

# Véhicules électriques : de nouveaux enjeux pour la Supply Chain

**Jean-Luc BROSSARD**

LCA & Vehicles with Low Environmental Footprint Program Director - PFA

**Olivier TALABARD**

Directeur Supply Chain - ACC AUTOMOTIVE CELLS COMPANY

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## PFA ROADMAP FOR THE ENERGY AND ECOLOGICAL TRANSITION

Jean Luc BROSSARD  
Président du CCFA  
Program Director  
LCA & Vehicles with Low Environmental Footprint

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## THE AUTOMOTIVE INDUSTRY AND MOBILITY

### Presentation of the PFA

**4000** entities  
**400 000** jobs  
**€6 billion** in R&D expenditure  
**1st industry** in terms of patent filings  
 PFA BRINGS TOGETHER THE AUTOMOTIVE INDUSTRY IN FRANCE TO DEFINE AND EXECUTE THE INDUSTRY'S STRATEGY AND TO DEFEND ITS INTERESTS



### Automotive industry players

#### CONSTRUCTEURS ET GRANDS ÉQUIPEMENTIERS



#### FÉDÉRATIONS



#### PARTENAIRES RÉGIONAUX



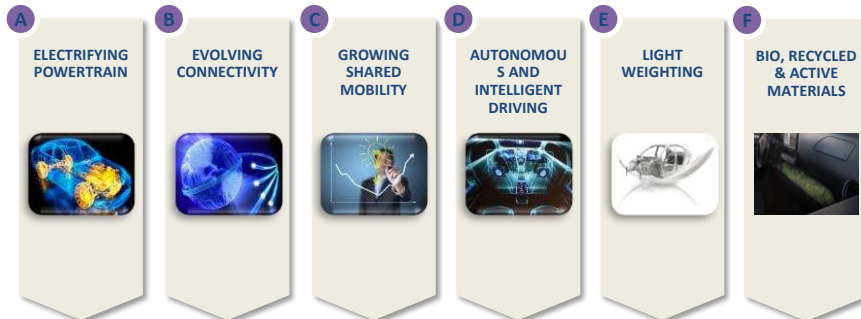
### Trends towards zero emissions in 2050

Electric, connected, autonomous vehicle and associated services  
 Safe and Secure  
 Environmentally friendly and low carbon footprint  
 Affordable



## THOSE SIX TECHNOLOGY TRENDS WILL REINFORCE AND ACCELERATE ONE ANOTHER AND REVOLUTIONIZE THE AUTOMOTIVE AND MOBILITY WORLDS

### Auto / Mobility disruptive technology-driven trends



*"We're going to see more changes in the next 10 years than we've seen in the last 100!"*  
 Ian Robertson, head of sales and distribution at BMW

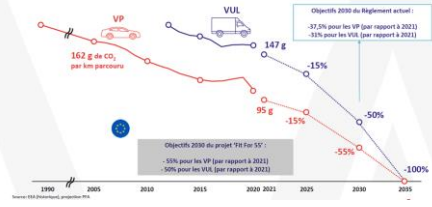


# IMPACT ON MOBILITY OF THE EUROPEAN DECARBONISATION STRATEGY

## Environmental challenges by 2025-2030, BAN ICE 2035 for LV and carbon neutrality by 2050



**CAFE 2030 :**  
 -55% VP  
 -50% VUL  
**CO2 regulation**  
 -45 % VI



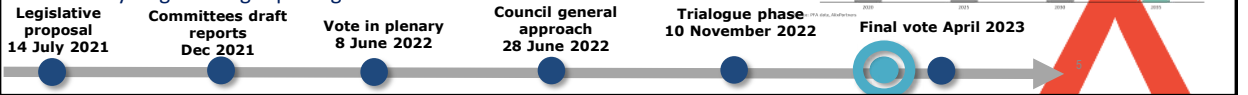
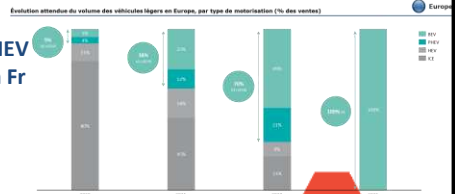
### From the Green Deal in 2020 to Fit For 55 on July 14, 2021: Upcoming regulations and guidelines

- Energy Tax Directive (ETD)
- Alternative Fuels Infrastructure Regulation (AFIR)
- Renewable Energy Directive (RED)
- Hydrogen and gas package



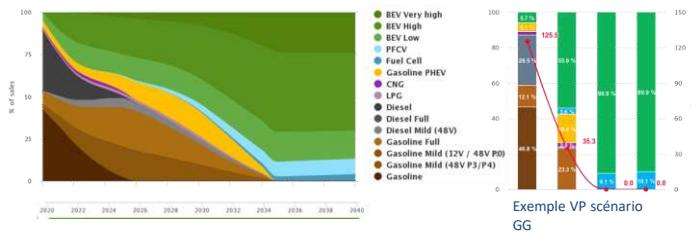
**70 % BEV & PHEV Sold in 2030 in Fr (>24% in T1 2023)**

### Need of electric vehicle with batteries or fuel cells depending on use



# EV ECOSYSTEM POSSIBLY READY

## Prospective scenarios monitored by the PFA and the BDO



## Documented scenarios on techno-economic macro trends



## Product offers already available



## Global and multi-segment coverage

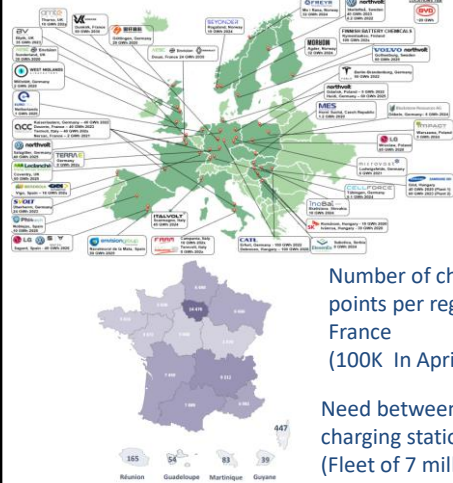


Note: les données des batteries sont les capacités déclarées. Les autonomie sont des valeurs WLTP - Date de mise à jour 06/10/2022  
 Source: données constructeur, analyse PFA

## EV ECOSYSTEM POSSIBLY READY

### Carbon-free mobility: Carbon-free energy, products, deployed infrastructure

A need for 600/800 GWh of battery in 2030 per year



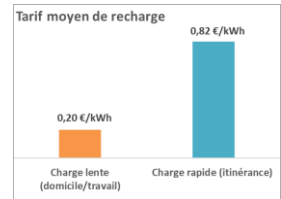
Battery cell manufacturing in EU  
Important Projects of Common European Interest (IPCEI)

Need for more than 100 GWh in France in 2030 (sales of 2 M vehicles BEV & PHEV)

Number of charging points per region in France (100K In April 2023)

Need between 400 K & 800 K public charging station in France in 2030 (Fleet of 7 millions vehicles BEV & PHEV)

The goal in Europe in 6.9 Millions of public charging station in 2030 for an investment required for the construction and commissioning of €70 billion



## WILL WE HAVE ENOUGH MATERIALS?

A collage of French news articles. The main headline reads 'Le boom des batteries va entraîner une ruée sur les métaux critiques'. Other headlines include 'Le lithium et le cobalt: les producteurs doivent faire face à leurs responsabilités', 'Cobalt, la peur de manquer', 'Une pénurie de métaux menace les batteries', and 'Les marchés des métaux suspendus à l'essor de la voiture électrique'. A bar chart titled 'Augmentation des besoins en métaux dans un monde 100% + VE +' shows projected demand for Lithium (8,999), Cobalt (1,000), Vanadium (444), and Graphite (324).



The cover of the report titled 'Mission de Philippe Varin' on strategic metals. It features the French Government logo and the INCE logo. The text on the cover includes 'Le boom des batteries va entraîner une ruée sur les métaux critiques' and 'Augmentation des besoins en métaux dans un monde 100% + VE +'. The report is dated June 2023.

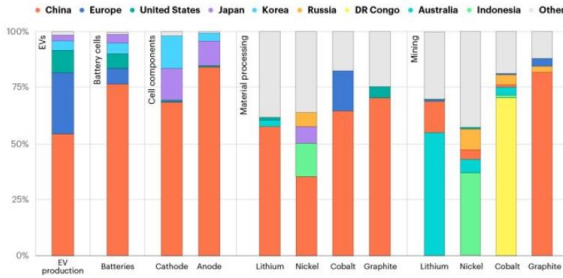
### French Government mission & ECRM act:

Under the responsibility of Philippe Varin to produce a report on strategic metals, in particular supporting the energy and ecological transition (Batteries etc.)



## Securing supplies to be built

**Geographical distribution of EV production/capacity by element of the supply chain**  
Global EV Outlook 2022

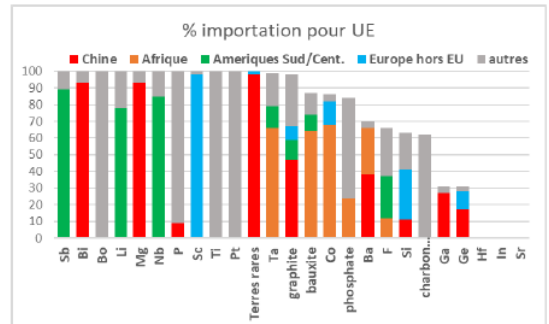
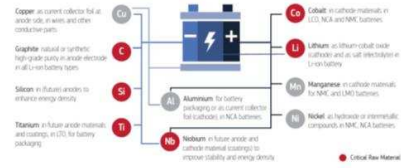


International Energy Agency

Today :

50% of the BEV value chain is in China

75% of the battery value chain is in China



## FRENCH GOVERNMENT MISSION

**Priority sector:**

Land mobility: car manufacturers

**Priorities:**

Battery materials: Li, Co, Ni,

Materials for electrification: rare earth permanent magnets

**Lead Time and activities decided:**

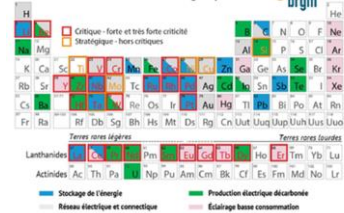
Presentation of the report to the ministers and publication on 10/01/2022

Appointment of an interministerial delegate Benjamin Gallezot

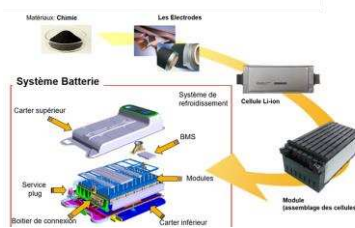
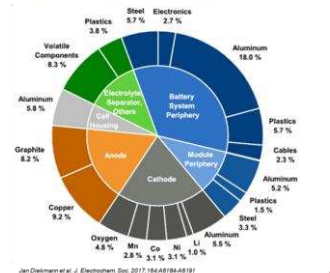
Creation of the National Observatory for raw materials OFREMI on 29/11/2022

Creation of a public/private fund in May 2023 Caisse des Dépôts Infravia R&D support on new technologies with new materials for automotive Industries through the PEPR

Les éléments de la transition énergétique



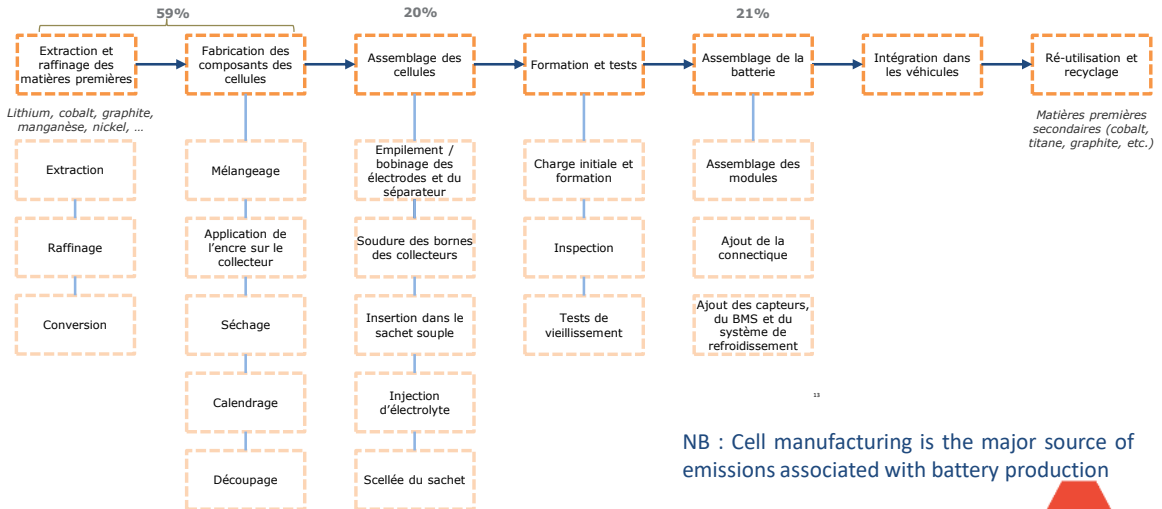
• Composition d'une batterie Li-ion :





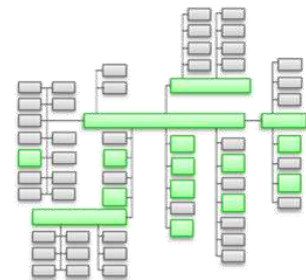
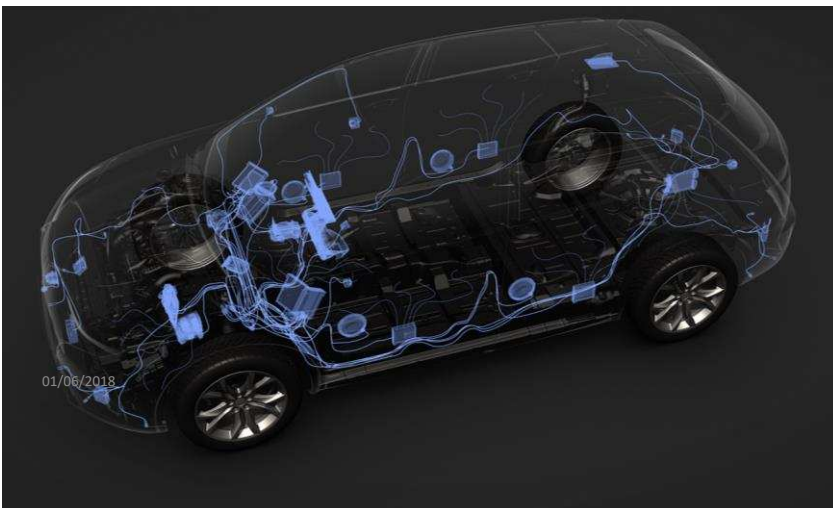


## SUPPLY CHAIN / VALUE CHAIN / SOURCE OF EMISSIONS



NB : Cell manufacturing is the major source of emissions associated with battery production

## Electronics Explosion: Electronic Electrical Architecture

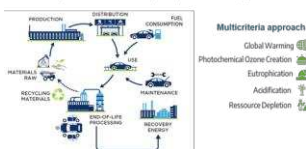


A few dozen computers  
 A few kms of cable  
 A few hundred connectors  
 A few tens of millions of lines of code

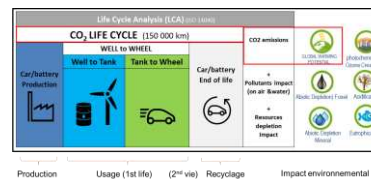
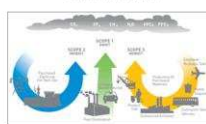
## CONCLUSION

- The automobile will evolve more in the next 10 years than it has evolved in the last 100 years.
- The path to carbon neutrality goes through the massive electrification of vehicles (with batteries or FCEV)
- To decarbonize the fleet, you need decarbonized energy (electricity and fuels).
- The electrification of the fleet must be accompanied by a coherent deployment of the charging infrastructure.
- Electrification must be accompanied by a minimum manufacturing capacity of battery cells near the terminal plants.
- This evolving vehicle content exposes us to the availability of materials & a strong dependency. There are no rare materials, but critical materials, which in industrial sectors become strategic (metals, plastics & polymers). Reducing this dependence requires technological developments.
- Future approaches must take full Life Cycle Assessment into account.

Life Cycle Assessment (LCA) methodology



Carbon Footprint



**THANK YOU FOR YOUR ATTENTION,**

Jean Luc BROSSARD  
Président CCFA  
Program Director  
LCA & Vehicles with Low Environmental Footprint