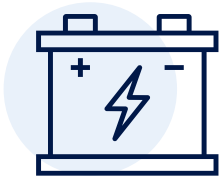
EUROPEAN BATTERY CELL PRODUCTION EXPANDS

In the coalition agreement „MEHR FORTSCHRITT WAGEN“ (venture more progress) between SPD, BÜNDNIS 90/DIE GRÜNEN and FDP from November 2021, the coalition partners took up the fact that, according to the proposals of the European Commission, only CO_2-neutral vehicles are to be registered in the transport sector in Europe in 2035, and declared that this will have a correspondingly earlier effect in Germany.

Current market developments show that the European automotive industry is well on track achieving the EU's emission reduction targets. Sufficient battery cells produced in Europe will be available to ensure a substantial electrification of drive technologies in the future.

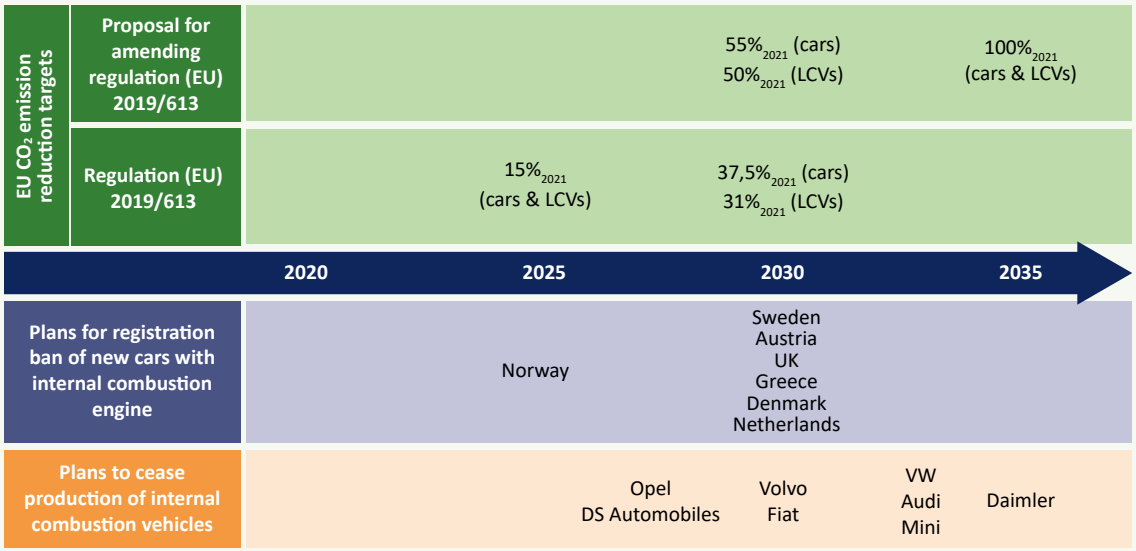


Certain automakers and EU member states ahead of EU emissions reduction targets

The EU Commission's climate package „Fit for 55“, published in July 2021, aims to align EU climate and energy legislation with the goal of reducing greenhouse gas emissions by at least 55% by 2030. This package includes amending the regulation setting CO_2 emission standards for passenger cars (cars) and light commercial vehicles (LCV). The regulation currently in force, Regulation (EU) 2019/631, specifies emissions reduction for new cars and LCV of 15% by 2025 and 37.5% and 31%, respectively, by 2030. According to the current proposal of the „Fit for 55“ plan, the average CO_2 emissions of new passenger cars and LCV should be 55% and 50% lower, respectively, in 2030 than in 2021. From 2035 onwards, emissions are to be 100% lower. For the automotive industry, this means that zero-emission vehicles will account for a large share of production by 2030 and that all cars and LCV produced for the EU domestic market must be zero-emission vehicles from 2035. [1]

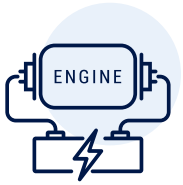
However, some EU member states pursue yet more ambitious targets and plan to ban the registration of internal combustion

Figure 1: Targets regarding the reduction of emissions from cars and LCV as well as communicated timeline for a phase-out of internal combustion engine. [2-16]



Extract, no claim to completeness. Own figure.

vehicles even before 2035 (see Figure 1). Major European automakers such as Audi, Daimler, Volvo and Renault have also announced that they will cease production of internal combustion vehicles before the EU's target date. This is confirmed by a recent study by Transport and Environment (T&E), concluding that vehicle manufacturers' plans are well ahead of the political targets. [17]



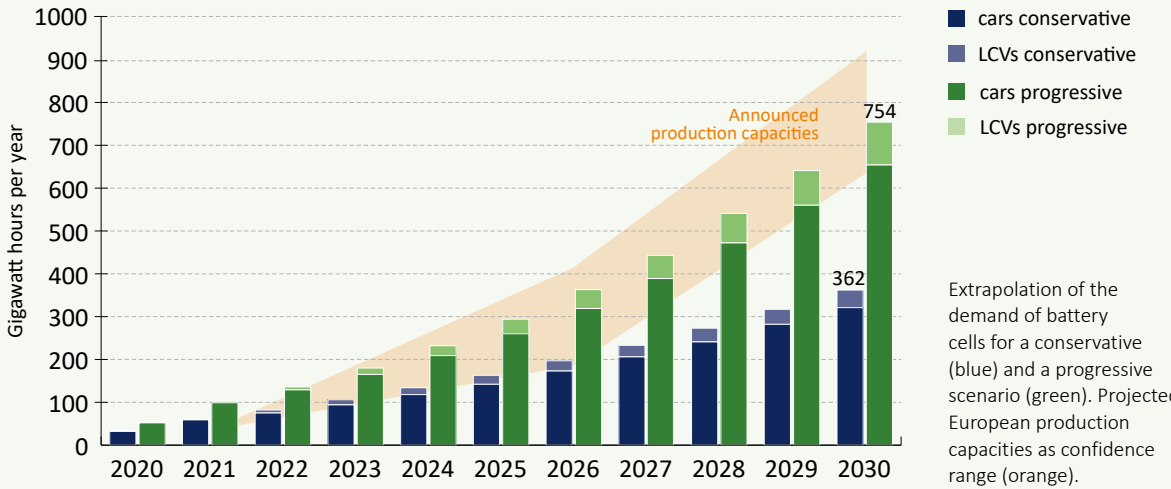
The ambitious climate and emissions targets set by the EU Commission's climate package as well as by individual member states and car manufacturers will result in a significant increase in need and demand for battery cells in the coming years. Correspondingly high production capacities will have to be built up and expanded in Europe timely.

Enormous increase in cell demand in the automotive industry

The extrapolated demand for Li-ion cells for battery-electric powered passenger cars and light commercial vehicles (BEV and PHEV) in the EU is expected to be between 360 and 750 GWh/a in 2030, which is about 10 to 15 times the production volume in the EU in 2020. Figure 2 illustrates the projected demand until 2030 as a bar chart.

The projection is based on a slightly declining vehicle production forecast in the EU (see info box) and an assumed increase in the share of electrically powered vehicles in total production to 40% (conservative) and 81% (progressive) for passenger cars as well as 35 and 55% for LCV by 2030. The lower production shares of the conservative scenario (Figure 2, blue columns) would likely be sufficient to achieve the emission reductions currently required by Regulation (EU) 2019/631.

Figure 2: European battery cell production can meet automotive industry demand.
Confidence range of announced European production capacities compared to the modelled battery cell demand in Europe until 2030.



Extrapolation of the demand of battery cells for a conservative (blue) and a progressive scenario (green). Projected European production capacities as confidence range (orange).

The progressive scenario (Figure 2, green columns) represents the high share of electrically powered cars and LCV. On one hand, this progressive scenario is based on emission reductions from passenger cars modelled by T&E based on automakers' plans, which are more advanced than those envisaged under “Fit for 55” plan (Figure 2, dark green column). [17] On the other hand, the higher share of electrically powered LCV would be sufficient to meet the reduction targets in vehicle emissions proposed by the EU Commission (Figure 2, light green column).

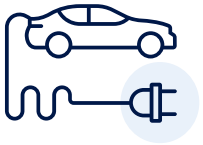
Decrease in production of cars and LCVs

In 2020, 10.8 million cars were produced in the EU, a decrease of 23.3% compared to the previous year. The significant decline is attributable to Brexit and Covid. However, the number of cars produced in the EU has been decreasing since 2017. The production of LCV is also declining, but only since 2019.

ACEA (01.02.2021), „EU commercial vehicle production“

Massive build-up and expansion of production capacities planned

The production volume of Li-ion cells in Europe (EU-27, UK, Norway, Serbia) accounted for around 35 GWh in 2020, or about 15% of global production capacities. As a result of ambitious development and expansion plans of the battery industry (see Figure 3), the share of cells produced in Europe in global production volume is expected to increase to 28 up to 43% by 2030, when it will be around 600 to 870 GWh per year (Figure 2, orange area).

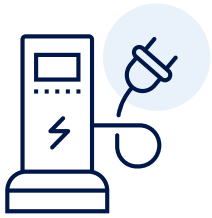


The dynamics in the battery cell market remain high. New production facilities are continuously being announced, as illustrated by the large number of European production facilities in Figure 3. Furthermore, production volumes by established manufacturers or by those new to the market increase. However, sporadic announcements of plans to reduce originally planned production capacities possibly indicate the beginning of market consolidation. In addition, numerous very ambitious announcements are subject to uncertainties with regard to their implementation, as the example of Evergrande[1] shows. [18] For this reason, the production capacities are presented in a minimum and a maximum view (Figure 2). Furthermore, it was assumed that all announcements are maximum figures and that the cell factories will achieve a yield of 90% in practice at a capacity utilization of 85%.

Good supply of battery cells in the coming years

The enormous demand for Li-ion cells from the automotive industry in the years ahead can be met by the planned development and expansion of production capacities in Europe. Based on the demand of the progressive scenario, which results from the increase in shares of battery-electric vehicles in total production to 81% for passenger cars and 55% for LCV by 2030, the supply of cells from European production is given if almost all announced production capacities will be realised. A sufficient supply of cells produced in Europe for the automotive industry would not be ensured in the future if around 15% of the announcements were not implemented as planned.

If the share of battery-electric vehicles in total production increases according to the conservative scenario, which would be sufficient to meet the requirements of the currently applicable EU regulation, the cell demand of the automotive industry would already be covered from 2023 by the production capacities assumed to be ensured. By 2030, battery cell production would exceed the demand of European automakers by 65-140%, making sustainably produced battery cells in Europe available for other applications in mobility, energy storage, and electronic devices, and for meeting the global demand. It is therefore foreseeable that sufficient battery cells produced in Europe will be available in the coming years for the mandatory conversion of the automotive industry.



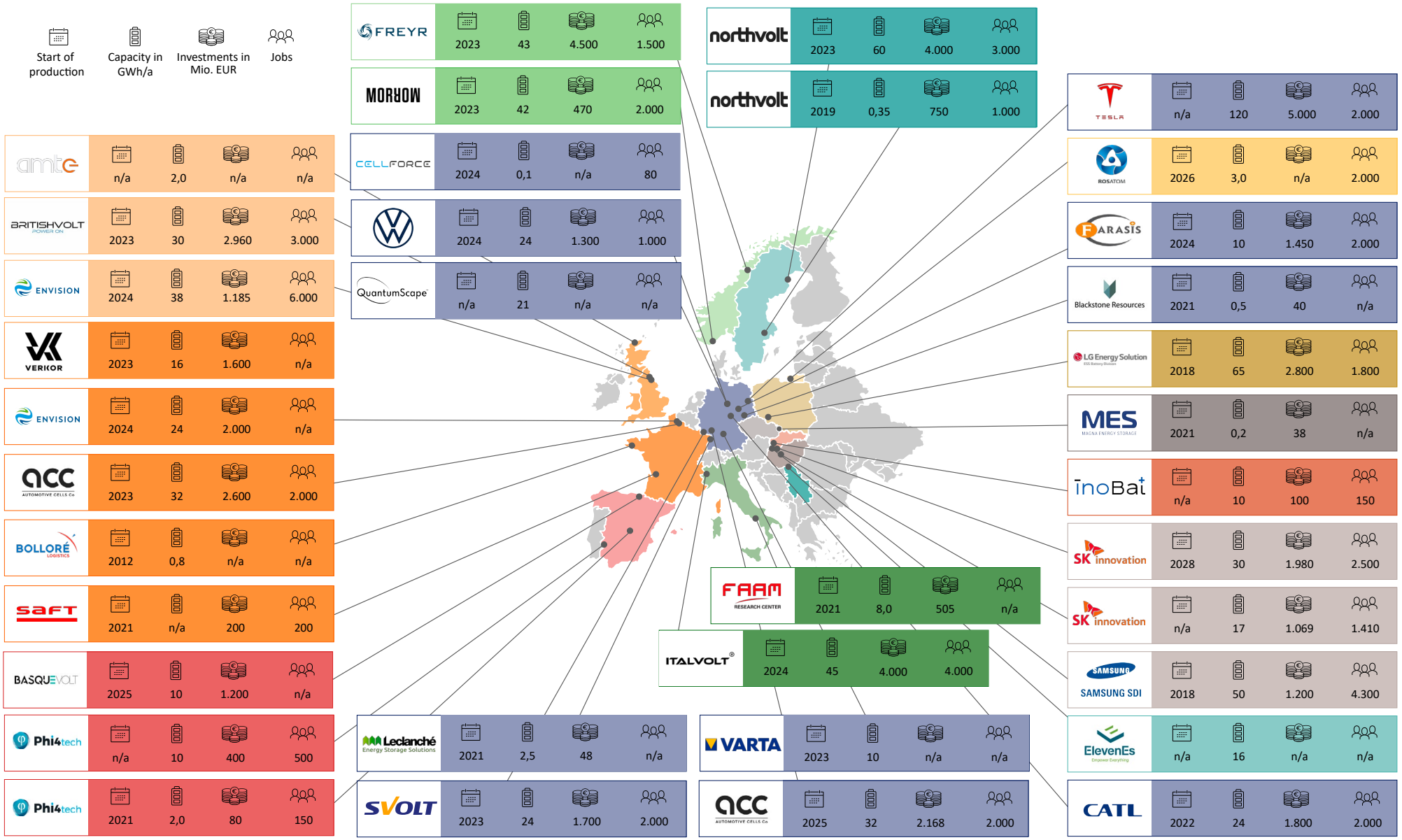
Numerous bottlenecks threaten the successful transformation of the automotive industry

How high the demand for battery cells in the automotive industry will actually be in the coming years depends on the one hand on the tightening of CO_2 emission standards for passenger cars and light commercial vehicles and, on the other hand, on the in some cases even more ambitious production plans of the car manufacturers themselves. However, whether the supply of batteries can meet demand depends on a sufficient supply of semiconductors and raw materials to the industry.

Delays in production due to the semiconductor shortage have been occurring since the second half of 2020. [19] In addition, there is the risk of insufficient supplies of critical raw materials, i.e. raw materials that cannot be reliably mined within the EU and thus must be imported for the most part. The European Union keeps a list of supply-critical raw materials. This list has been steadily expanded in recent years and now includes 30 raw materials, almost twice as many as ten years ago. [20] Around two thirds of these critical raw materials are relevant to the automotive industry. The supply of these has a huge impact on industry, as the current international supply shortage of magnesium from China demonstrates. According to the Association of the German Metal Industry, there is currently a threat of Europe-wide production stoppages in the aluminium value chain, which, along with others, would directly affect the automotive industry. [21]

1 In June 2019, the currently highly indebted real estate group China Evergrande announced its intention to also produce battery cells. [18]

Figure 3: Battery cell production sites in Europe.



Own figure based on announcements of the manufacturers.

Supply bottlenecks for certain raw materials are also expected due to the increasing demand for battery cells. Compared to 2021, demand in 2030 is expected to be eleven times higher for lithium, seven times higher for natural graphite, and almost three times higher for nickel, for example. [22]

The first noticeable deficits emerged for nickel in 2021. In the first nine months of the year, demand exceeded supply. [23] Deficits of up to 50% in the supply of cobalt, copper, lithium and graphite are forecast for 2023 and 2024. [24] Not least due to the reduced availability of raw materials and the resulting rising costs, BloombergNEF's recently published “2021 Battery Price Survey” forecasts an increase in prices for Li-ion cells in 2022 after decades of declining prices. [25]

To counteract the threat of raw material shortages, recycling capacities are being successively built up, the utilization of alternative raw material deposits is being evaluated, and research is being conducted on novel cell chemistries that use fewer or no critical raw materials.

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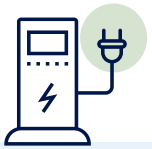

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