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Critical metals for electric vehicle batteries: how to control demand

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The necessary electrification of the car fleet as part of the ecological transition must be accompanied by a major shift towards greater sufficiency and resource efficiency if it is to be consistent and acceptable in terms of social, industrial and environmental risks. In terms of critical metals in particular, it is important that regulatory and fiscal instruments clearly reflect this need for frugality, both in terms of behaviour and in the products offered by manufacturers. Against this backdrop, the Mobility in Transition Institute (Institut

Mobilités en Transition, IMT) has joined forces with a French study undertaken by the WWF to identify ways of reducing pressure on critical materials in France and quantifying their impact. The study shows that there is considerable room for manoeuvre. For the transition to succeed, public policy tools must evolve to take greater account of these key issues.

Tensions between supply and demand

The need for the electrification of private vehicles is now widely accepted¹, and the stages of this transition are set out in the European Union's regulatory framework. There is now a need to establish the conditions for efficient electrification, in terms of resources and energy, to ensure that as many people as possible have access to cars, and to liberate those reliant on cars from fossil fuel dependency. This is the only way to achieve the electrification rate required² to meet the decarbonisation targets.

The issue of the raw materials needed to achieve this electrification seems to be relatively structural in several respects. Some of these materials, notably lithium, copper, cobalt and nickel, are described as critical in the sense that supply needs for battery manufacture will accelerate, while mining and refining capacities are currently limited and concentrated in certain countries. The tensions between this rapidly growing demand, and a supply that is constrained in terms of growth by the conditions for implementing new sources or new supplies and processing capacities, are leading to price volatility that is likely to have a major impact on the accessibility of electric vehicles. These tensions can also lead to situations of geopolitical or strategic dependence, making the transition period a potentially risky one, particularly for Europe.

While battery recycling will enable the challenges of sovereignty and environmental impact to be met, once most of the vehicle fleet has been electrified, the transition period is likely to take more than a decade. In the meantime, we need to be as economical as possible and implement the tools needed to control the demand for batteries and the materials of which they comprise.

A forward-looking analysis: towards a sustainable scenario

The IMT has joined forces with a [study commissioned by the WWF](#) (carried out by EY and involving Ademe, the *Bureau de recherches géologiques et minières* and the CNRS) to quantify these issues for the French market and to measure the potential impacts and benefits. The study compares a baseline scenario, in which the increase in vehicle size observed in recent years continues, and there is little recourse to alternatives to individual vehicles, with a more sustainable scenario in which all public policy levers are activated with the aim of influencing the products of manufacturers, their sales and usage trends towards more sufficient and frugal solutions.

The value of the work carried out lies in a detailed and practical simulation of the various mobility parameters, making it possible to estimate the future demand for materials linked to the electrification of private vehicles in France. With the help of its technical partner C-Ways, the [IMT](#) contributed to this study by providing analytical elements and proposing scenarios for changes in the factors influencing demand. The first stage involved reconstructing an inventory of recent mobility trends in France, based on modal shares and according to trip type (short distance/long distance, urban/rural areas). The significant changes observed in recent years, such as the increase in working from home and the growth in the modal share of lighter transport options (bicycles, electric bikes, scooters, quadricycles), have been analysed. Econometric analyses were also used to establish price elasticities for changes in the number of kilometres travelled. This vision of current dynamics has enabled three scenarios to be constructed for changes in

mobility needs in 2025, 2030 and 2035. Based on this starting point, the second stage of the analysis involved transcribing the impact of this mobility demand on the transport system, and particularly on the development of the new vehicle market. Some notable achievements already established in other countries were regarded as achievable targets for France, whether in terms of modal shift (for example, the modal share of cycling in Germany is four times higher than in France) or vehicle size (smaller on certain European or international markets). Lastly, public policies that have already been implemented were considered in this work, such as the (already measurable) impact of the car-sharing plan or the ambitions of the rail plan.

The main conclusion of the work is that a more sustainable transition scenario, in the sense of one that reduces the need for car transport and is based on a range of more resource-efficient vehicles (size, shape, range), would reduce battery demand by 26% by 2035 compared with a baseline scenario. It should be emphasised that this more sustainable scenario does not call the general mobility provision into question, a fact that can be ascertained by looking at the needs and trends already underway, or that have been observed in countries where the situation is more favourable. This work should enable public decision-makers to assess the benefits and impact of a more proactive policy in terms of car taxation (on purchases or usages) and the supply of alternative transport options. Similarly, this study is an invitation to consider the conditions for a successful transition to electric vehicles, and for a geostrategic desensitisation of the issue of critical materials.

¹ The European Union has approved a ban on the sale of new petrol and diesel cars from 2035:

https://www.europarl.europa.eu/news/en/headlines/economy/20221019STO44572/eu-ban-on-sale-of-new-petrol-and-diesel-cars-from-2035-explained?at_campaign=20234-Green&at_medium=Google_Ads&at_platform=Search&at_creation=DSA&at_goal=TR_G&at_audience=&at_t...

² 15% of vehicles in the fleet to be 100% electric by 2030 (SGPE, Plan summary, July 2023, p.24:

<https://www.gouvernement.fr/upload/media/content/0001/07/dc29785bc6c40139f4b49ee2ac75c2a154856323.pdf>).

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