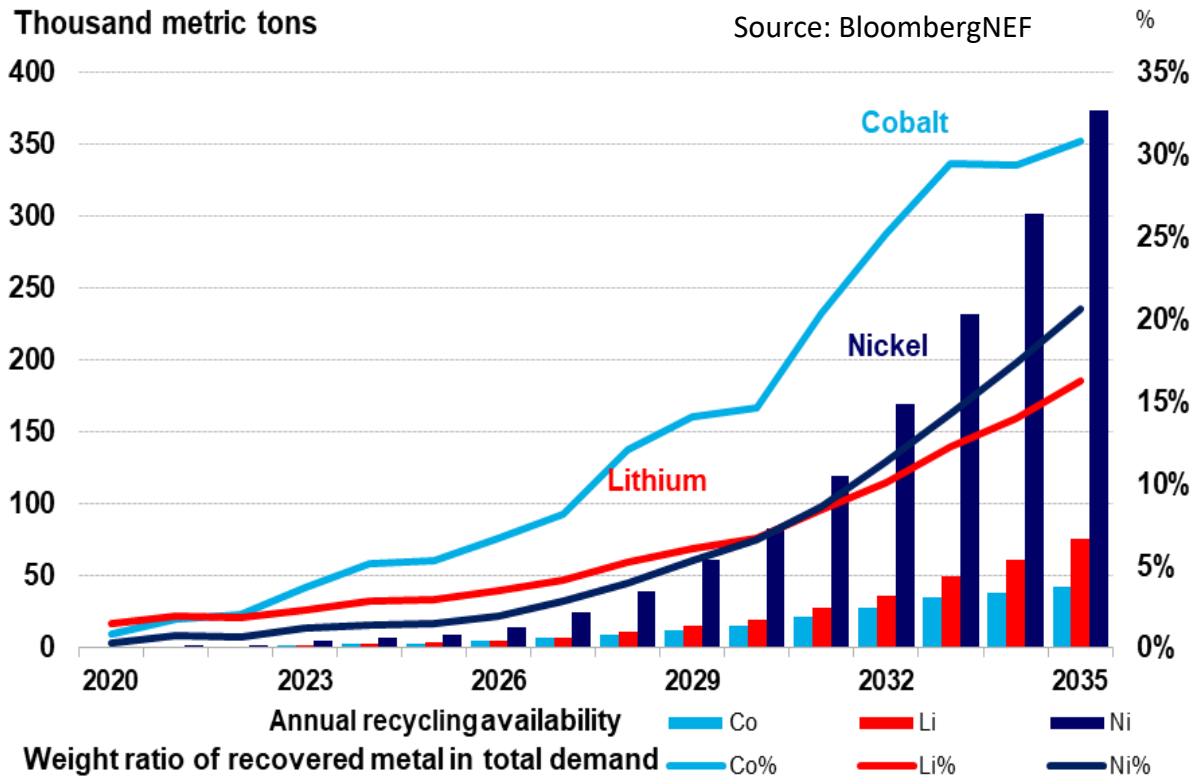
Global demand for battery metals growing dramatically by 2030.

End-of-Life Batteries: A Future Source of Battery Materials

Battery retirements by sector

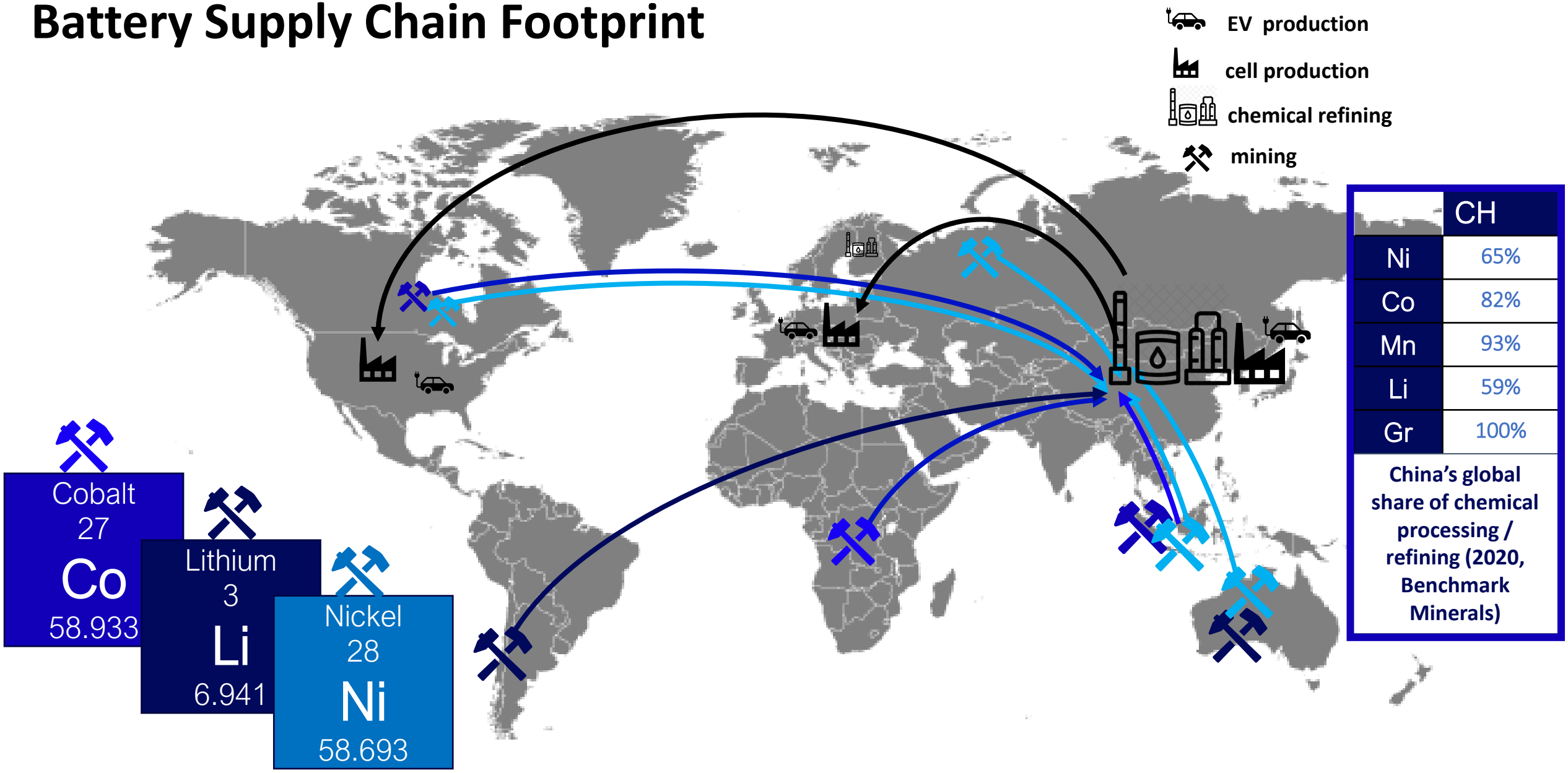


Metal availability from battery recycling



Significant percentages of global Li, Ni and Co demands can be met through recycling.

Battery Supply Chain Footprint

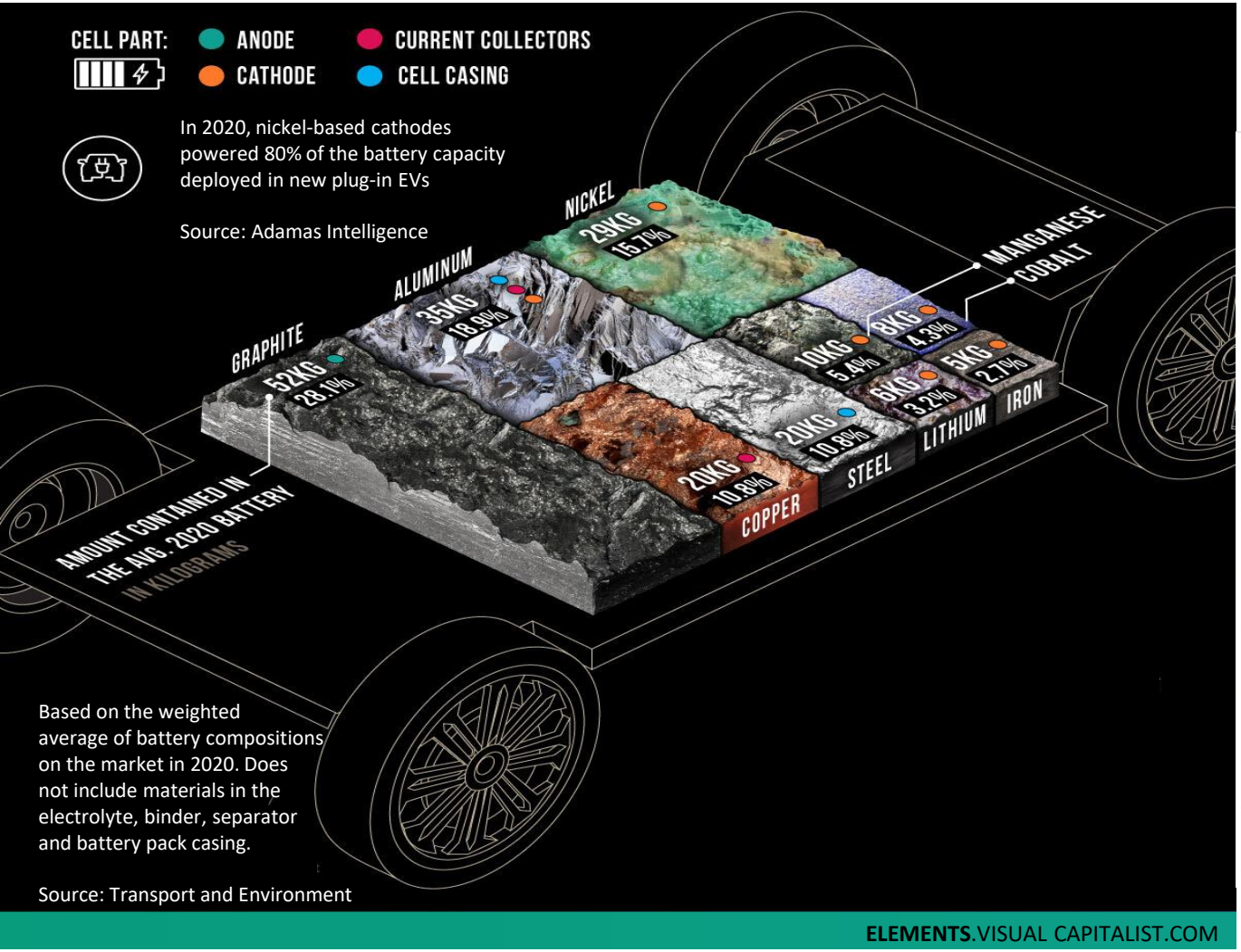


	CH
Ni	65%
Co	82%
Mn	93%
Li	59%
Gr	100%

China's global share of chemical processing / refining (2020, Benchmark Minerals)

Transitioning to largely regional supply chains will take time and $$$$$.

The Key Materials in an EV Battery/the 'Urban Mine'



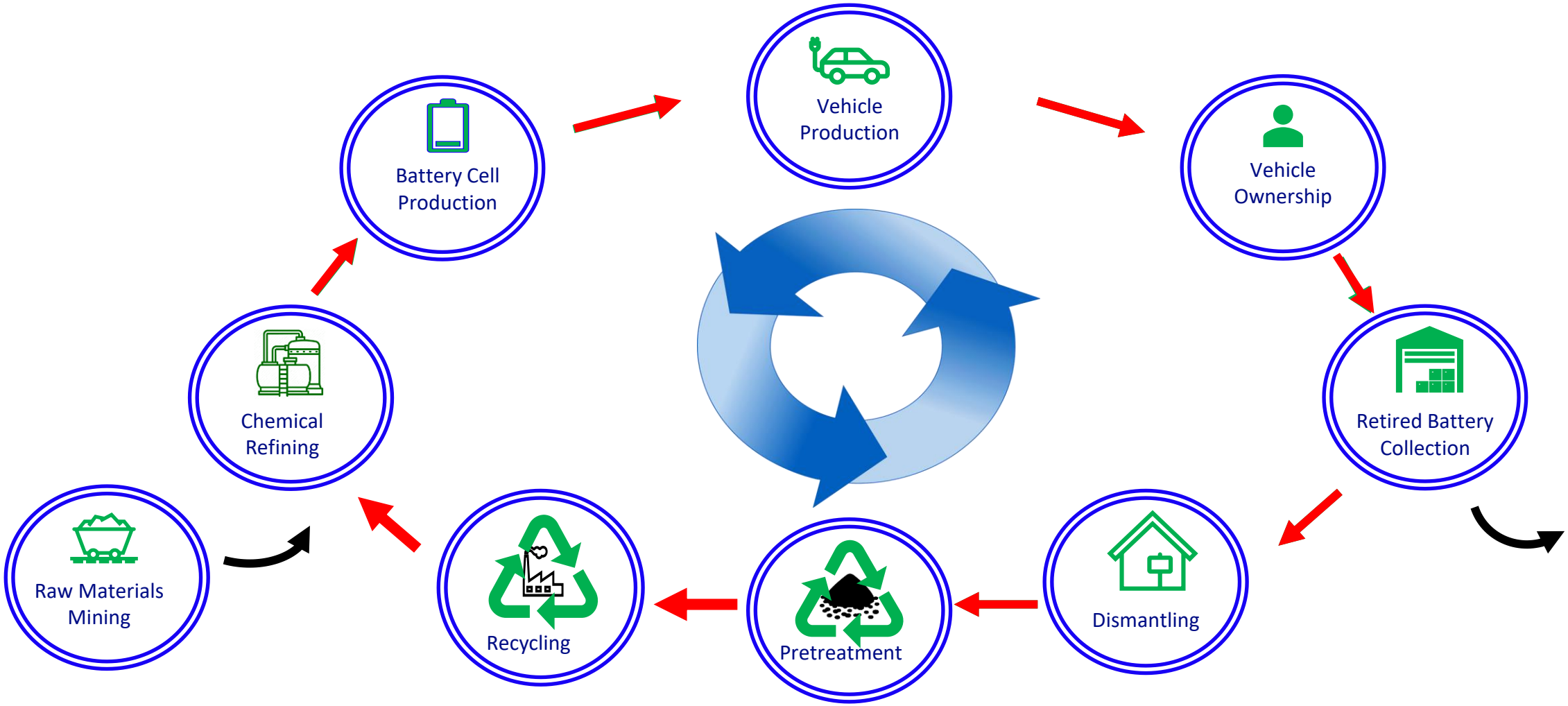
Elements in a ~2020 vintage 60 kWh EV battery (various chemistry scenarios)

	NMC811 Nickel (80%) Manganese (10%) Cobalt (10%)	NMC523 Nickel (50%) Manganese (20%) Cobalt (30%)	NMC622 Nickel (60%) Manganese (20%) Cobalt (20%)	NCA+ Nickel Cobalt Aluminum Oxide	LFP Lithium iron phosphate
LITHIUM	5KG	7KG	6KG	6KG	6KG
COBALT	5KG	11KG	11KG	2KG	0KG
NICKEL	39KG	28KG	32KG	43KG	0KG
MANGANESE	5KG	16KG	10KG	0KG	0KG
GRAPHITE	45KG	53KG	50KG	44KG	66KG
ALUMINUM	30KG	35KG	33KG	30KG	44KG
COPPER	20KG	20KG	19KG	17KG	26KG
STEEL	20KG	20KG	19KG	17KG	26KG
IRON	0KG	0KG	0KG	0KG	41KG

Source: ELEMENTS.VISUAL CAPITALIST.COM

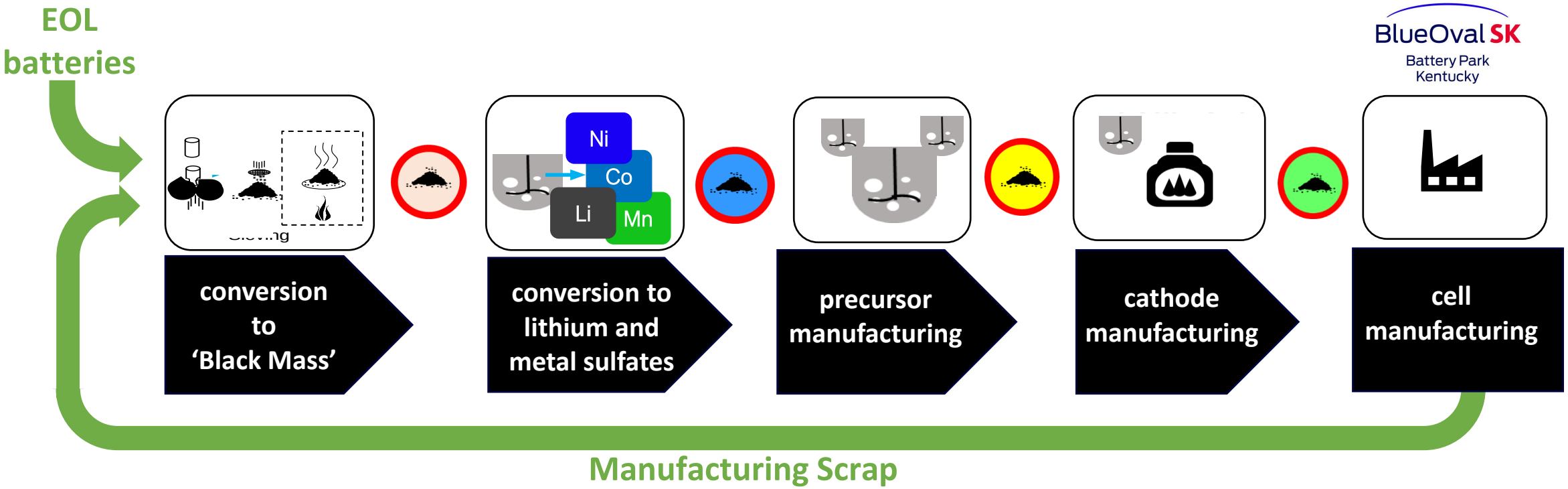
Visualization above explains the strategic importance of recycling.

The Complex Battery Life-Cycle



OEMs are increasingly involved from cradle to gate (closing the loop).

Lithium-ion Battery Material Value Chain

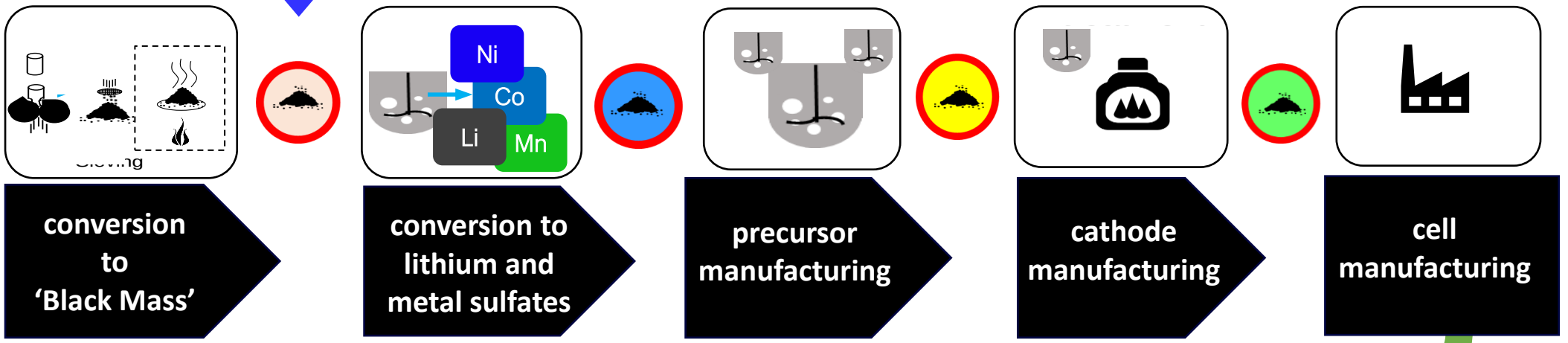


Lithium-ion Battery Material Value Chain Varies by Recycler

Different recycling processes have different outputs

- Cathode
- Precursor
- Metal sulfates, lithium compounds
- Black Mass

EOL batteries



conversion to 'Black Mass' → conversion to lithium and metal sulfates → precursor manufacturing → cathode manufacturing → cell manufacturing

Manufacturing Scrap

Objectives as an OEM

Produce affordable, sustainable vehicles that delight our customers and are good for the planet.

Technical Criteria

- Performance and design
- Safety and Quality
- Cost
- Production Capacity (and material and human resources to achieve)

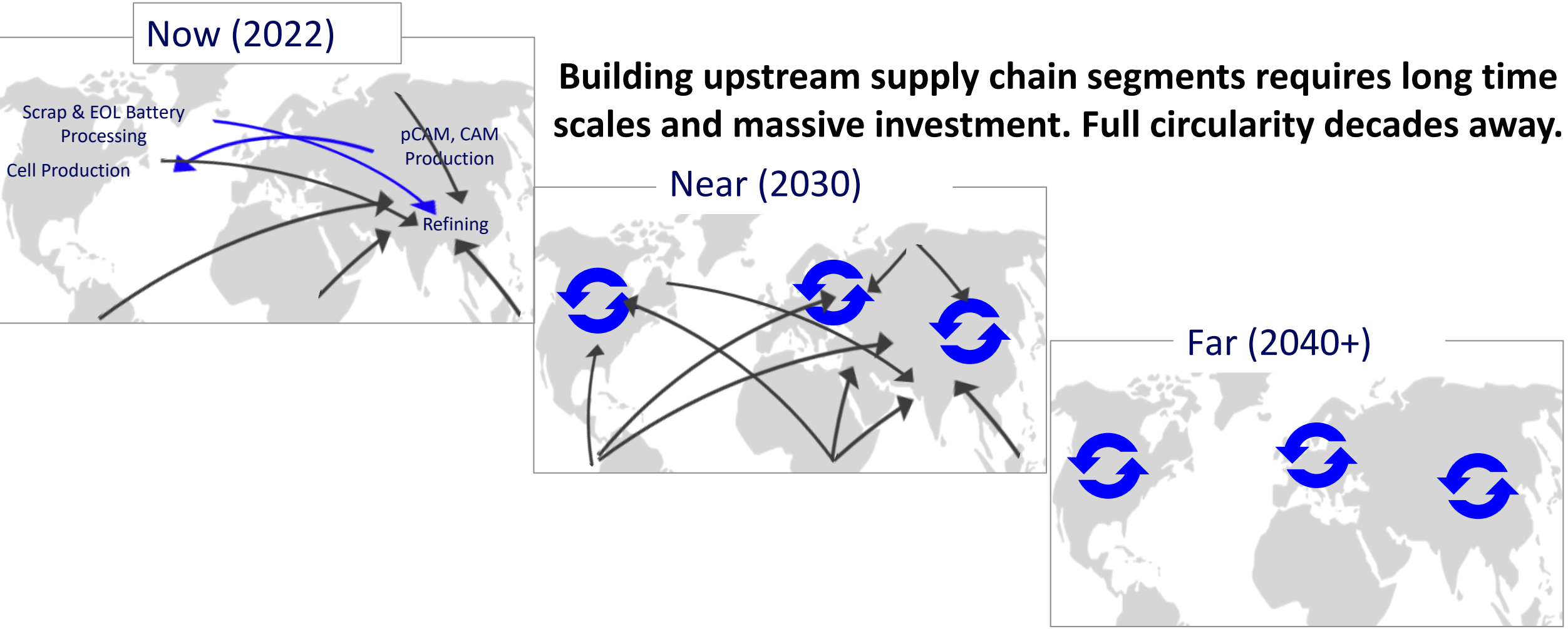
…AND EQUALLY IMPORTANT…

ESG (Environmental, Social, and Governance)

- Technology Sustainability Footprint (CO_2, water, electricity, LCA, supply chain infrastructure…)
- Responsibly Sourced Materials (Supplier Code of Conduct, Human Rights and Environmental Policy, Responsible Material Sourcing Policy…)

Ford's Mission: To help build a better world, where every person is free to move and pursue their dreams.

Recycling Stages: Getting to Regional Supply Chains



Building upstream supply chain segments requires long time scales and massive investment. Full circularity decades away.

Regional circularity of recycled materials is much closer!

Battery Recycling is a Critical Element of the EV Revolution

- Sustainability: Protect people and the environment
- Product stewardship and regulatory compliance
- Securing critical, conflict-free materials for our supply chain
- Economics

Photo Credit: Ascend Elements