



MECAWARE

Pitchdeck – Series A
October 2022



New mobility requires a huge amount of batteries.

Electric vehicles demand forecasts more than 300M cars on the road in 2040

\$14bn global support policy framework implemented by governments to enhance electric vehicles transition

CO2 emission standards for new cars require a shift to battery-powered electric vehicles



Source: International Energy Agency



Securing critical metals is vital...

Urgent need to relocate critical metals production in Europe and stop importing the necessary battery raw materials

80%

of the necessary critical metals are imported in Europe

...while conventional mining remains very damaging.

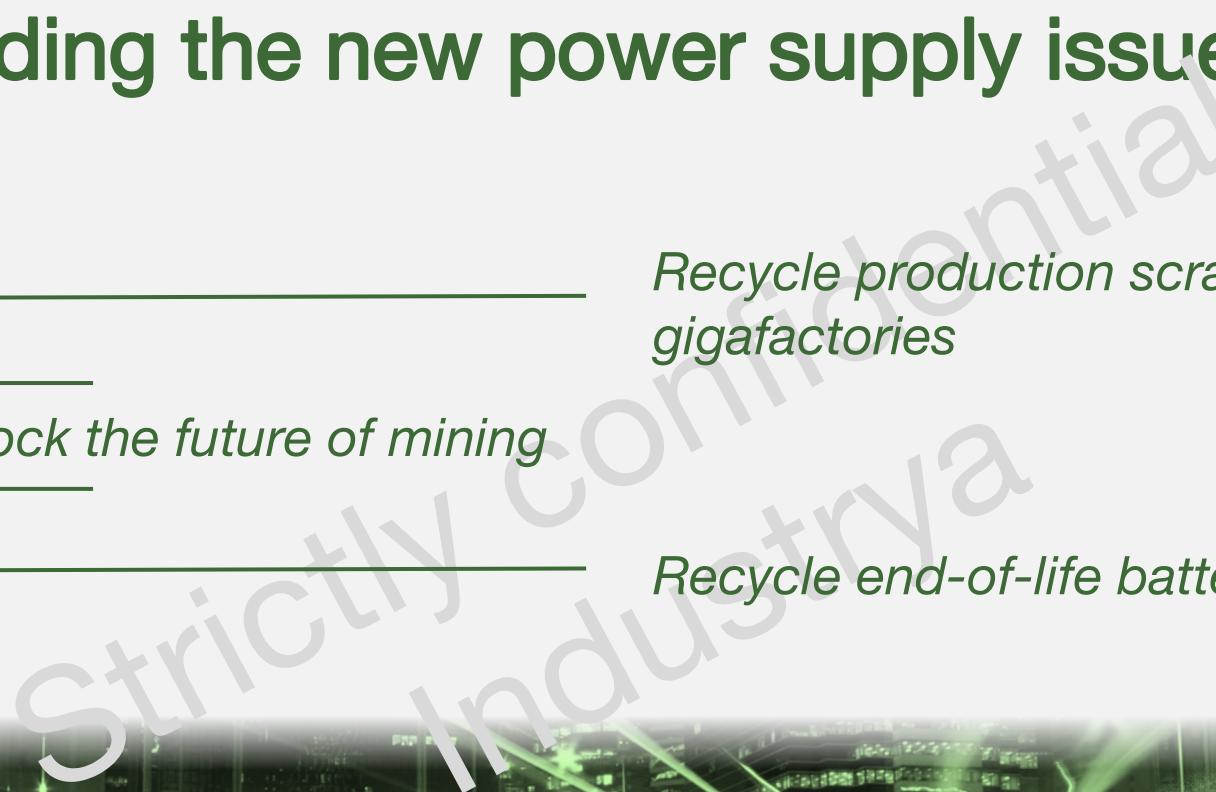
Conventional mining releases CO2 emissions and contaminates soils while not being economically sustainable

4bn tons

of CO2 emissions for global metals and mining industry



How can sovereignty and sustainability be ensured regarding the new power supply issues ?

- 
- Leverage waste to unlock the future of mining*
 - Recycle production scraps from gigafactories
 - Recycle end-of-life batteries





MECAWARE

The sole player using CO₂ to produce critical metals at a battery-grade level.

*Unlock the future of mining
by introducing a powerful &
impactful recycling solution.*



2 recycle streams
Production scraps and
end-of-life batteries



99%+ purity
Battery-grade level
production



No effluent
Extremely low use of
chemical extractants



Low Opex
30-50% less costly than
conventional methods



Low carbon
100% circular and CO₂
utilisation



Low Capex
2x less thanks to its
compact industrial process

MISSION

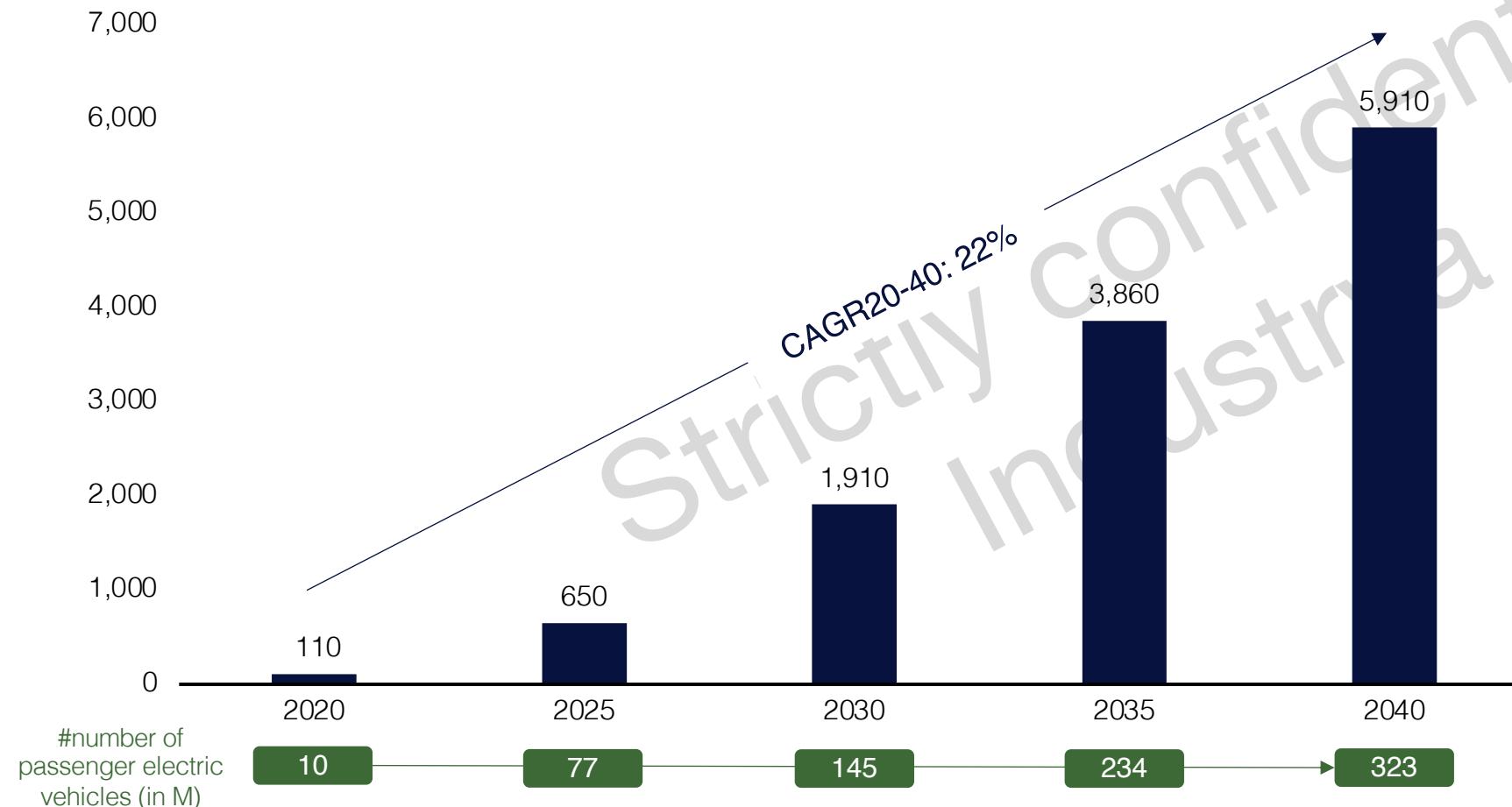
Create, develop and deploy **eco²-efficient industrial solutions** to meet the circular economy challenge

Deploy a **multi-factories model** to be the leading European critical metals recycling solution and reach **€400M of revenue in 2030**

AMBITION

A huge increase in electric vehicle batteries demand.

Global electric vehicle batteries demand from 2020 to 2040 (in GWh)



2035

End of sales for vehicles with combustion engines in Europe

\$280bn global incentives

Governments across the world spent \$280bn to support electric vehicles sales in 2022

International Energy Agency

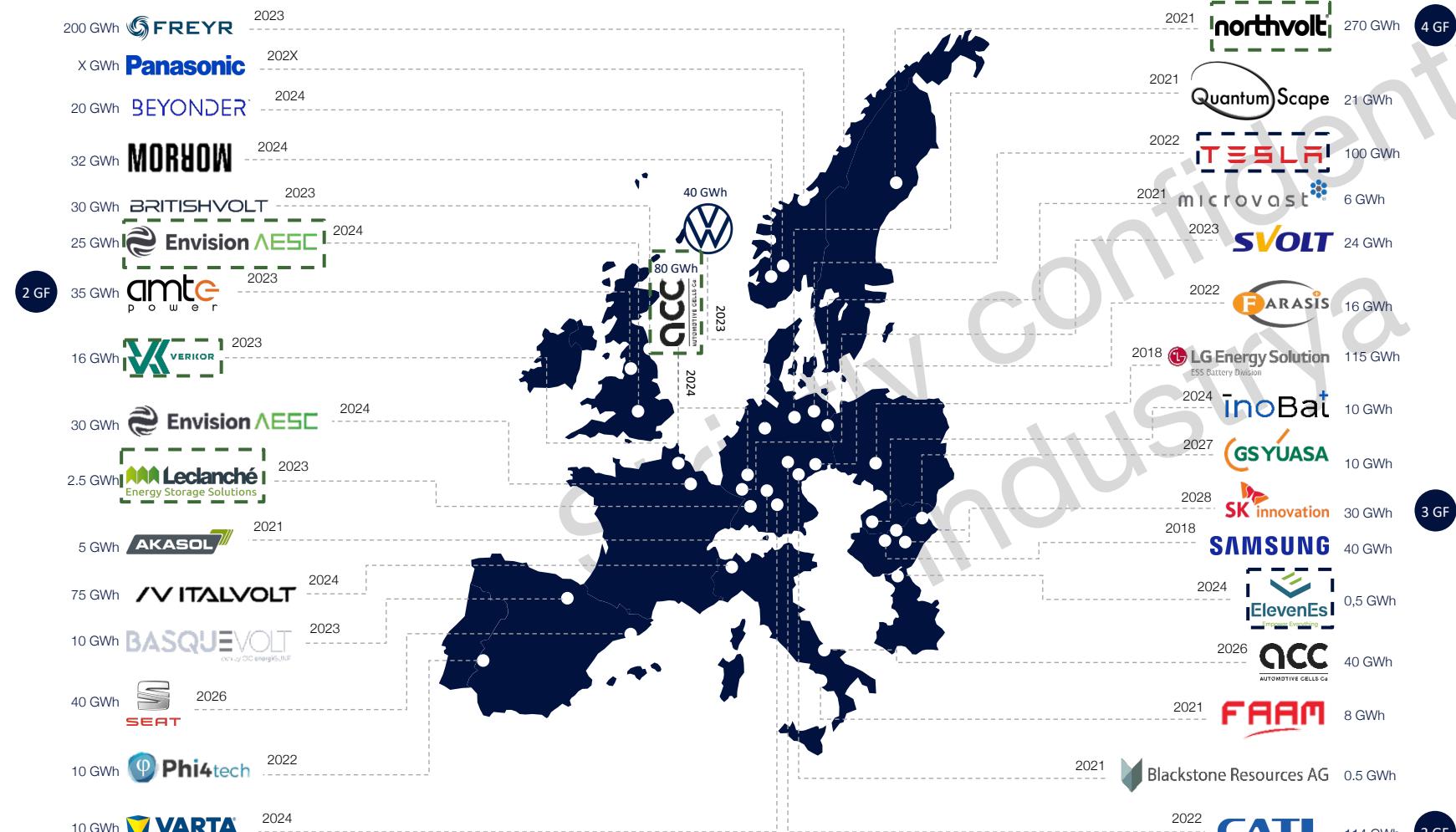
Supporting efforts to help governments implement the transition to electric vehicles



Sources: E.On Energy, European Commission, ScienceDirect, Statista Research Department, World Economic Forum, International Energy Agency

40+ gigafactories in Europe to meet batteries demand.

European Gigafactories Outlook until 2030



1,500GWh

Total addressable market for gigafactories in Europe

2Mt

Total volume of metals required to meet Gigafactories' demand in Europe

20%

Average production scraps rate for a Gigafactory

12Mt

Electric vehicle batteries expected to retire in 2030 worldwide



Sources: CIC energiGUNE,
Benchmark minerals

Business opportunities
identified by Mecaware

5 Business opportunities
identified by Mecaware

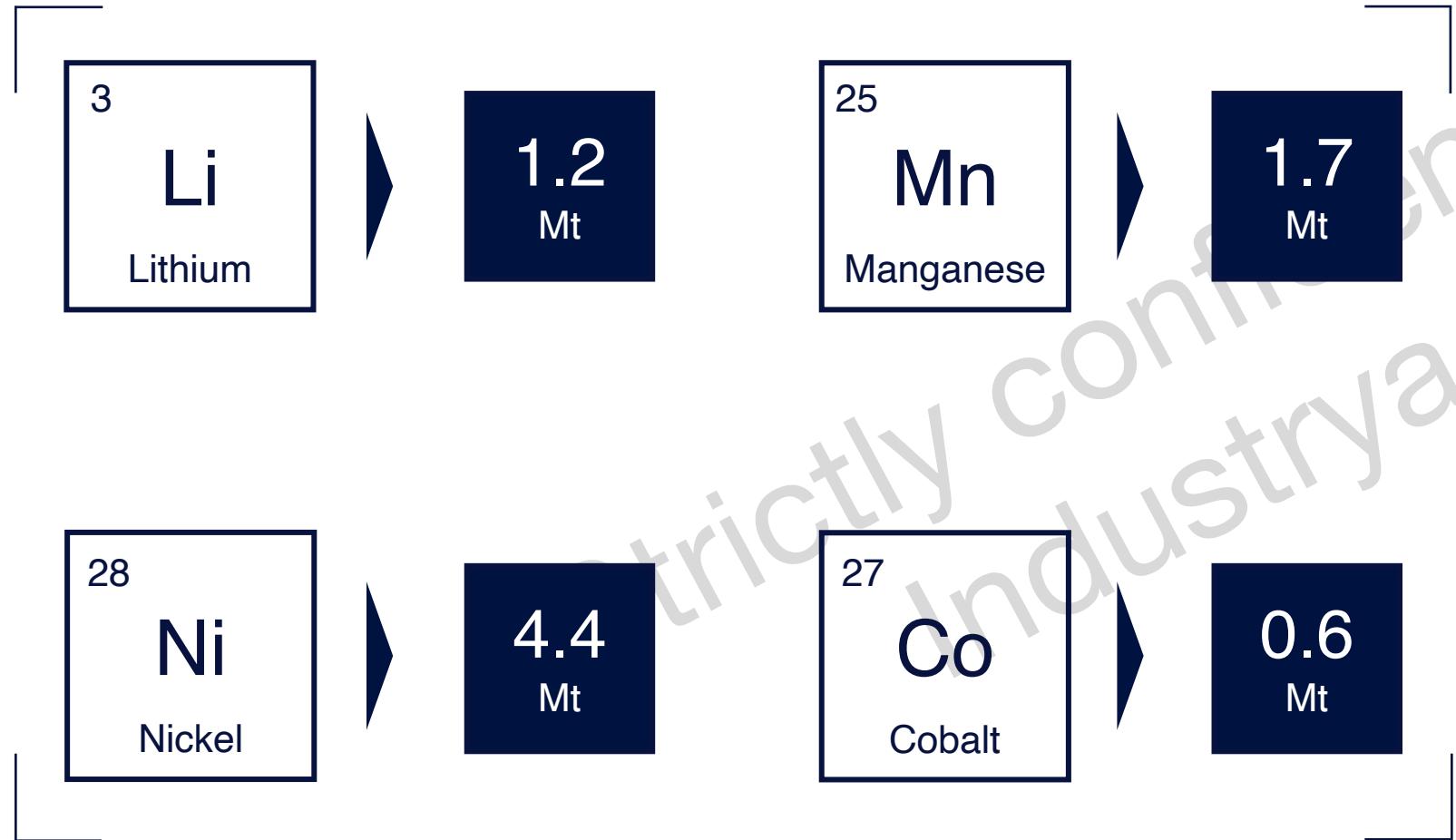
NCA batteries

9

Critical metals are key composites in lithium-ion batteries.



Weighted average lithium-ion battery composition



Mt

Expected global transportation energy demand⁽¹⁾ (in Mt)

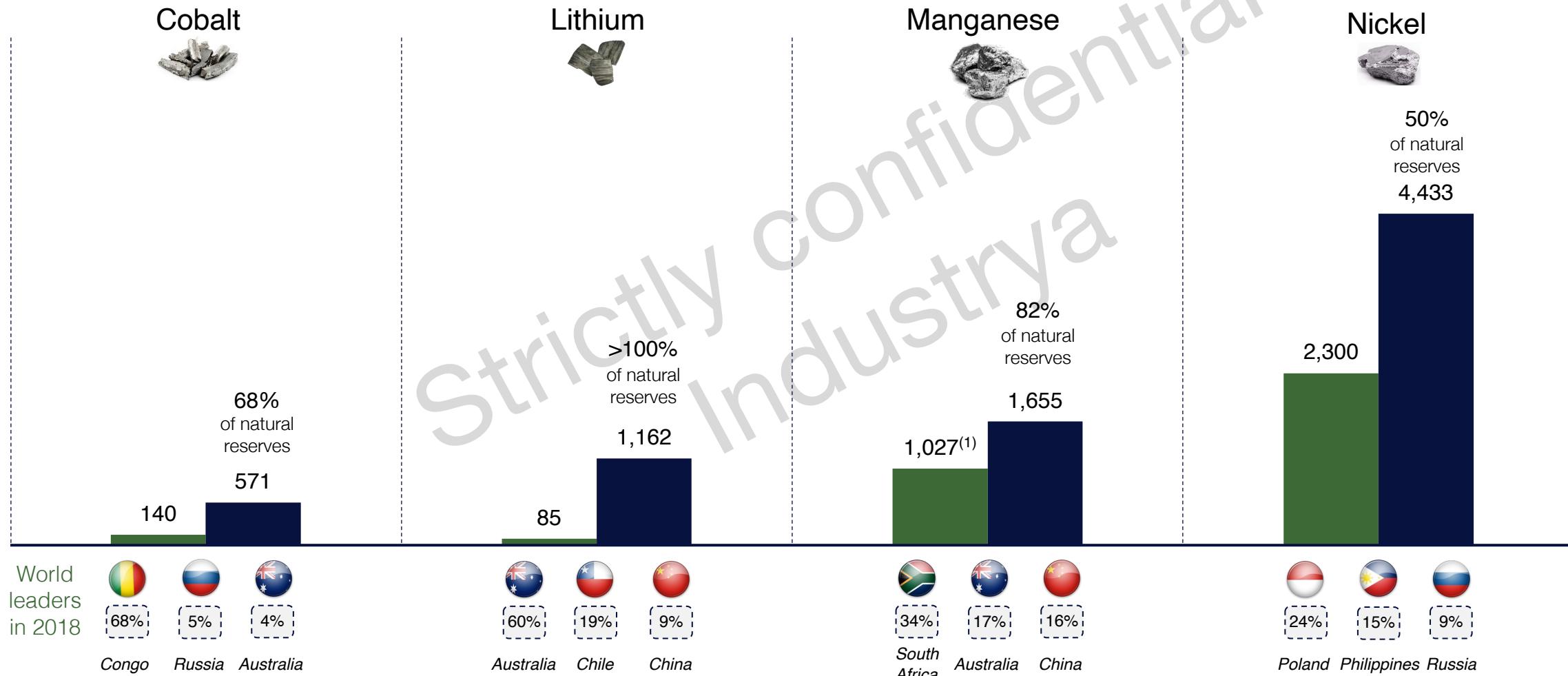
Note: (1) 2030+

Sources: British Geological Survey, The Faraday Institution; McKinsey



Current production is largely insufficient to cover needs while natural reserves are dwindling.

Global production of metals in 2018 vs. expected demand in 2040 (in kt)



Note: (1) Production for manganese used within the transportation industry

Sources: US Geological Survey, Science Direct

of global production per country

[]

2018 production

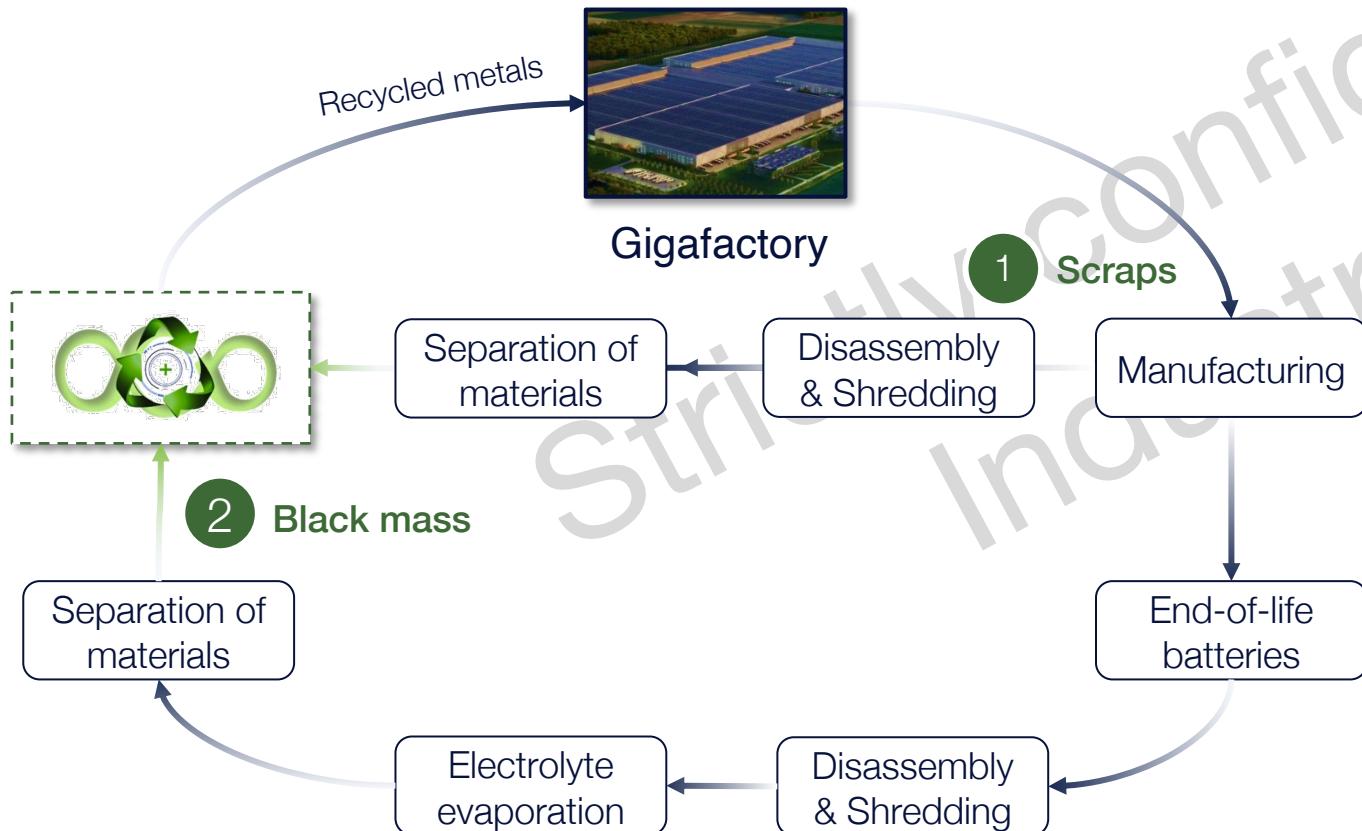
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2040 expected demand



The future mining: production scraps and end-of-life batteries.

Addressing both scraps and black mass is now a must-have to benefit from the full value potential



1 Scraps



Production process generate nearly 20% of scraps which will reach 1m+ kt in 2030

2 EoL batteries



Black mass



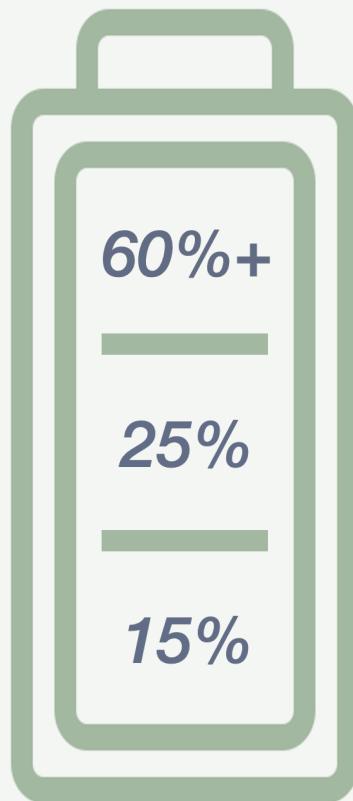
<1% of lithium-ion batteries are recycled while 12Mt are expected to retire by 2030



Sources: Standford MAHB, Circular Energy Storage

Critical metals are key in the battery value chain...

... and their market value increases.



Active materials (cathode & anode) share value of a battery

Manufacturing and depreciation share value of a battery

Separator, electrolyte and battery housing share value of a battery

	Price (\$/t)	CAGR 20-22	Market value	2018	2040
Manganese	2,000	3%	\$280M	\$1.1bn	
Cobalt	50,000	19%	\$7bn	\$29bn	
Lithium	75,000	150%	\$6bn	\$87bn	
Nickel	21,350	9%	\$49bn	\$95bn	
Total			\$62bn	\$212bn	



Extraction and non-recycling heavily contaminates soils and spoils water while emitting large amounts of CO2.



Critical metals extraction

- Global metals and mining industry contributes to 8% of the 50bn tons of global CO2 emission per year
- Raw material extraction process to produce 1t of lithium requires 2.3M liters of water

2.3M of litres

of water required for raw material extraction to produce 1t of lithium

End-of-life Batteries



- 800k tons of automotive batteries enter the EU today and this figure is expected to generate 12Mt of retired batteries by 2030
- Electric vehicle batteries rotting in the environment may contaminate $5,214\text{Mm}^2$ of soil by 2040

12M of tons

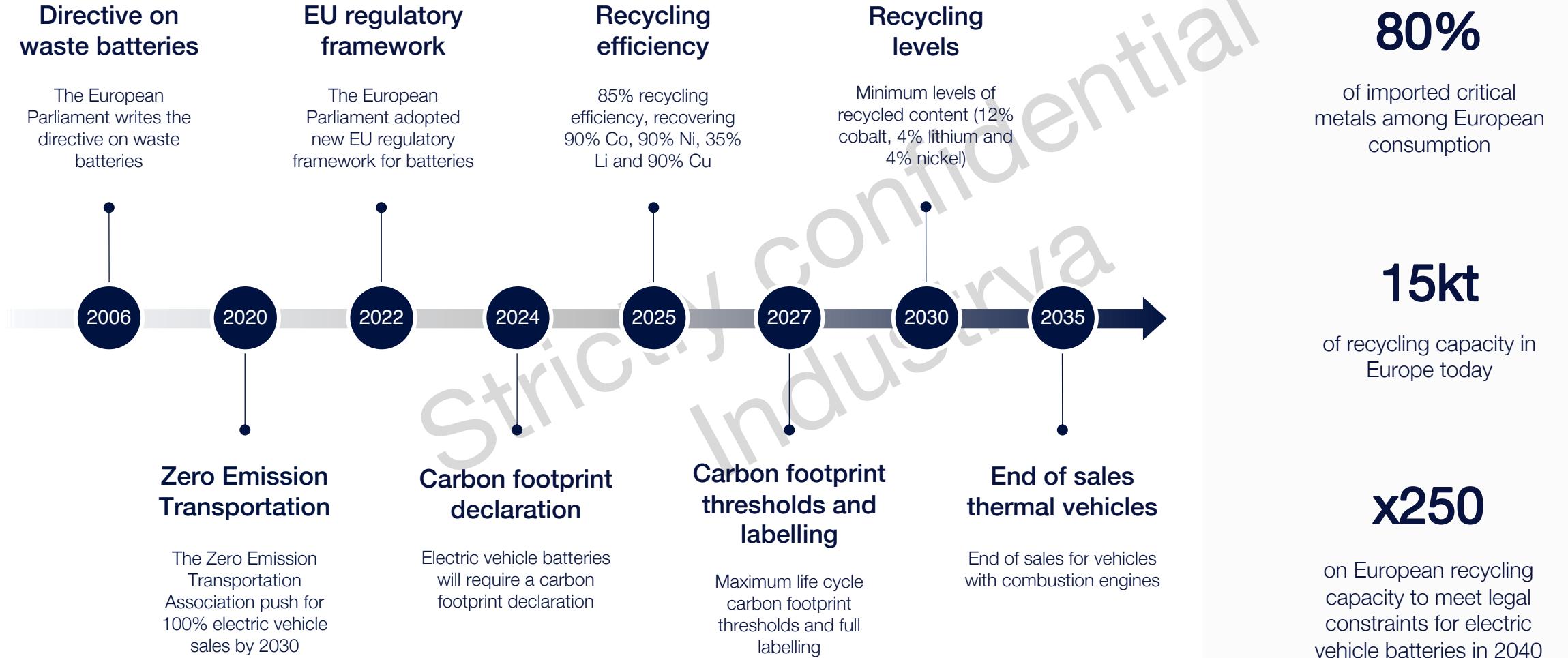
Electric vehicle batteries expected to retire in 2030 worldwide



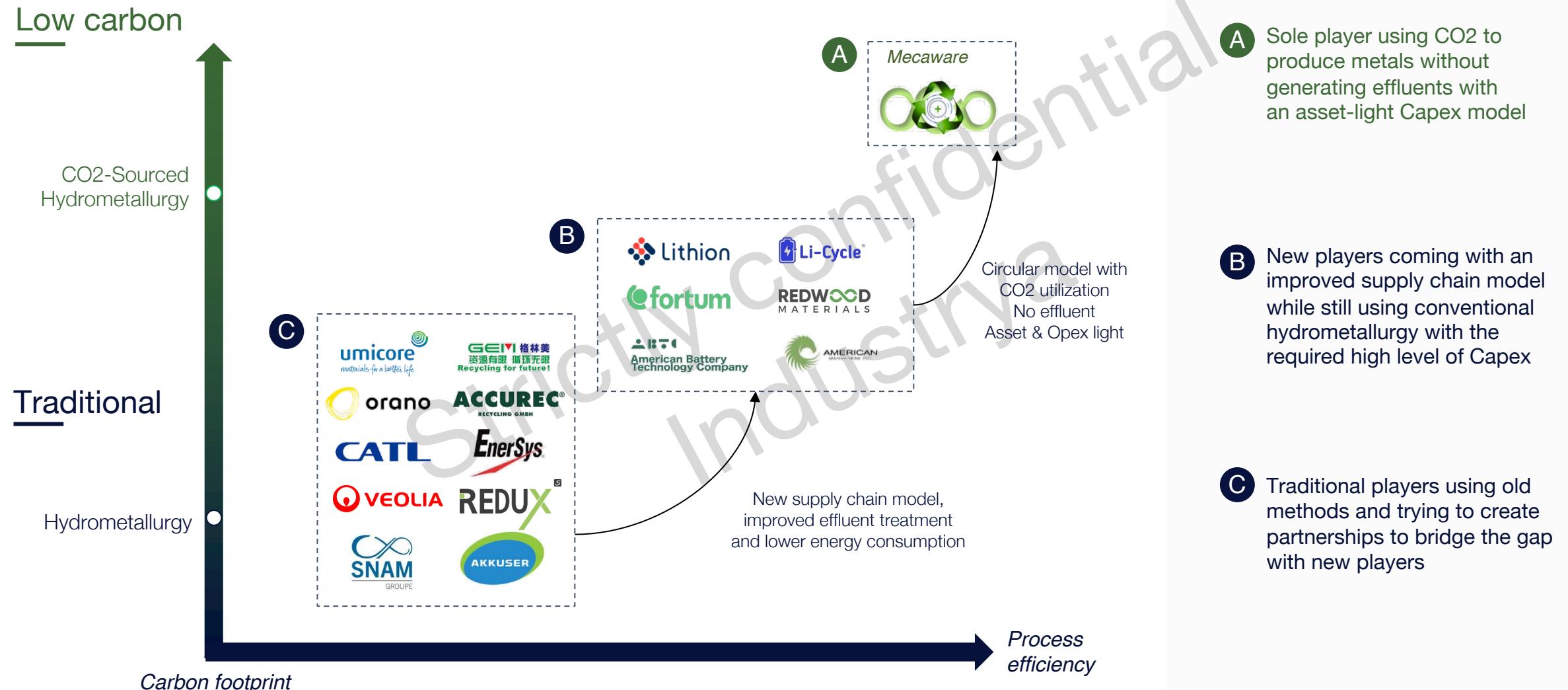
Sources: Ecojungle, Nature, The Guardian, Stanford MAHB



Europe aims to rapidly increase sovereignty through recycling.



Existing solutions are less impactful and cost-efficient than Mecaware.



Mecaware: a game-changing solution which uses CO₂ waste to produce metal.

 Activity	 Veolia	 Accurec® RECYCLING GMBH	 Snam	 Umicore materials for a better life	 American Manganese Inc.	 Li-Cycle®	 Mecaware
Grinding & Electrolyte extraction	No	Yes	Yes	No	Yes	Yes	No
Scraps recycling	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Black mass recycling	Yes	Yes	No	No	Yes	Yes	Yes
Recycling Capacity (t/y)	2,000 Europe	1,000 Europe	3,000 Europe	7,000 Europe	9,000 Global	30,000 Global	38,000 ⁽¹⁾ Europe
 Technology							
Extraction process	Chemical hydrometallurgy	Thermal pyro/hydrometallurgy	Thermal pyro/hydrometallurgy	Pyro/hydrometallurgy	Hydrometallurgy	Hydrometallurgy	Carbo metallurgy
Chemicals	One per metal extracted	One per metal extracted	One per metal extracted	One per metal extracted	One per metal extracted	One per metal extracted	No chemicals
CO ₂ -Sourced	No	No	No	No	No	No	Yes
On-site production capabilities	No	No	No	No	No	No	Yes
Asset-light	 	 	 	 	 	 	
Opex-light	 	 	 	 	 	 	
Low carbon recycling	Acid discharges	Thermal process	Thermal process	CO ₂ emissions	CO ₂ emissions	CO ₂ emissions	Low carbon

Note: (1) Expected in 2028
 Sources: Websites, Techcrunch



Systemic recycling approach

Circular and sustainable

No effluent

Capex & Opex light

Introducing CO₂-sourced hydrometallurgy.

CO₂ Integration

Use of CO₂ waste from combustion flue gases and contact with amines



#1
#4



Hydroxides production

Formation of metal hydroxides or carbonates required by CAM manufacturers

Solubilisation

Solubilisation of black mass in amine to bring metals into solution



#2



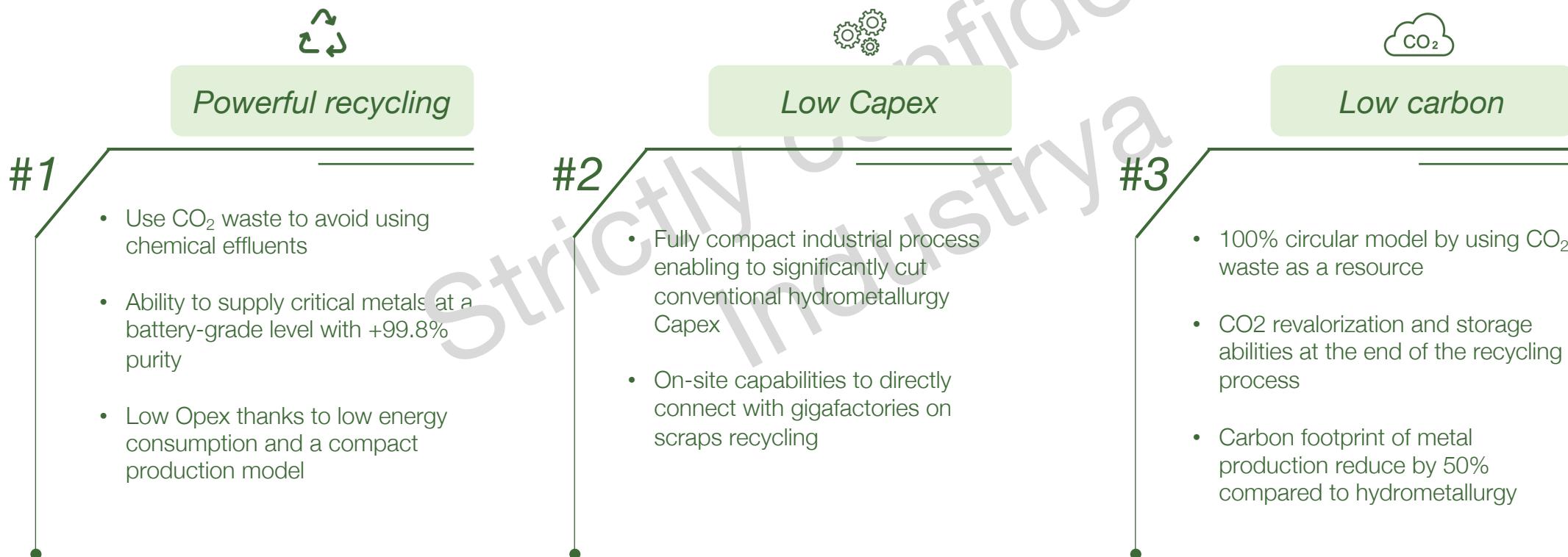
Precipitate → Filtration

Extraction process

Mechanical leaching (lithium & aluminium) and Electrodeposition (nickel, manganese & cobalt)

Mecaware: CO₂-sourced hydrometallurgy for widespread recycling.

Recovering combustion CO₂ from flue gases to recycle critical metals at a battery-grade level



Mecaware recycling

A step forward for the recycling industry...

- Structural approach
- **30-50% less costly & 2x less Capex intensive**
- **100% circular model** with a CO₂-based recycling process
- Mechanical leaching with **10x less acid** used than in the conventional process
- Cutting nearly **100% of effluent**
- **50% less polluting** with zero waste released during the process

Conventional hydrometallurgy

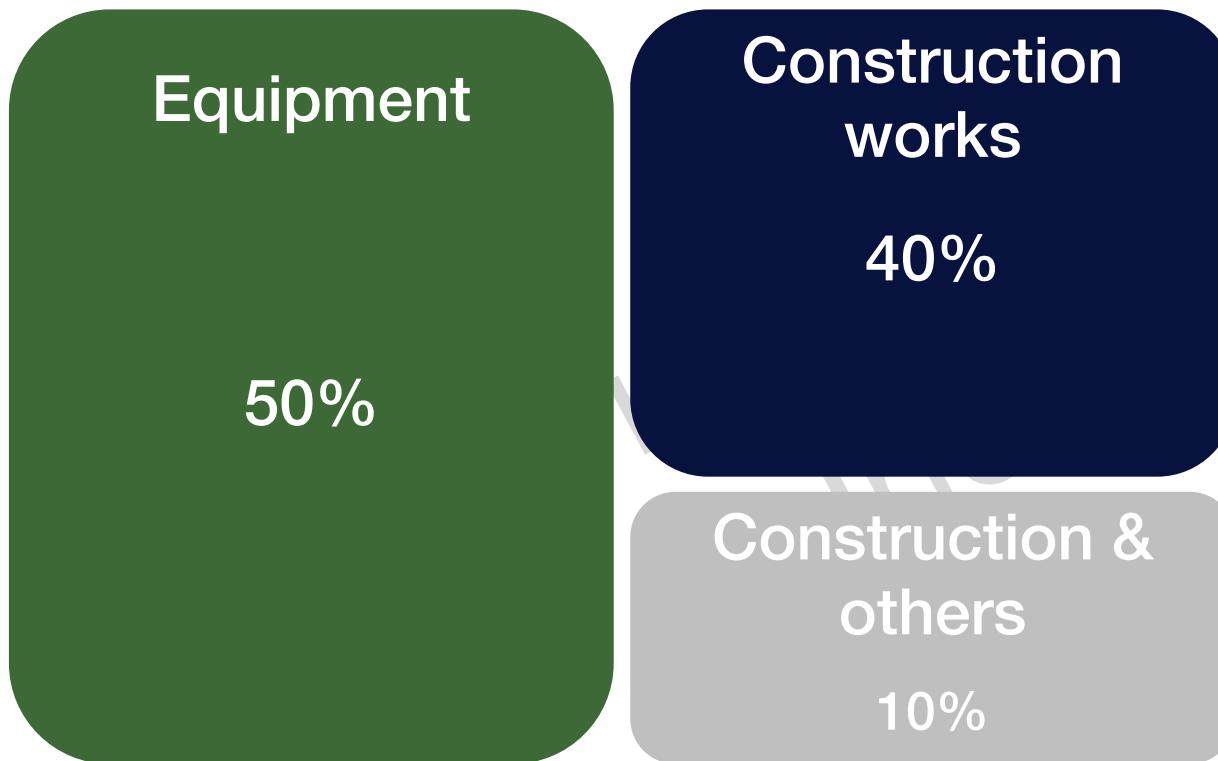
...aiming to make disappear an old and inefficient method.

- Segmented approach (One acid per metal extracted)
- High Opex & high Capex
- Recycling process emitting CO₂ into the atmosphere
- Large volumes of water required
- Acid leaching to recover metals highly pollutes ground and water
- Sulfuric acid used as the leachant releases sulfate waste into toxic ponds



A Capex efficient process with unique on-site production capabilities.

— €60M Capex for a 6Mt production unit —



Why Mecaware is
2x more Capex
efficient than
others?

1. No effluent

No need to invest in effluent
retreatment infrastructure

2. No energy consumption

Ambient pressure and
temperature requirements
remove any energy need
in the process

3. Compact

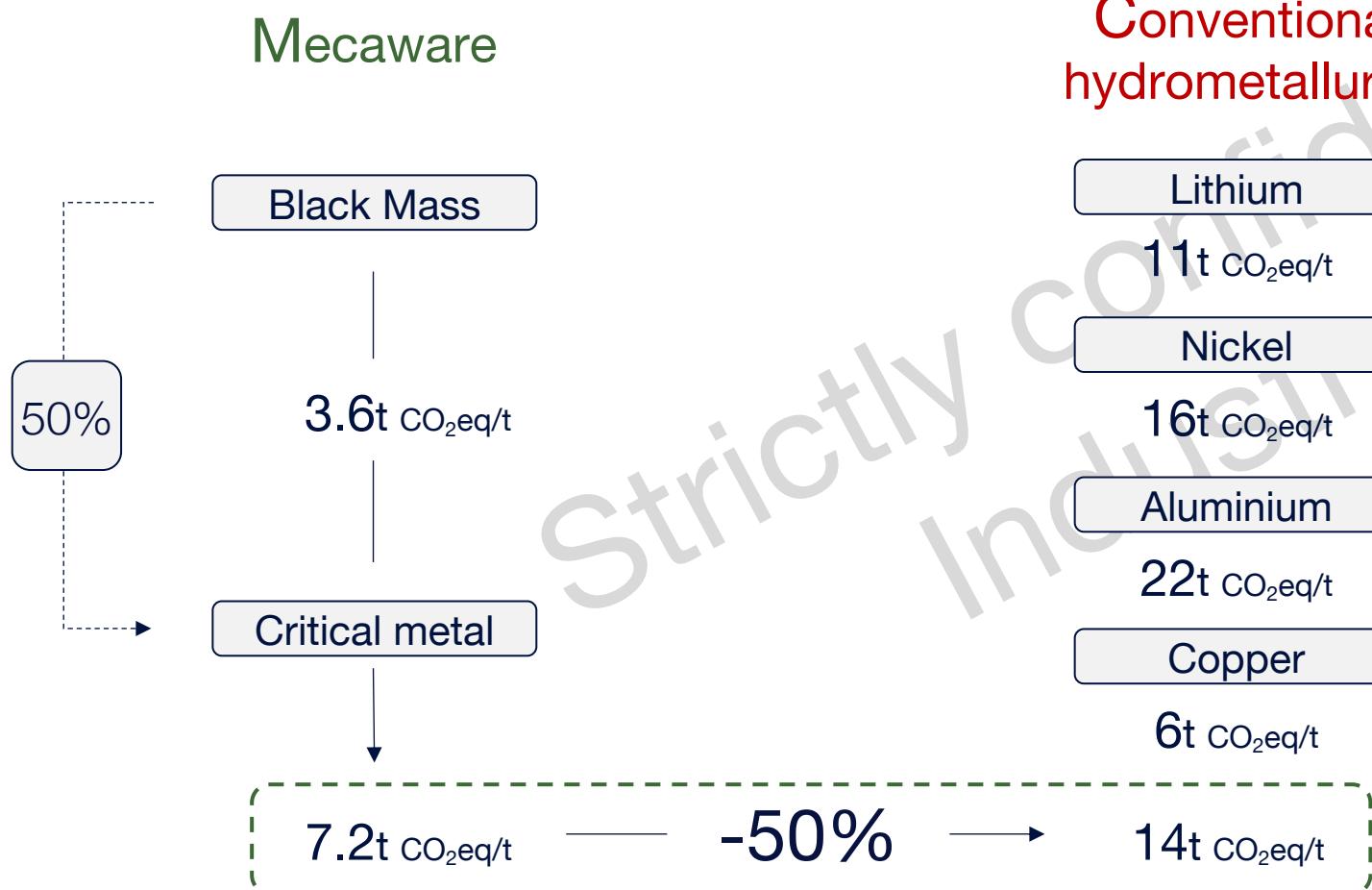
Mecaware use 20,000m²
while others use more
than 10ha for the
same production
capacity



Sources: Reuters

21

400Mt saved each year thanks to Mecaware.



Gigafactory scope

-25%

CO₂ avoided for a
Gigafactory assuming
15% of recycled metals

Global scope

-50%

CO₂ emission avoided for
each critical metal unit
produced

400Mt

Global CO₂ emission
avoided using Mecaware
recycling process



Sources: Mecaware, Sustainable Lithium, CSIRO

Core IP secured by 4 intercontinental patents (North America, Europe, Asia).

#1 { eCO2-Chem
Fundamental chemistry - Contact of CO₂ gas with an amine produces carbamate, allowing a particular affinity with metals in order to modify their molecular structure.
WO 2014188115 A1 }

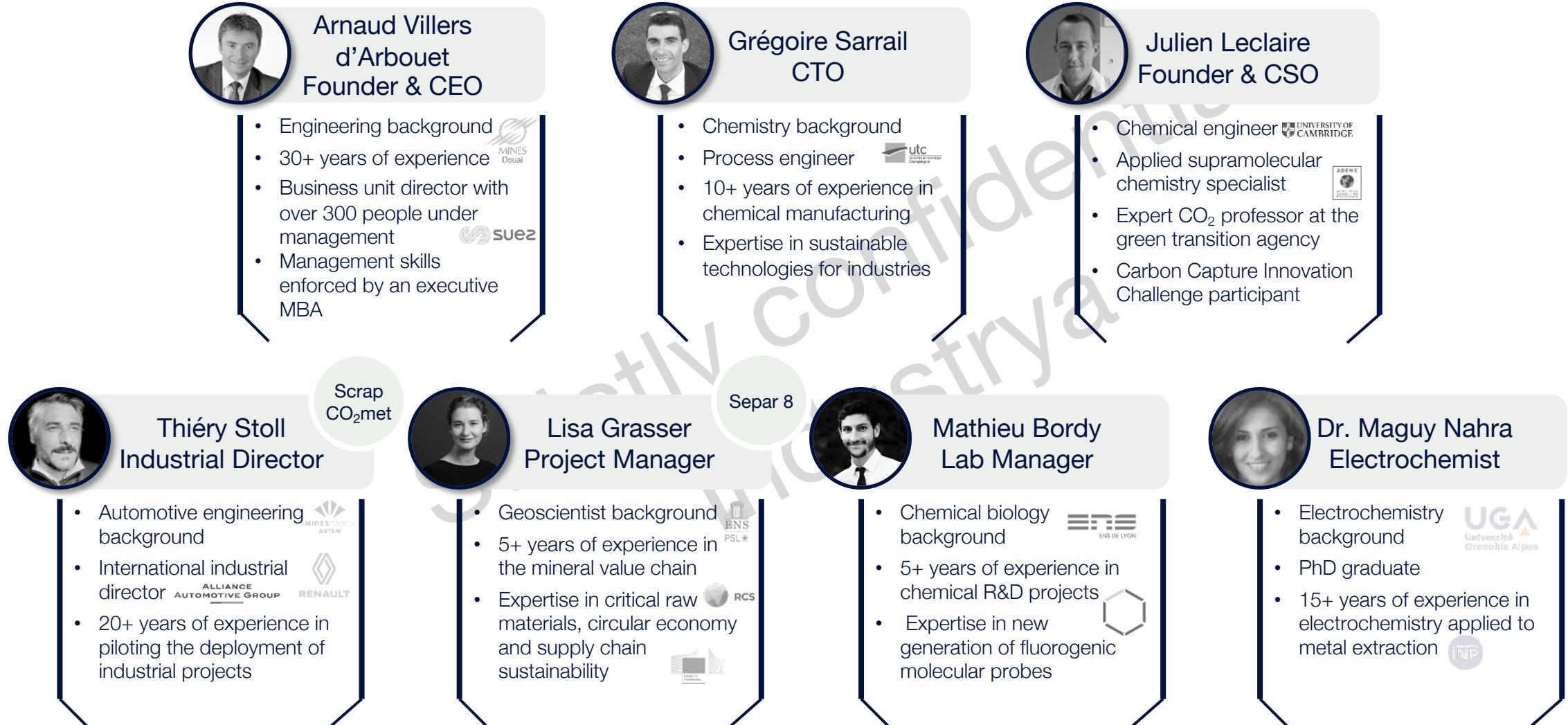
#2 { eCO2-Leach
Application 1 - The desolubilization process allows black mass dissolution to obtain t first precipitate with metal.
WO 2014188115 A1 }

#3 { eCO2-Prec
Application 2 - The couple acid pH and CO₂ allows to manipulate the characteristics of the fluid to precipitate the metal to be extracted.
WO 2014188115 A1 }

#4 { eCO2-Strip
Modification of the extraction chemistry to improve the extraction performance for nickel and cobalt in the continuity of the MIT patent
WO 2014188115 A1 }

100% of the extraction process is covered with the capacity to address the global mining market

A highly qualified team of experienced engineers.



#1 Use case:



A large-scale battery production project where Mecaware is key to address scraps technological recycling issues

Mecaware would be directly connected to the Verkor Gigafactory while being able to optimize and sustain the production process

Approved by French state

Key meaware units regarding the Verkor project

€90M

Mecaware revenue in 2028

6,000t

Production volume in 2028



Mecaware bridge the tech gap

A Battery production & scraps gridding

Large scale battery production



Scraps collection and preparation of black mass



B Critical metals recycling

Circular critical metals production

Directly connected to the Verkor factory



C Active materials preparation

Collection of metal salts and active materials preparation

Buyers of critical metals produced by Mecaware

BASF umicore
We create chemistry

#2 Use case: EoL Batteries

- Recycle at a large scale End-of-Life batteries that face a challenge of disposability

Mecaware would be directly connected to all the stakeholders of the battery recycling chain value while bringing a unique technology to recycle critical metals

Key meaware units regarding the EoL batteries project

€90M

Mecaware revenue in 2028

6,000t

Production volume in 2028

Northern France



Mecaware bridge the tech gap

A Battery collection & disassembling

Collection of End-of-Life batteries



Disassembling of EoL Batteries



Electrolyte extraction



B Critical metals recycling

Circular critical metals production

Production of metal salts



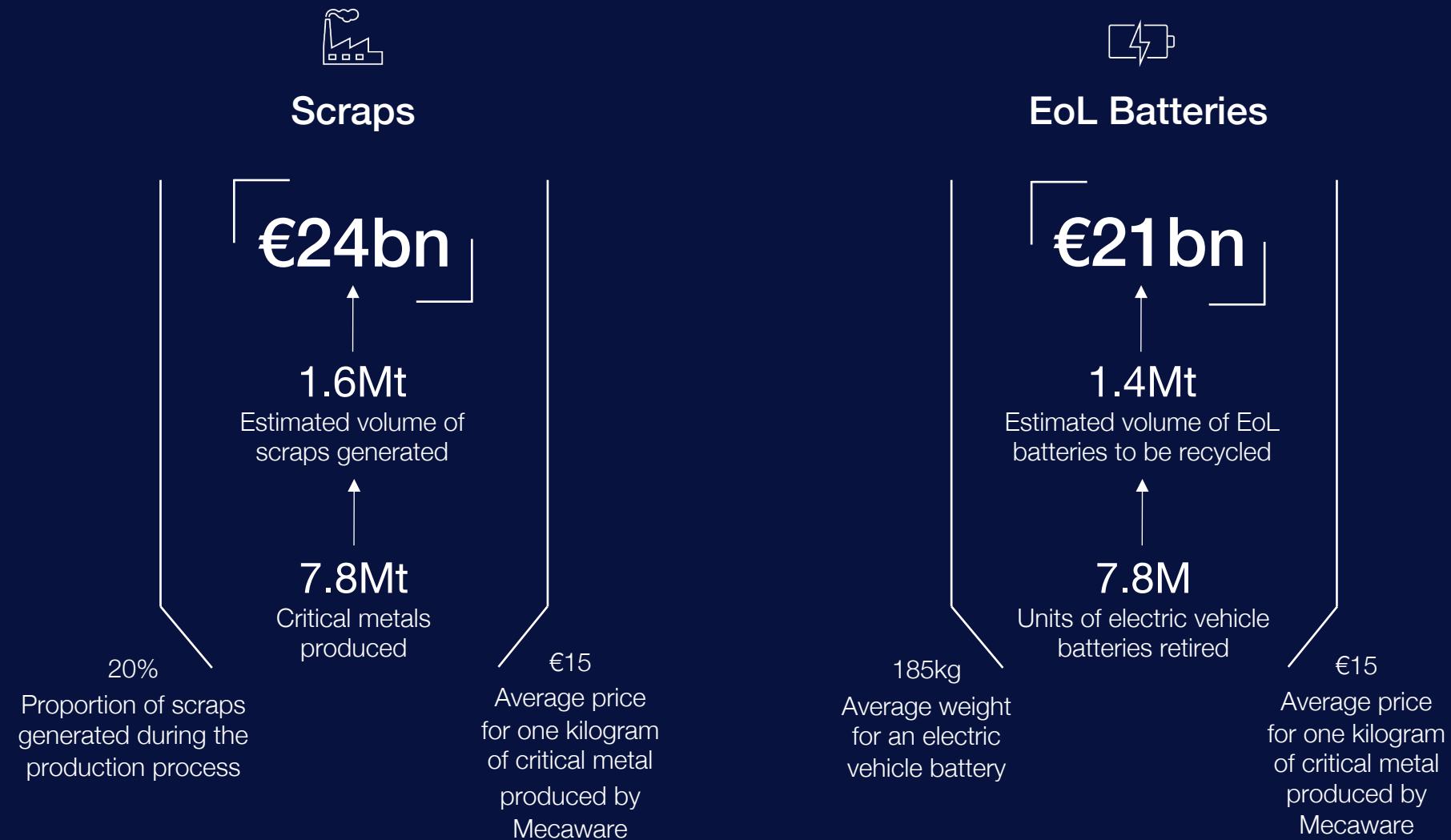
C Active materials preparation

Collection of metal salts and active materials preparation

Buyers of critical metals produced by Mecaware

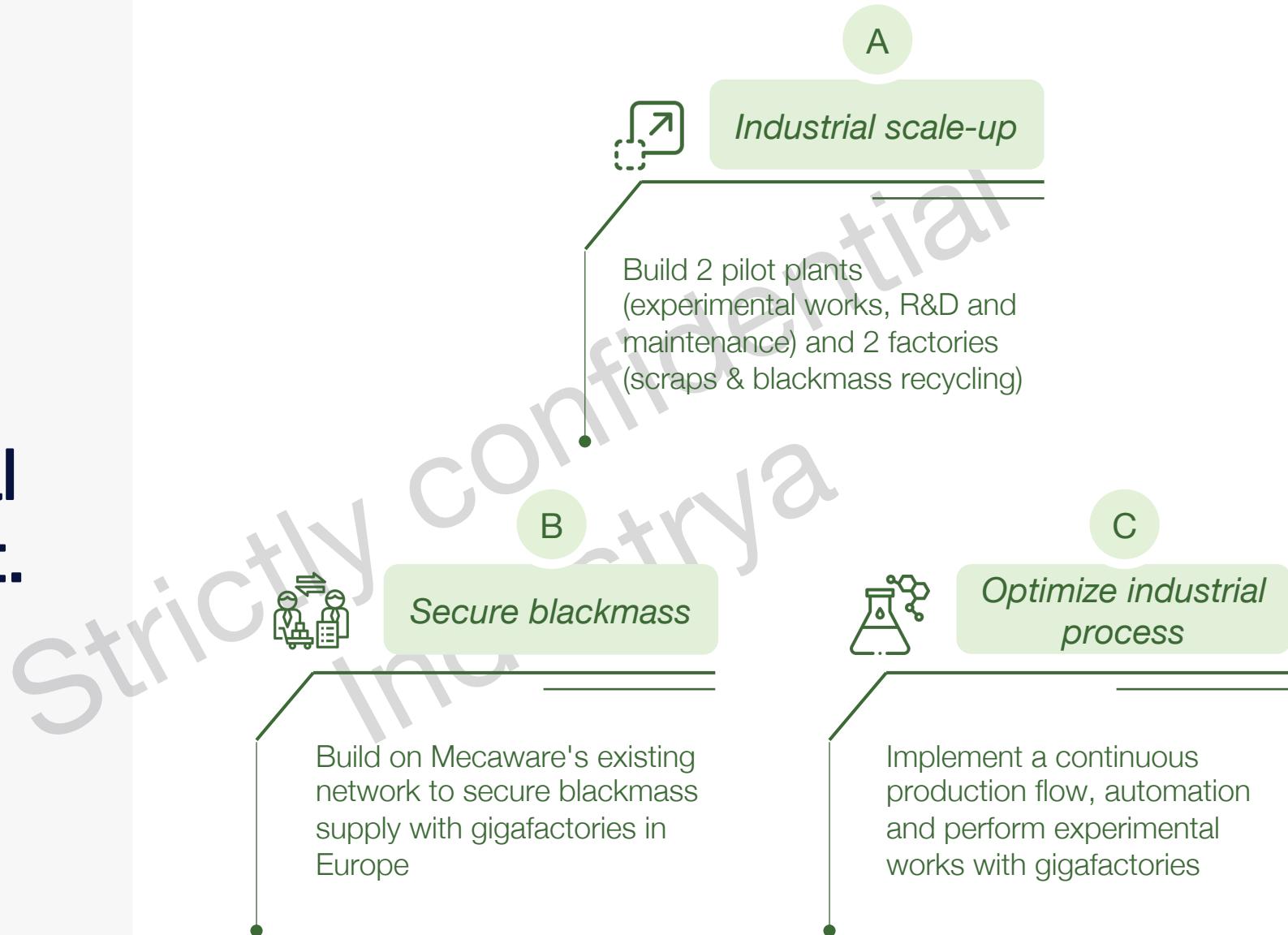


Mecaware addresses an expected global €45bn market.

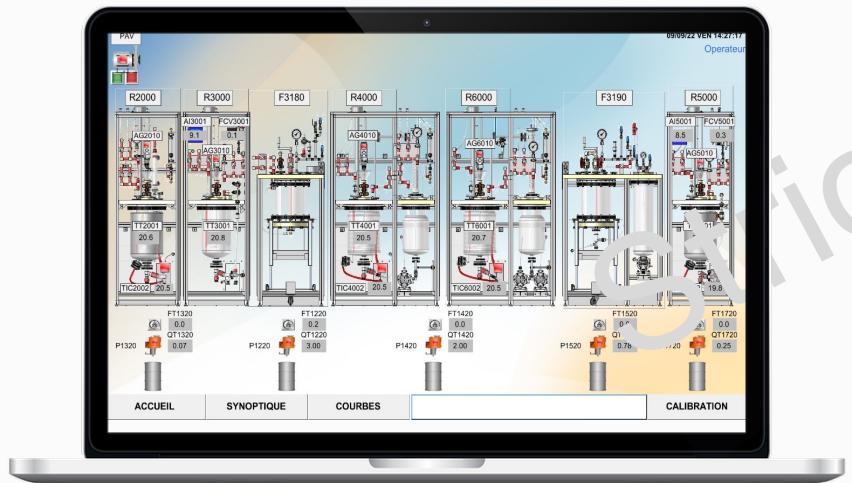


Note: (1) Data for 2030-2040 period
Sources: World Bank, IDTechEx

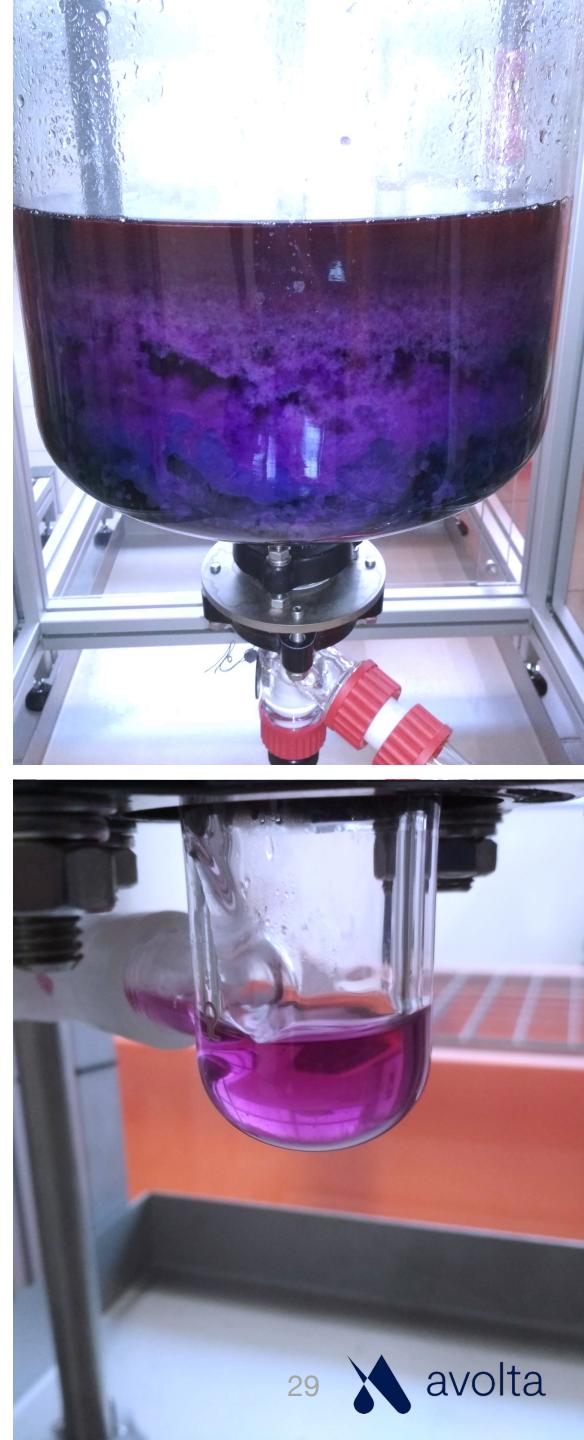
3 pillars to disrupt the metal recycling market.



Mecaware has proven the power of its technology.



strictly confidential
Industrixa



Now let's scale.



Implement continuous production flow

Move from a batch production process to a continuous flow process



Adapt the technology to all blackmass

Implement pilot plants to conduct experimental work with gigafactories

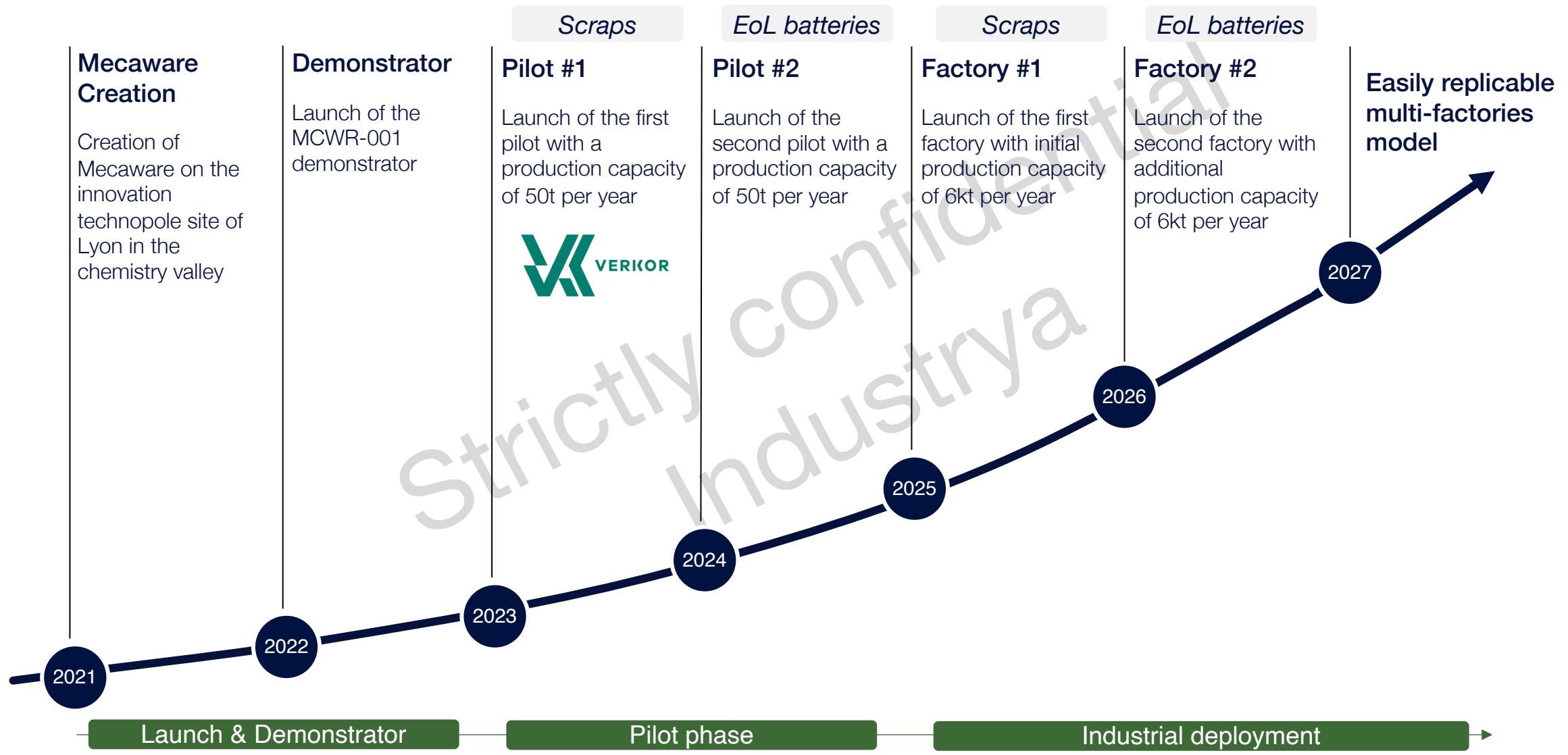


Optimize the production process

Automate the production process and increase the production volume per hour

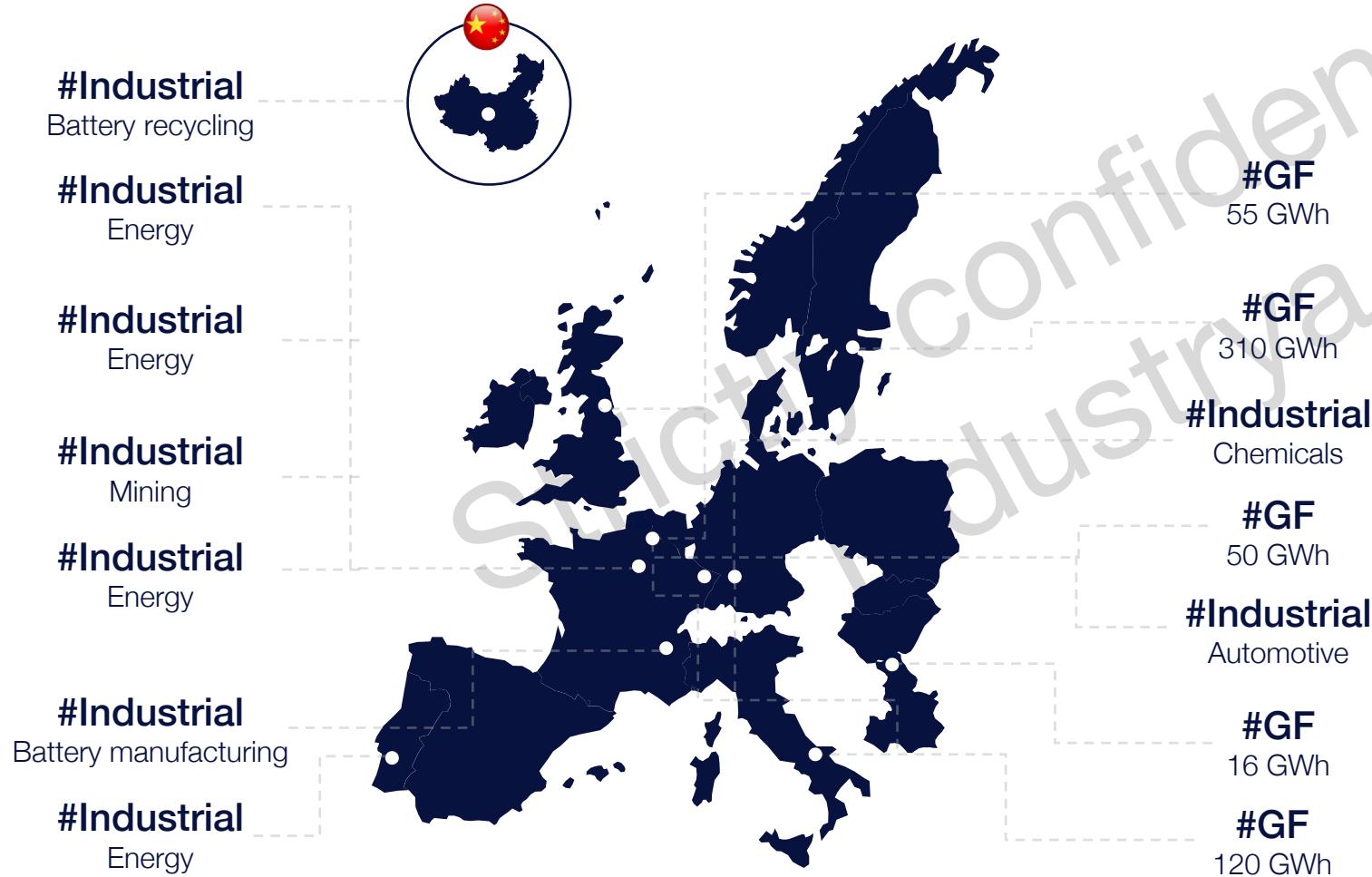


Strategic Roadmap to conquer the European market.



The technology is already generating a strong inbound demand.

Outlook of the different discussions with potential partners in Europe and China



#5

Number of gigafactories under discussion with Mecaware

580kt

Total addressable demand of blackmass for gigafactories partners already in business negotiations in 2030

€8.7bn

Market value of total addressable volume of critical metals produced with partners already in business negotiations



4 pillars to enhance the extraction process.

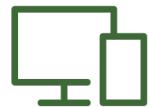
Increase metal extraction

- From 4 extracted metals to 8



Reach perfect purity

- Continuous work to achieve 99.9% purity



Ever more greener

- Reduce the already small amount of acid used in the extraction process

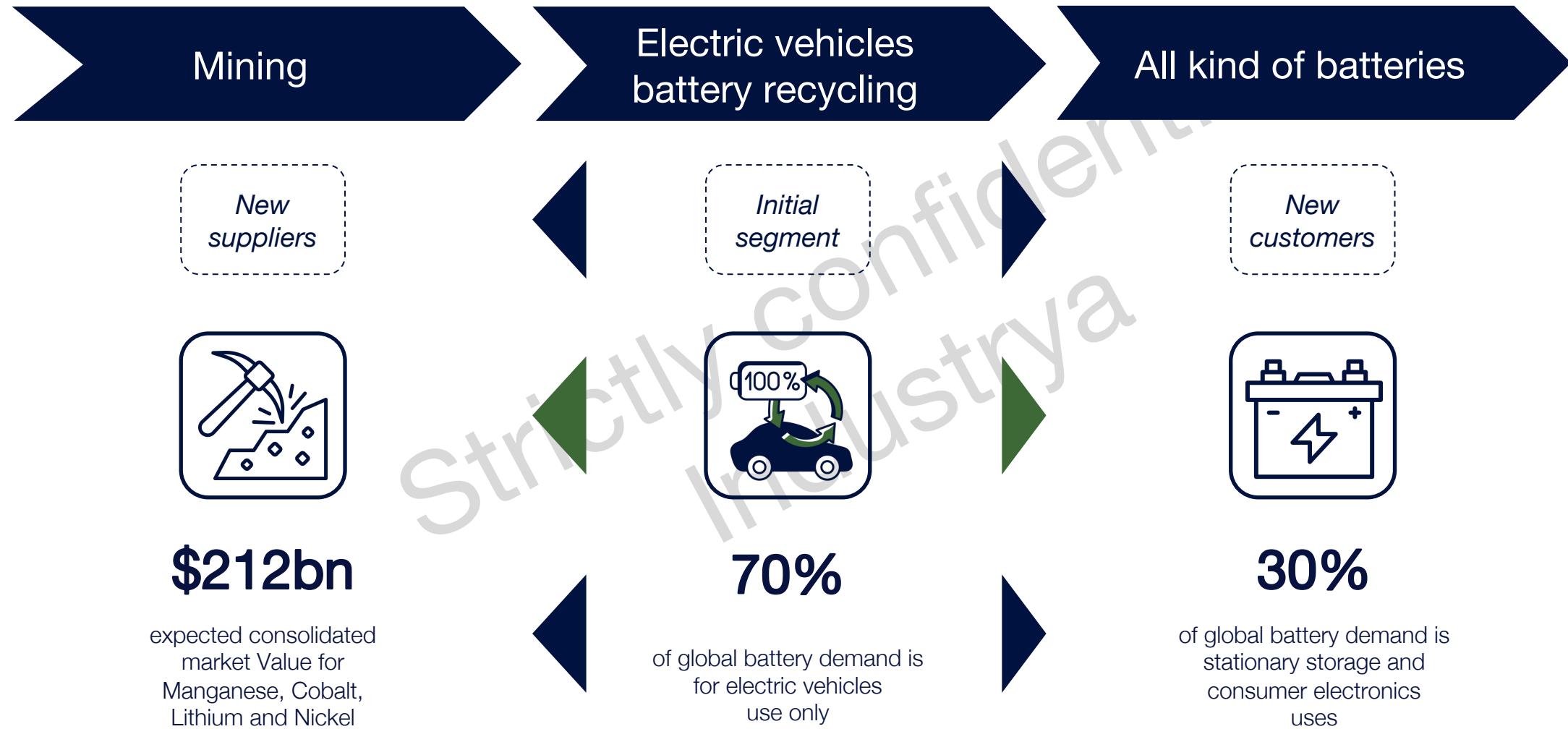


Improve extraction rate

- Implementation of electrochemistry in the selective extraction process

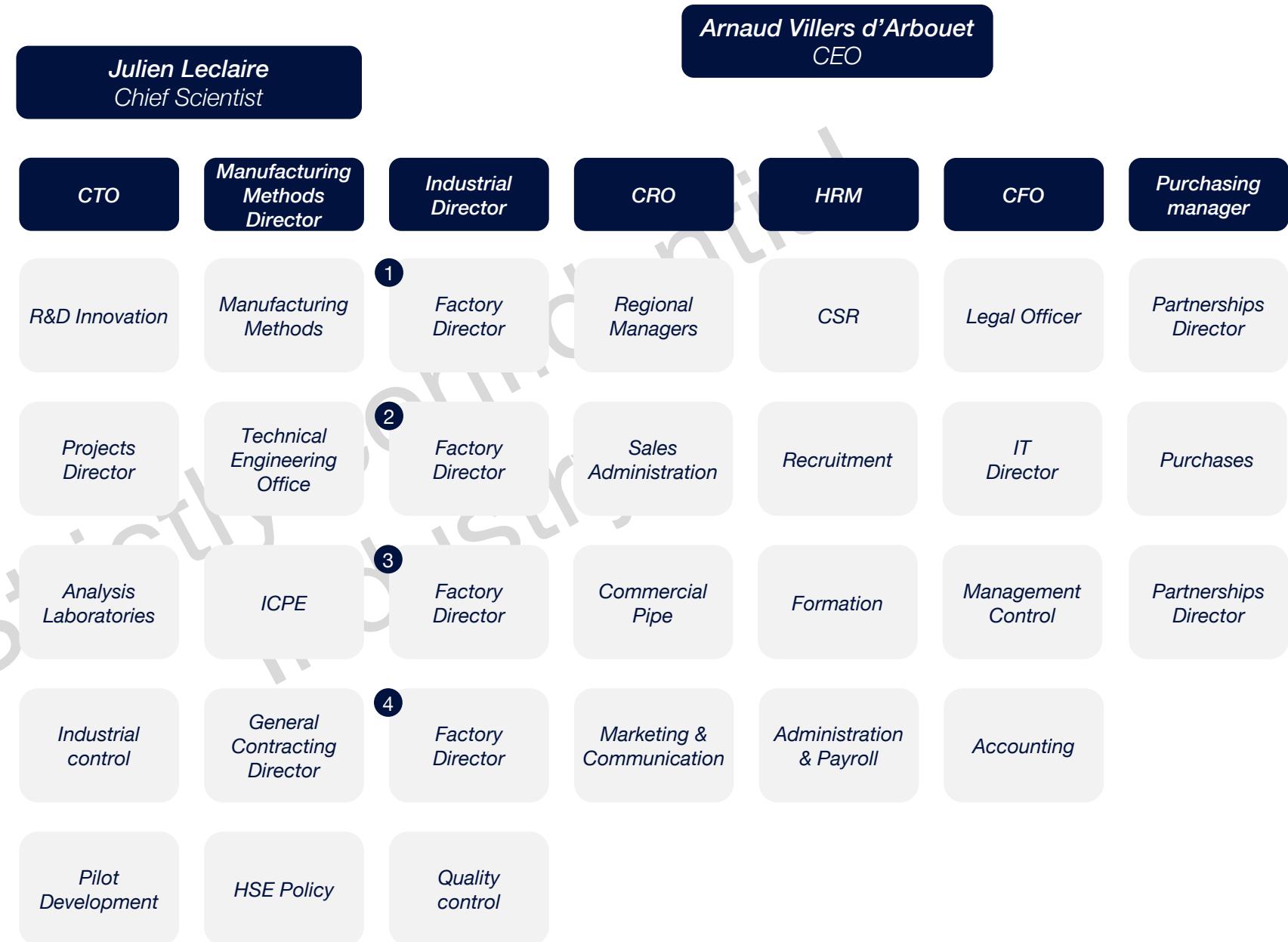


A potential to become a universal critical metals producer.

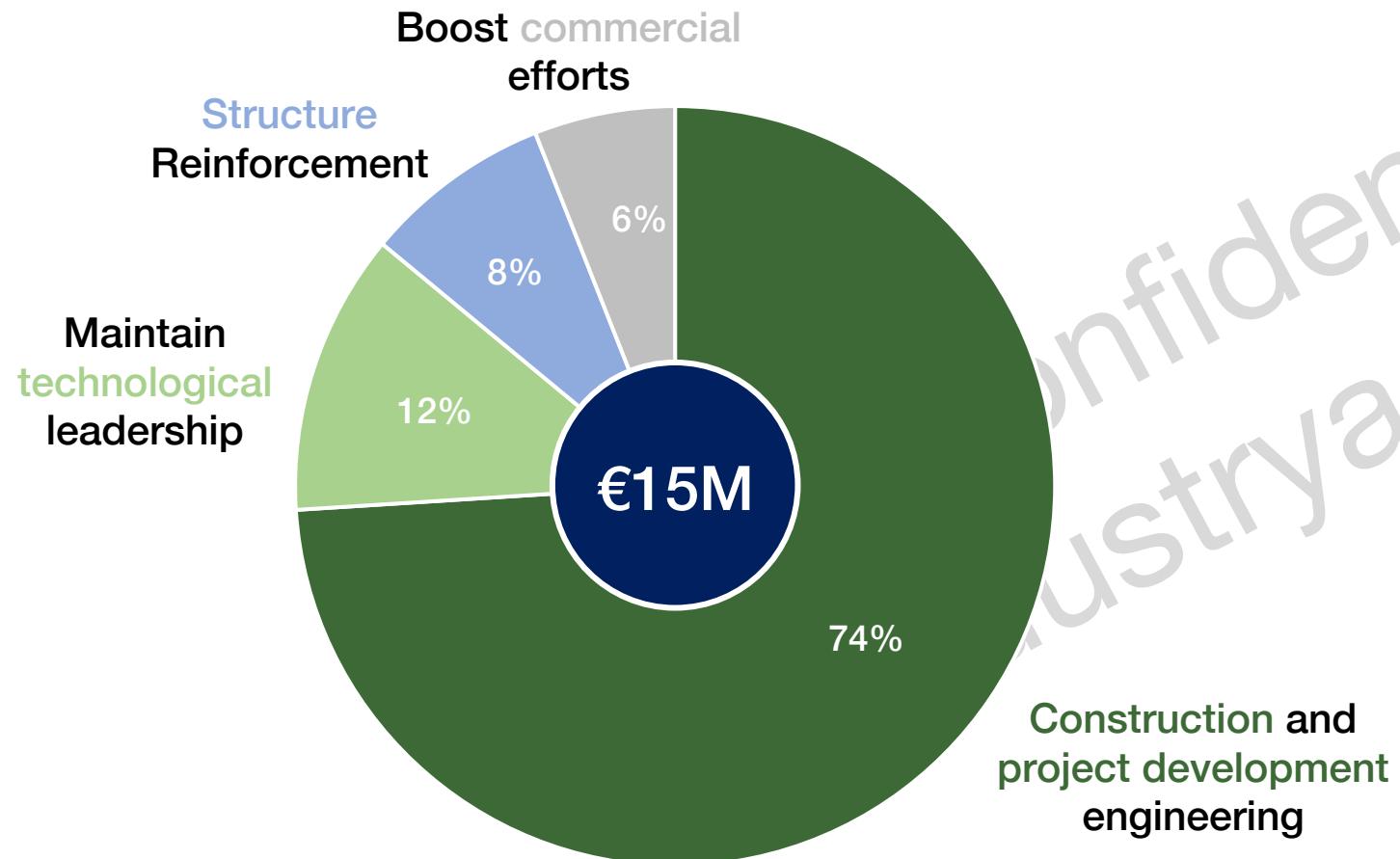


Structure of the team from 2025 onwards.

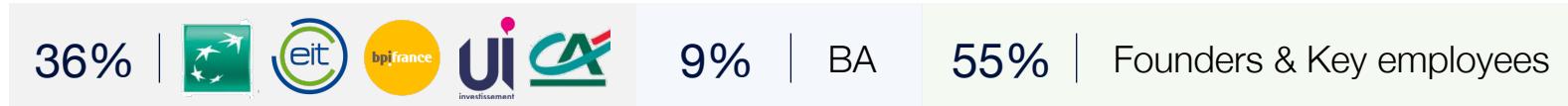
- *R&D experts to strengthen recycling performance*
- *Industrial specialists to ensure a smooth scale up of the pilots*
- *Sales team to build on the commercial pipeline*



€15M to start industrialise the technology.



Current capitalisation table



1 Build 2 pilots before getting into full-scale production

2 Improve the critical metals extraction process

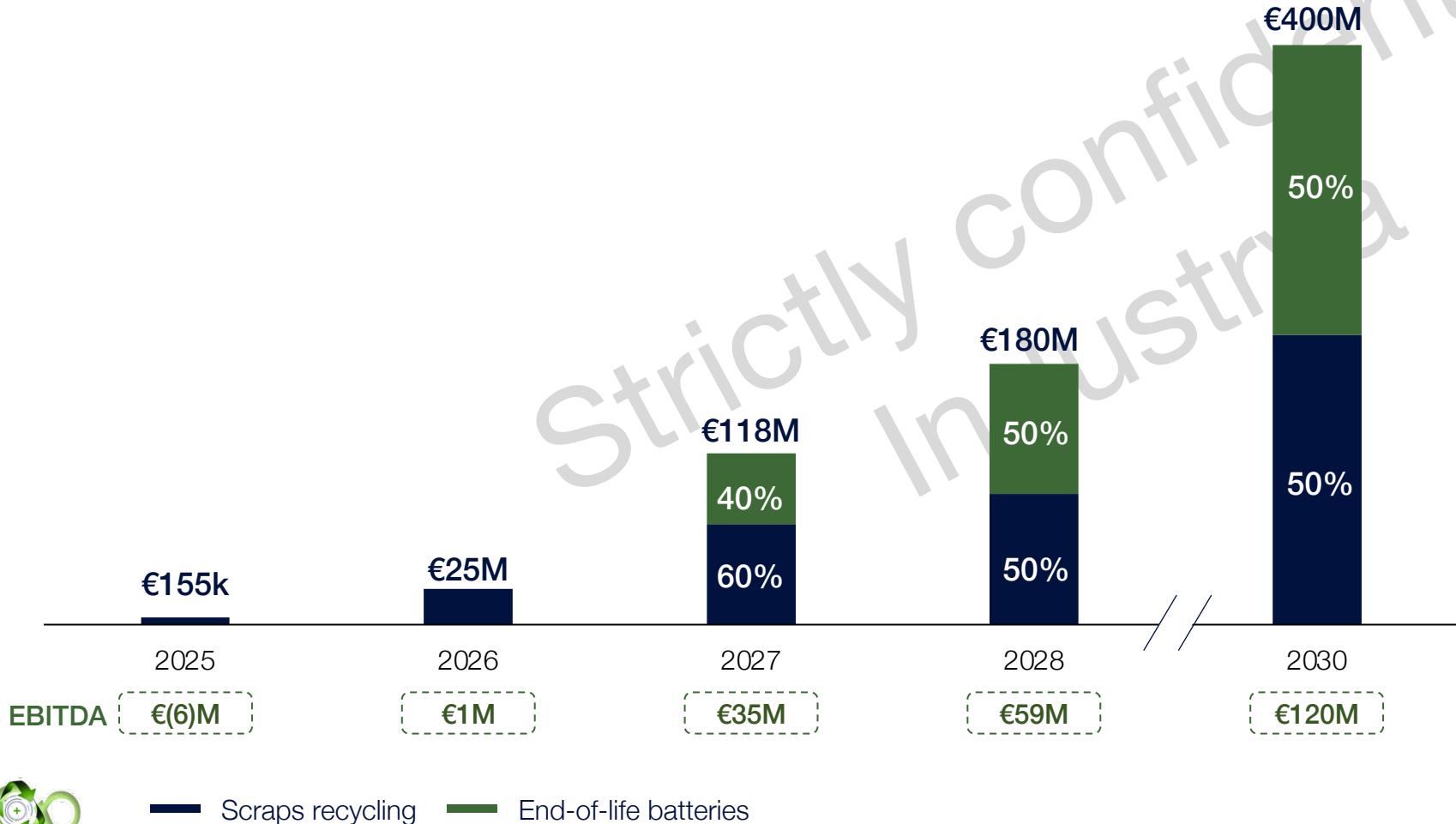
3 Support growth and recruit key top managers

4 Boost commercial efforts to connect to all gigafactories



On track to become the leading metals recycling technology in Europe.

Mecaware consolidated revenue 2025-2030 (in €M)



22kt

of critical metals produced
(2025-2028)

18kt/year

of recycling capacity (2028)

3

Operational factories in
Scraps & End-of-life
batteries recycling (2030)



— Scraps recycling — End-of-life batteries



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