



How not to lose it all

Two-thirds of Europe's battery gigafactories at risk without further action

March 2023

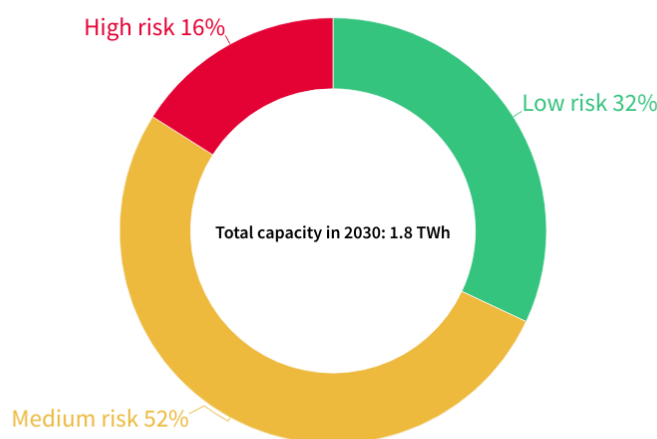
Executive Summary

How not to lose it all: Two-thirds of Europe's battery gigafactories at risk

Close to 50 lithium-ion battery factories are planned for Europe by 2030, but US subsidies and other factors pose a new threat to these nascent projects. T&E looked at¹ project maturity, funding, permits and companies' links to the US to analyse how much of Europe's 1.8 TWh battery factory potential is at risk:

- 68% of potential battery production capacity in Europe (1.2TWh) is at risk of being delayed, scaled down or not realised if further action is not taken
- Tesla in Berlin, Northvolt in northern Germany and Italtvolt near Turin are among the projects that stand to lose the greatest volumes of their planned capacity
- Germany, Hungary, Spain, Italy and the UK have the largest shares of battery cell capacities at risk
- To counter US subsidies, Europe needs a strong response including faster approvals for best-in-class projects and EU-wide funds that are easily accessible and focused on production scale-up.

Almost 70% of European battery cell capacity is at risk



¹ Based on the data available in the public domain until February 2023, T&E performed in-house analysis and developed an in-house methodology to rate the risk of battery projects. This data is not aimed at investors or financial institutions, and does not attempt to analyse financial risk.

Europe's leading climate rules, such as the Fit for 55 package, meant the continent has led in global cleantech investments until recently. Dozens of billions have poured into scaling electric vehicle (EV) manufacturing, batteries and component manufacturing. As a result, over half of all lithium-ion batteries (LIB) the EU used in 2022 were already produced locally, with close to 50 gigafactories planned by 2030.

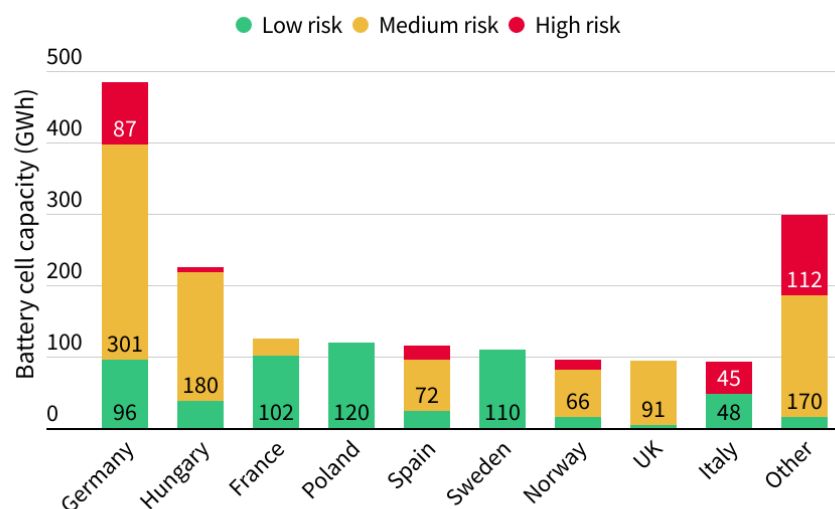
But on top of China's dominance in EV supply chains, the US Inflation Reduction Act - that pours at least USD 150 bln into batteries components and metals manufactured in the US (or friendly countries) - is changing the rules of the game fast. In terms of global investment into LIB tracked by BloombergNEF, Europe's share dropped from 41% in 2021 to a meagre 2% in 2022, while investment in China and the US continued to grow.

In theory, one might argue that European and American battery supply chains can develop in parallel and benefit from efficiencies. In practice, skilled workforce, company capital to invest in procurement and permits, and above all supply of raw materials such as lithium, are all in short supply. This means the global race to capture battery manufacturing is in reality more of a zero sum game. Companies from Northvolt, to Polestar to Iberdrola have already signalled expanding in the US.

Using an in-house methodology that looks at project maturity, funding, permits and links to the US, T&E has analysed how much of Europe's 1.8 TWh battery factory pipeline potential is at risk. The analysis reveals that around a fifth (or 285 GWh) of the announced projects are at high risk, and a further 52% (or around 910 GWh) at medium risk. Overall, **almost 70% of the potential battery cell supply in Europe is at risk**. The projects might be delayed, scaled down or not realised at all if further action is not taken.

This includes projects such as Northvolt in Germany and Italtvolt in Italy.

Germany, Hungary and Spain have the largest battery cell capacities at risk



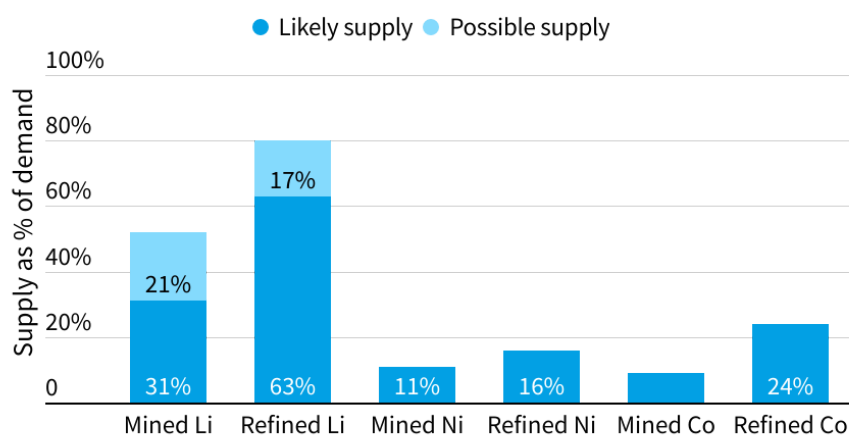
Source: T&E analysis, company reports

Europe needs to put in place a robust green industrial policy to capture the economic, technology and jobs value from the energy transition. This should leverage Europe's strengths such as **strong climate regulations** on electric cars, vans and trucks to create investment certainty; as well as introduce a **green simplification agenda** to allow for faster approvals for best-in-class projects - e.g. more staff, better expertise and digitalisation - without undermining environmental safeguards. Above all, to be effective Europe's response should mirror the US IRA in focus, simplicity and visibility. Given limited resources, **prioritisation** should be on battery value chains (notably cells, components such as cathodes and processing of critical metals into those), renewables such as wind and smart grids. Europe won't compete in these without a robust **European financial framework** (e.g. via the European Sovereignty Fund and reallocation of EU recovery and other funds in the short-term) that has sufficient money, focuses on **production scale-up** and is easy to access by companies.

Wherever Europe's ambition in battery supply chains is discussed, the question arises around raw materials availability. Europe is not a mining super power, but a combination of responsibly sourced global imports, sustainable domestic projects and, above all, critical metals coming from waste streams can help the bloc secure access. Looking at the domestic projects to extract lithium, nickel and cobalt in the pipeline, Europe can secure around 10% of its needs for nickel and cobalt in 2030 from local mining. In the case of lithium, especially

thanks to cleaner technologies such as direct extraction from geothermal brines, half of Europe's needs can be met.

Europe can extract up to half of its Li demand and around 10% of Ni and Co demand by 2030



Supply compared to demand in T&E's regulatory scenario based on expected car CO2 standards, higher truck CO2 standards and estimated grid storage needs.

Lithium possible supply refers to those projects that face opposition from local communities. Refined Ni and Co supply excludes existing capacities for Ni and Co metal, traditionally serving non Li-ion battery markets.

Source: T&A analysis

The upcoming Critical Raw Materials act should help capture this potential in a socially and environmentally sound way. Goals on self-sufficiency, including refining and recycling, should be set and achieved via “strategic projects” and targeted support. Our large consumer market means that potential to recycle faulty or used battery cells, as well as scrap from upcoming battery factories or waste streams from old mine sites, is as large as domestic extraction.

In short, China's dominance and the US IRA pose a serious risk to Europe's ambition in the battery value chain. But if Europe acts quickly and overcomes its inertia by introducing a targeted, strong and sustainability focused framework, it can still keep in the race.

Key recommendations

- 1 To create investment certainty, Europe should lock-in the 2035 engine phase-out for new cars and vans and introduce a similar deadline for trucks.
- 2 Prioritise the battery value chain - including cell and component manufacturing, critical metals refining and processing - in the upcoming Net Zero Industrial Act and financing.
- 3 Simplify permitting and approval processes for battery value chain projects, while ensuring strong social and environmental safeguards and engagement of local communities.
- 4 Provide simple tax breaks and production aid for best-in-class projects and reward accelerated implementation of the carbon footprint, circularity and due diligence provisions in the new EU Battery regulation.
- 5 Additional funding at EU level is necessary to support successful projects across Europe, e.g. via the Recovery and Resilience funds in the short term and the European Sovereignty Fund in the mid- and long-term.
- 6 Ensure diversified raw materials sourcing via the new Critical Raw Materials Act by prioritising European projects in refining, processing and recycling, while working with partners to import responsibly sourced materials.

Introduction

The European Green Deal is one of the world's most ambitious climate policies to usher the European Union into the net zero economy by 2050. It cannot happen without a massive and speedy ramp up of green technologies from wind turbines to electric car batteries. The global race to lead the production of this cleantech, as well as raw materials that go into them, has been unfolding for a few years now. Until recently, and as a result of ambitious climate regulation such as the EU clean car rules, Europe has secured much investment: e.g. the continent is projected to produce up to a third of lithium-ion batteries globally by 2030 (from just a few percent today).

But first the Chinese decades-long support for its battery and EV industry and now the US Inflation Reduction Act (IRA), launched in August 2022 (a game changer in industrial policy) risk syphoning away investments that would otherwise go into batteries and critical metals in Europe. In just a few months since the launch of the US IRA, investments into battery factories, new metals processing plants and electric vehicles have mushroomed in North America. At the same time, Europe's media headlines are full of stories that companies such as Tesla, Northvolt and Iberdrola will prioritise building factories in the US first.

So Europe must without delay beef up its climate policy with a robust industrial muscle. Europe's response to this has so far been the new Green Deal Industrial Plan² (GDIP), alongside changes to the national state aid framework and repackaging of the existing EU financial mechanisms such as REPowerEU and the post-Covid recovery funds. Worryingly, the GDIP does not have the same targeted scope as the US IRA. While the US IRA is targeted mostly at battery supply chains and renewables, with over USD 150 bln out of USD 369 bln going to battery cells³ alone, the EU talks of all technologies, potentially including biofuels, carbon capture utilisation & storage, biogas, etc. It is also unclear how much additional money, and in what format, will be available for European projects on top of what is already there.

Should Europe worry that it lacks a bigger focus on the battery value chain? What are the risks to its nascent but so far successful industry? This paper identifies the risks to Europe's battery industry and proposes recommendations.

1. European potential in the battery value chain

The phase-out of diesel and petrol cars and vans in the EU - as agreed as part of the EU car CO2 standards at the end of 2022 - is expected to accelerate the demand for lithium-ion (Li-ion) batteries over the next decade. The law means up to 60% of all new cars sold in 2030 will have to be battery electric (or fuel cell), rising to 100% by 2035.

² European Commission, 2023, "*The Green Deal Industrial Plan: putting Europe's net-zero industry in the lead*". [Link](#)

³ Credit Suisse, 2023, "*US Inflation Reduction Act: A catalyst for climate action*". [Link](#)

Previously⁴, we developed three scenarios showing the potential growth paths for batteries in the EU, UK and EFTA countries up to 2035. The scenarios take into account the electric vehicle (EV) sales of cars, vans, trucks and buses, assuming the average EV battery size for each vehicle category. Demand from energy storage systems (ESS) has also been added to the analysis, while consumer electronics are excluded.

To recap, the analysis showed that:

1. Europe is on track to **produce 6.7 million battery electric cars (BEV) by 2030⁵**, or just over half of all the cars produced, which is in line with the recently agreed -55% CO2 target for carmakers for 2030 that is expected to result in a 50-60% share of BEV sales. This shows that carmakers follow climate regulations and plan domestic investments accordingly. If we accelerate the pre-2030 ambition, notably by setting an EU Fleets mandate for corporate BEV registration by 2026/7, a market for battery electric cars can be a lot bigger in 2027, creating a better business case for the battery value chain.
2. Half of the Li-ion battery cells used in electric vehicles and energy storage systems in the EU were already made in the bloc in 2022, notably in Poland, Hungary, and to a lesser extent in Germany and Sweden. T&E analysis of the battery cell capacity announcements to date shows that Europe can be self-sufficient in battery cells, i.e. produce **100% of our Li-ion battery cell demand from 2027**.
3. Looking further into battery components, **two-thirds of all the cathode active material** (the most valuable part of the battery that contains metals such as cobalt and nickel) **can be produced in Europe by 2027** already, with largest projects in Germany, Poland and Sweden. This is where Europe currently leads over the US in terms of project pipeline.
4. Investments are also happening in the refining and processing of battery metals, where China dominates today. T&E analysis of the potential to refine lithium shows that **over 50% of Europe's refined lithium demand can come from European projects by 2030**. Lithium to feed those can come from global mines, European projects provided these meet high standards (supported by the CRM act e.g.) and - crucially in the future - from battery recycling streams.
5. Significant recycling potential also exists: the **materials available for recycling** from end-of-life batteries or scrap (from European battery factories) **could meet at least 8-12% of the critical metals needs in 2030**, including a tenth of all cobalt, 7% of nickel and 6% of lithium. Even if the percentages are not huge, these can nonetheless help European companies with shortages or high prices on the spot market (which are set at the margin).

⁴ T&E, 2023, "A European Response to the US IRA": [Link](#)

⁵ T&E, 2021, "Promises but no plans": [Link](#)

The above demonstrates the potential available in Europe: most of the projects are mere announcements with few commitments or permits secured so far. But it nonetheless shows what's feasible, i.e. worth strong industrial policies to secure.

1.2. Battery cell gigafactories

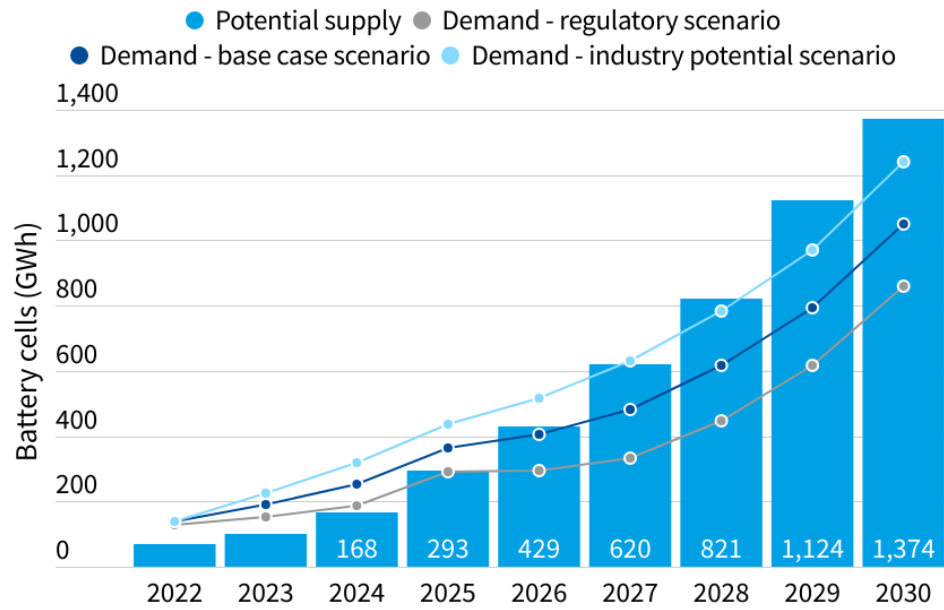
Based on T&E's tracking of gigafactory plans until 2023, Europe has until now been expected to have enough battery cell supply to meet its demand in the second part of the decade.

From around 69 GWh of production output in 2022, Europe could reach **293 GWh in 2025, 620 GWh in 2027 and 1,374 GWh in 2030**⁶ (or 78% of the total theoretical capacity of 1,765 GWh), when taking into account the 50 gigafactory projects that have been announced until now. This means that Europe can have sufficient cell manufacturing to meet the demand from electric cars, vans, trucks, buses and storage systems by 2030 in all three T&E scenarios.

However, the sufficient supply of EU made batteries in the most ambitious scenario (or industry potential scenario - which models a much faster uptake of electric cars, vans and trucks than the minimum of EU regulations) can only be reached if all the potential battery cell projects come online.

Companies with the largest production output in 2030 include CATL (140 GWh), Freyr (98 GWh), Northvolt (94 GWh), LG Chem (93 GWh), Tesla (93 GWh), ACC (92 GWh) and Volkswagen Group (90 GWh). Almost 60% of European production in 2030 would be from European companies, while Chinese companies would account for around 20% of production.

⁶ The production output was estimated taking into account progressive capacity utilisation rates in line with the ramp-up of factories (up to 85% of the nameplate capacity) as well as discounting the scrap volumes depending on maturity of the factory.



Battery plants assumed to progressively ramp-up up to 85% of their nameplate capacity.
25% to 5% production scrap included depending on plant age.

Source: T&E analysis, company reports

Figure 1: Battery cell production output and demand scenarios in Europe



Battery production in Europe: Up to 1.8* TWh in 2030

Gigafactories with expected capacity above 2GWh

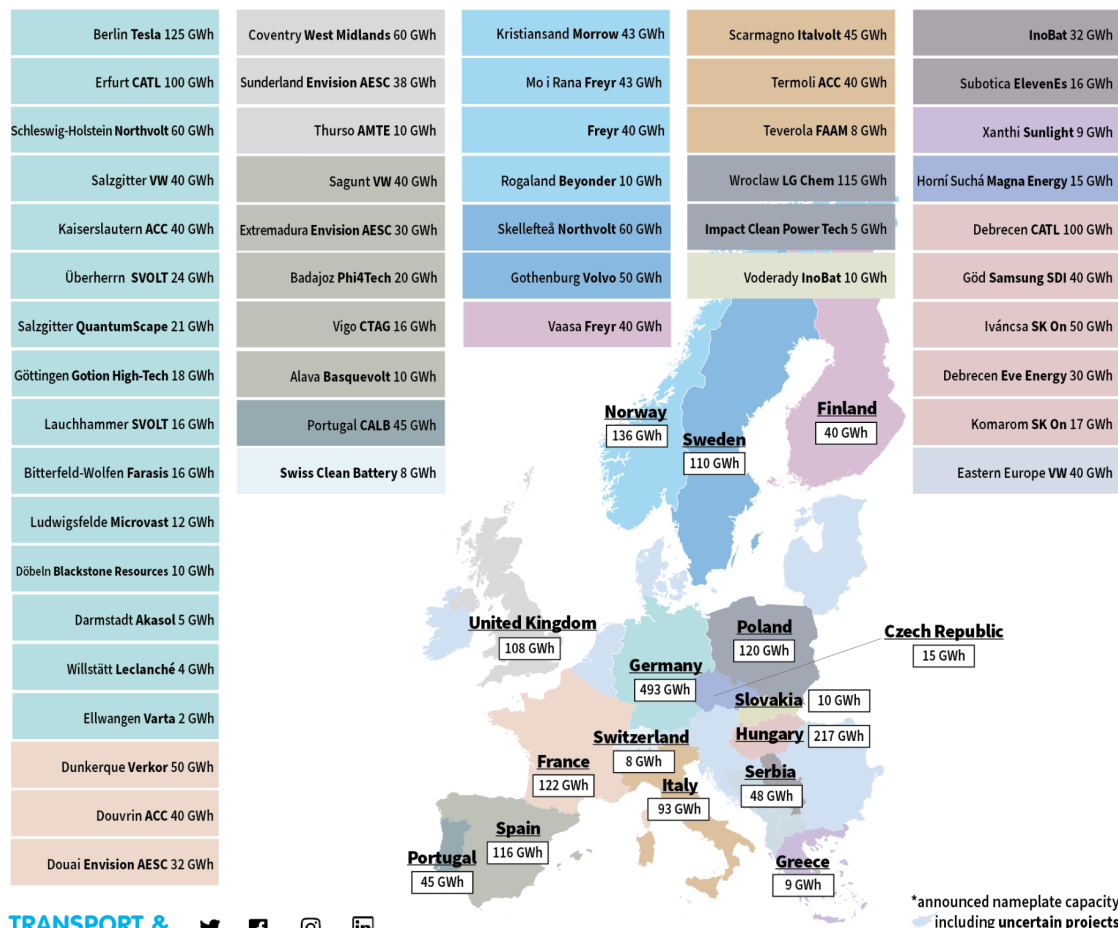


Figure 2: European battery cell factories and their capacities in 2030

2. How much of the battery supply is at risk?

Many of the announced battery gigafactories have not yet secured financing, permits, started a construction or even chosen the battery chemistry or secured offtake from automakers. This means they can still be delayed or cancelled out completely. This is where the US Inflation Reduction Act poses a serious risk.

Undermining Europe's battery ambition was never the aim of the US, but Europe was caught in the crossfire between China and America. But the simplicity, volume and bankability of the production credits available to battery cell, module and component manufacturing, as well as metals processing makes the US a highly attractive destination to build battery factories in.

To recap, on the manufacturing side, the IRA includes generous tax credits for the battery and minerals production process (known as the Advanced Manufacturing Production Credit):

- 10% of the production costs of critical minerals,
- 10% of the cost of battery electrode active materials,
- USD 35/kWh for battery cells production,
- USD 10/kWh for battery modules production, so USD 45/kWh overall if both cells and modules are produced together.⁷
- All of the above can be stacked together and claimed jointly, the credits are also bankable (i.e. sellable between companies).

According to BNEF analysis⁸ of investments into lithium-ion batteries, China and Europe led globally and accounted for most of it in 2021. However, the picture changed dramatically in 2022: while the overall investment almost doubled, the US investment has significantly grown in absolute terms with the global share remaining constant. In contrast, Europe's share of the global investments dropped from 41% in 2021 to only 2% in 2022 (China accounted for the largest share of investments). The US share is expected to increase in the coming years due to a "rapidly swelling pipeline of battery-cell projects". This points to a reprioritization that is taking place globally, with battery investments (outside of China) shifting from Europe to the US.

In theory, both Europe and the US can develop their battery value chains in parallel, and even learn and support each other. But in practice, skills, engineers, finance and resources to oversee large capital projects (permitting, construction, procurement, etc) are all limited. Crucially, the supply of critical metals such as lithium and nickel is also strained, and ultimately not every project will be able to secure sufficient raw materials. Given limitations on labour, resources and raw materials, in reality the global battery ramp-up (at least outside China) is more of a zero sum game. The US officials calling up European companies to set up shop in the US instead of Europe, as reported by the Financial Times, is only adding fuel to the fire.

⁷ US Department of Energy, Battery Policies and Incentives. [Link](#)

⁸ BNEF, Energy Transition Investment Trends 2023. (BNEF subscription required)

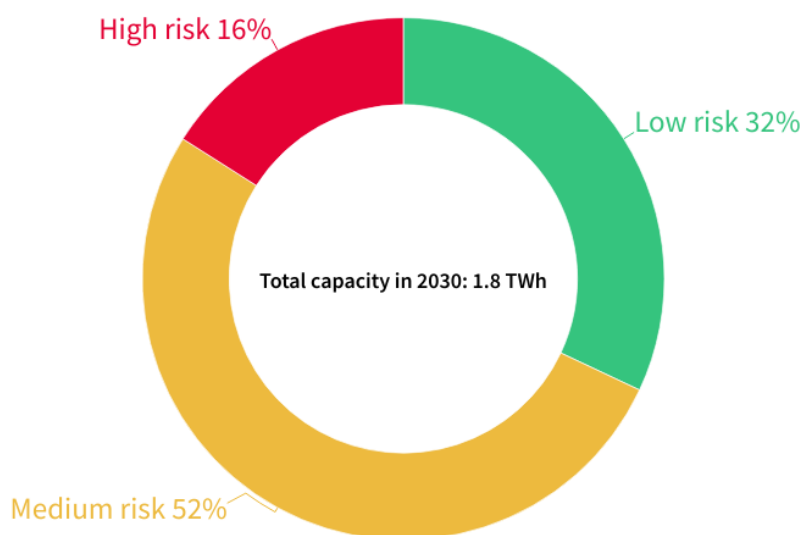
So how many of Europe's anticipated battery factories are at risk? Any such modelling entails uncertainty as the future cannot be predicted and myriad factors are at play on why companies succeed or fail.

However, T&E has developed an in-house methodology to estimate the factories potentially at risk (all detail in Annex 1). The methodology examines 50 plants that have been announced until now in Europe and assigns a risk category (low, medium, high) to each phase of each plant. The risk category is calculated based on a scoring system that takes into account several factors (including any ties to or partnerships in the US), each with a rating of 0 to 2, where 0 is low risk and 2 is high risk. These factors are:

1. Secured funding
2. Secured location
3. Construction status & permits
4. Investments from European OEMs or support from the EU institutions
5. Already planned projects in the US
6. Cooperation with the US OEMs.

As a disclaimer, T&E used the data and information from publicly available sources as well as in-house estimates. In addition, the analysis of risk is based on the above parameters and T&E's expert judgement and interpretation of the available data up to February 2023.

The analysis reveals that around 285 GWh (or 16%) of the total announced capacities for 2030 are at high risk of not coming online, and around 910 GWh (or 52%) are at medium risk. This means that **68% of the potential battery cell supply in Europe is at risk** and may not materialise without further action.

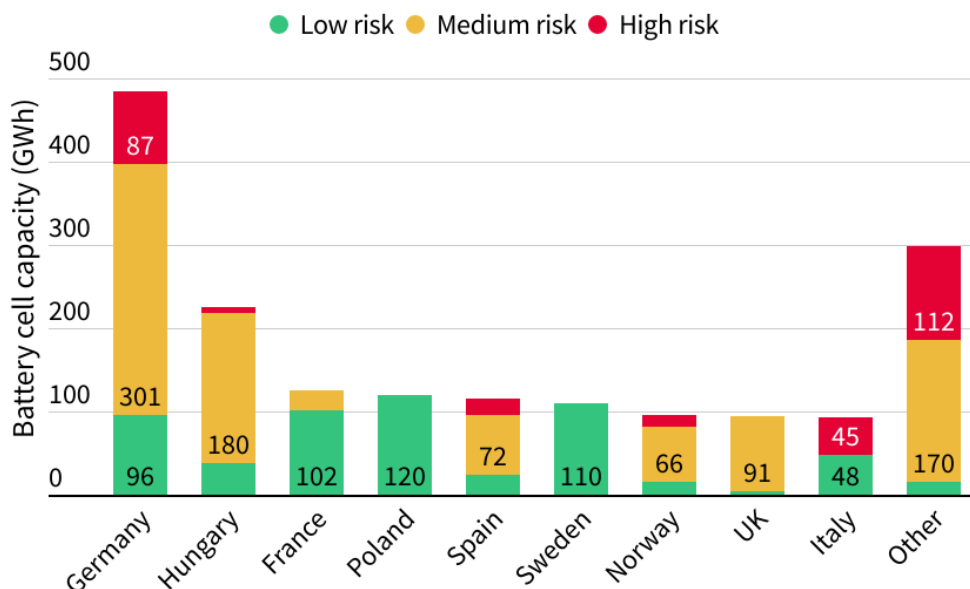


Source: T&E analysis, company reports

Figure 3: Risk assessment of European battery cell capacities in 2030

Countries with large share of projects at high and medium risk include:

- **Germany**, notably Tesla and Northvolt
- **Spain** with VW PowerCo, Phi4Tech, Envision AESC
- **UK** with West Midlands Gigafactory, the expansion phases of Envision AESC; Britishvolt was excluded from the analysis due to its insolvency
- **Italy** with Italtvolt



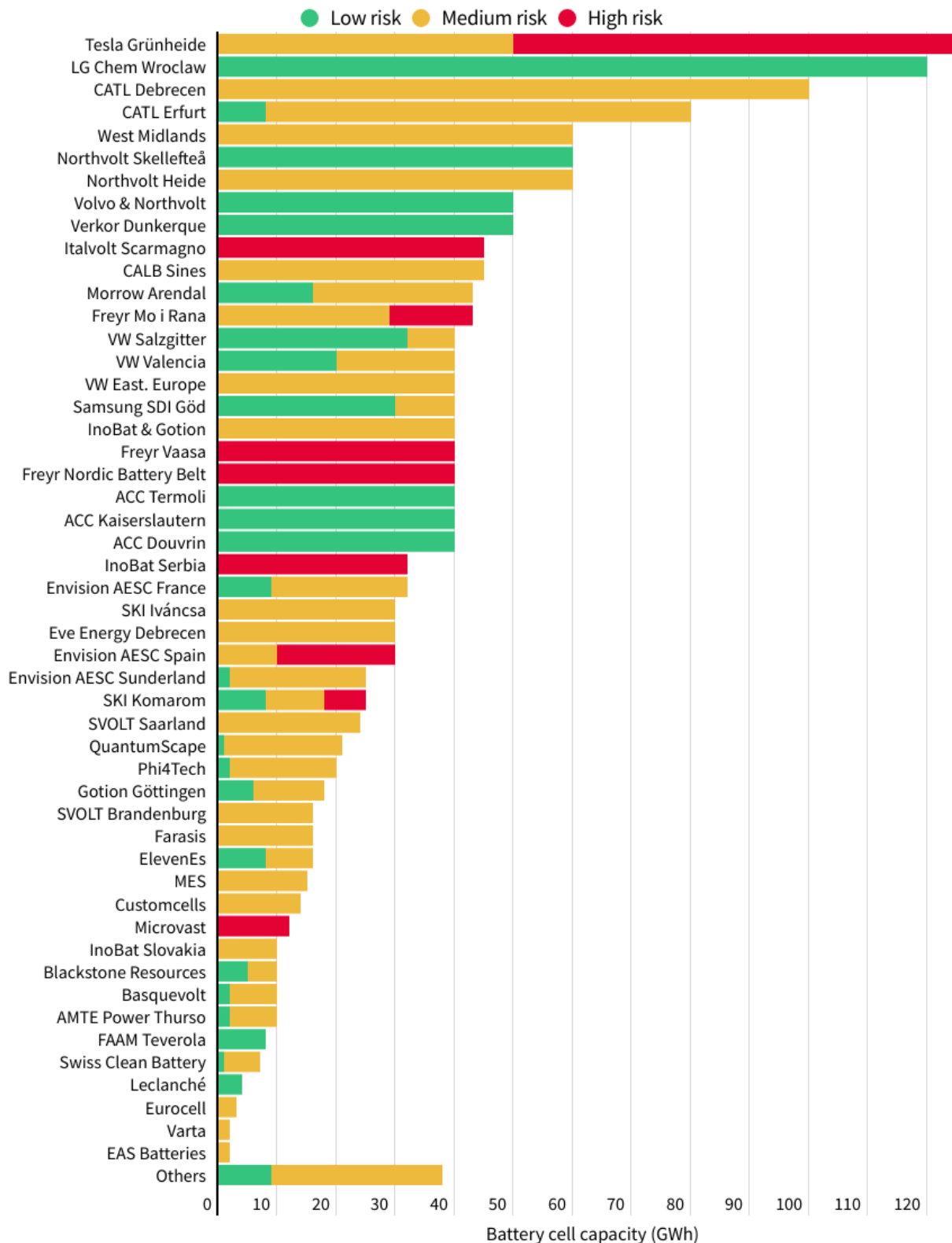
Source: T&E analysis, company reports

Figure 4: Risk assessment of European battery cell capacities in 2030 by country

We assessed **Tesla's Giga Berlin** as being the plant with the largest volumes at risk in Europe (of being delayed or deprioritised), considering its sheer scale and the likely prioritisation by the company of cell manufacturing in Texas, US following the IRA. VW-backed **Northvolt**, which already has an operating plant in Sweden and was planning another one in Heide, Germany (known as Northvolt Drei), may also reevaluate its expansion in the US in light of the US IRA and increasing energy costs in Germany.

Other large-scale projects that are under risk include: **Italtvolt**⁹ in Italy , **West Midlands** in the UK, **CALB** in Portugal (Chinese company), **Freyr**'s multiple plants in the Nordic region (and planning its Giga America factory in the US with investment from the multinational conglomerate Koch Industries), **Inobat**'s plants in Serbia and Spain, and others as shown in the chart below.

⁹ Following a conversation with Italtvolt, the previous reference to its relationship with Britishvolt has been deleted.



Source: T&E analysis, company reports

Figure 5: Risk assessment of European battery cell production capacities in 2030 by factory

Overall, this means that Europe will not be able to satisfy its battery cell demand until 2030 if battery gigafactories that are at high or medium risk are delayed, scaled down or not happen at all.

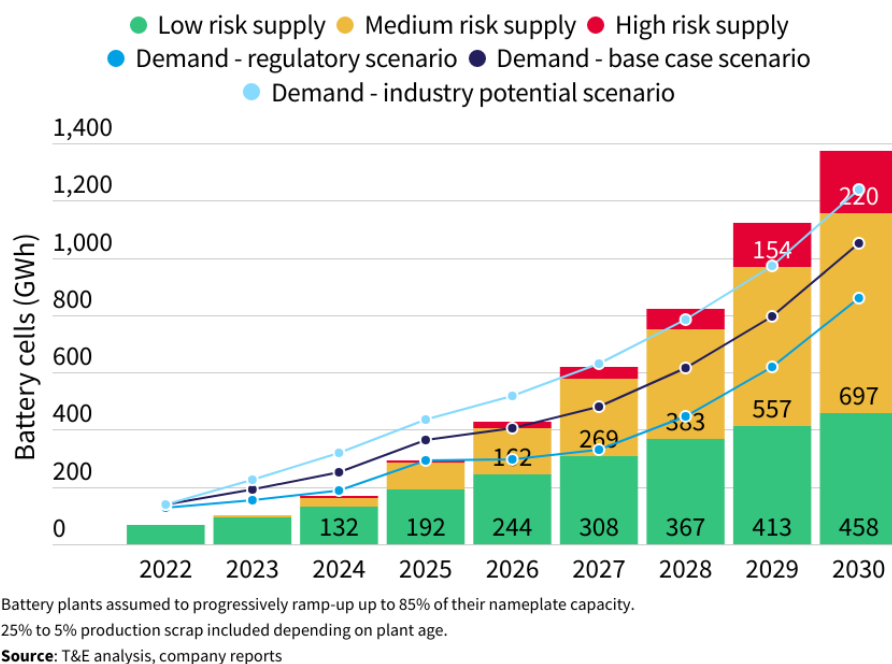


Figure 6: Battery cell production output and demand scenarios in Europe

3. Mining raw materials for those battery factories

The growing battery and midstream industry - including components such as cathodes and battery grade materials such as precursors - will necessitate considerable volumes of critical metals such as lithium, nickel, cobalt and others. Given the global race to secure those metals, including by China (with a strong advantage in controlling key supply chains today) and the US (where the US IRA is currently driving a lot of investments into critical metals production), it might be easy to dismiss Europe's efforts.

But Europe can still secure the metals it needs from global and domestic projects and, above all, innovative solutions. Europe will need a mix of measures including ambitious recycling and circularity policies, leveraging the benefits of innovation (including downsizing electric cars) and substitution, and exploiting its own potential for critical metals on the precondition of high social and environmental standards.

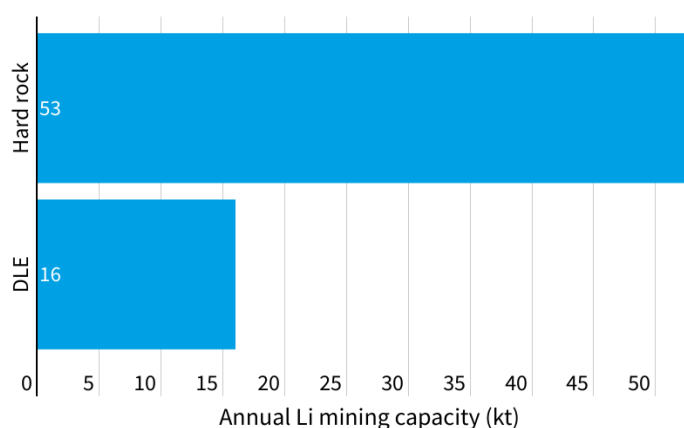
T&E has already looked into Europe's potential for recycling. Here we examine Europe's announced projects for extracting lithium, nickel and cobalt. Before going into the results from the announced projects, it is important to underline that only those that adhere to strict social and environmental criteria, as well as have communities engaged and on board, should have the licence to operate in Europe.

Lithium

Today Europe mines small amounts of lithium for the ceramic industry and all the required lithium for batteries is imported. We identified 18 mining projects, of which 17 shall be integrated with downstream refining capacities.¹⁰ **Altogether they account for a theoretical capacity of almost 70 kt Li by 2030.**¹¹

Companies like Vulcan Energy Resources (Germany), Eramet (France), Lithium de France (France) and Northern Lithium (UK) are leading the development of Direct Lithium Extraction (DLE), a more environmentally friendly technology for lithium production today.

The rest of the projects plan to extract lithium from hard rock. These include Rio Tinto/Jadar project (Serbia, largest potential), Imerys/EMILI (France), Lithium Iberia/Aguablanca (Spain), European Metals/Cinovec (Czech Republic), Savannah Resources/Mina do Barosso (Portugal), British Lithium (UK), Infinity Lithium/San Jose de Valdeflorez (Spain), LusoRecursos/Mina do Romano (Portugal), Keliber Lithium (Finland), Deutsche Lithium/Zinnwald Lithium (Germany), European Lithium/Wolfsberg (Austria) and Cornish Lithium (UK).



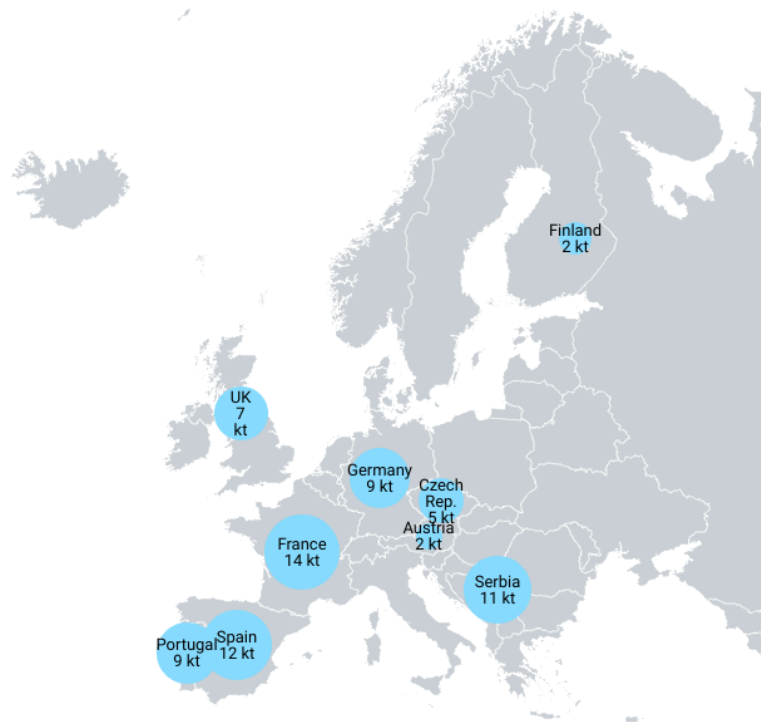
Source: T&E analysis, company reports

Figure 7: Lithium mining capacities in Europe by feed source

According to the project pipeline, France, Serbia, Germany and Spain would have the largest lithium mining capacities in Europe by the end of the decade. When assuming standard capacity utilisation rates as these projects ramp up production, their combined output could reach around 54 kt Li by 2030. However, it should be noted that around 40% of this volume comes from projects that are facing opposition from local communities and/or governments in Serbia, Spain and Portugal, therefore timelines and viability remain uncertain despite the important potential for Europe's self-sufficiency.

¹⁰ Since the publishing of the report [“A European Response to US IRA”](#), we have identified one more integrated lithium project in Spain.

¹¹ We considered all potential projects that have been announced in the public space in order to assess Europe's full potential.



Source: T&E analysis, company reports

Figure 8: Lithium mining capacities in Europe by country in 2030

Taking into account that the Li-ion battery demand in T&E's base case scenario (which is higher than the regulatory minimum) of 1,050 GWh by 2030 would require 126 kt pure Li, these lithium projects could meet up to 43% of Europe's needs (and 26% when excluding those facing opposition). When the demand from electric light and heavy duty vehicles, as well as energy storage in the minimum regulatory scenario is considered (860 GWh requiring 103 kt Li), the projects can cover up to 53% of the demand for lithium by 2030, so more than half.

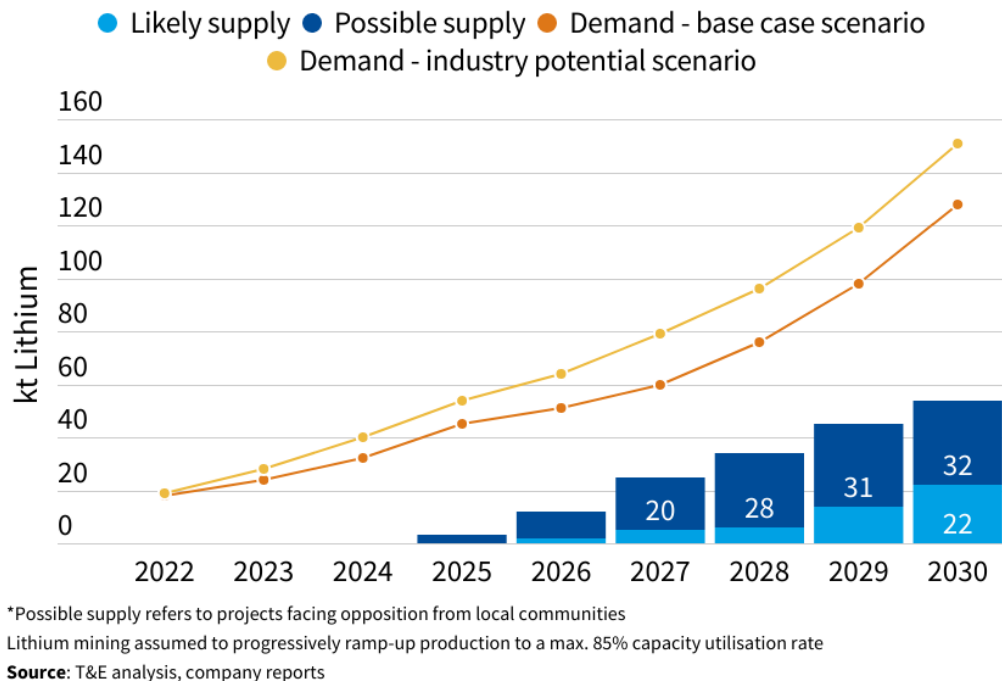


Figure 9: Lithium demand and mined supply scenarios in Europe

Nickel

Nickel mining is rather limited in Europe with the main operations located in Finland. While some extraction takes place in countries such as Greece, Macedonia and Albania, the output is in the form of ferro-nickel which is used in the stainless steel sector and is not suitable for Li-ion batteries.

In Finland, nickel is mined by Terrafame (formerly Talvivaara) and Boliden, and it is expected that Anglo American joins the ranks later in the decade. By 2030 we estimate the nickel mined output in Finland to reach almost 50 kt Ni, which would meet 9% of the demand from electric vehicles and energy storage systems in the base case scenario, and 11% in the regulatory scenario. Nonetheless, among these companies only Terrafame is specifically targeting the batteries sector and has integrated refining facilities to produce nickel sulphate for battery cathodes.

On the nickel refining side, there is a higher potential in Europe. Apart from Terrafame, Nornickel's Harjavalta plant in Finland plans to expand its existing nickel sulphate production, while Hellenic Minerals in Cyprus just started (2022) refining nickel intermediates imported from Africa. Altogether these companies could produce almost 70 kt Ni contained in nickel sulphate by 2030, equivalent to 13% of Europe's demand in the base case scenario, or 16% in the regulatory scenario ¹².

It is important to note that Europe already produces significant volumes of high purity nickel metal at plants such as Glencore's Nikkelverk (Norway), Nornickel's Harjavalta (Finland), Vale's Clydach (UK) and

¹² Assuming a moderate production expansion at Nornickel due to geopolitical uncertainties.

Sibanye-Stillwater's Sandouville (France). However, historically they have been supplying nickel metal to melting applications (e.g. stainless and special steels, alloys) and are less likely to switch the production route to nickel sulphate in the coming years. Should they decide to do so, Europe's capacity to cover its demand for nickel in batteries could theoretically increase.

Cobalt

Since cobalt is a by-product of nickel extraction in Europe, Finland is also the main producing country with Terrafame and Boliden at the forefront. By 2030 we estimate the cobalt mined production to amount to almost 5 kt Co. This volume would cover 8% of Europe's needs in the base case scenario, rising to 9% in the minimum regulatory scenario.

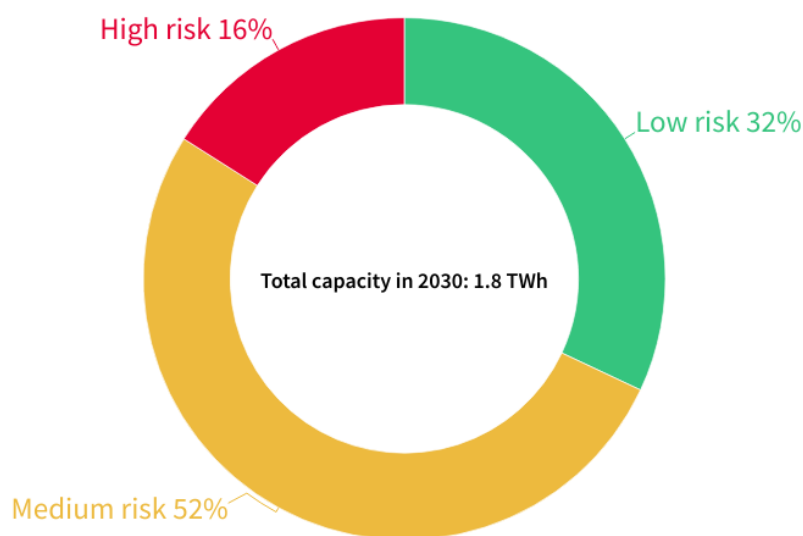
Cobalt sulphate for use in batteries is refined by Terrafame, Nornickel's Harjavalta and Umicore's Kokkola plants in Finland, along with Hellenic Minerals in Cyprus. Their output volumes combined would reach around 11 kt Co in cobalt sulphate by 2030, or 20% of Europe's demand from batteries in the base case scenario (and 24% in the regulatory scenario).

Several other plants refine cobalt into metal, powder and chemicals other than sulphate, such as Glencore's Nikkelverk (Norway), Jervois' Kokkola (Finland) and Sibanye-Stillwater's Sandouville (France), but their products are geared towards other industries.

4. Conclusions & policy recommendations

Until now, Europe was on the way to capture significant parts of the battery value chain from battery cells, to key components to - more recently - even the processing of minerals. To secure raw materials for that, a mix of global and domestic efforts, as well as recycling, would help Europe secure critical metals for that value chain. However, on top of China's long dominance of the value chain, the US Inflation Reduction Act now risks syphoning priority away from Europe to the other side of the Atlantic.

This means that Europe's early advantage in batteries is at risk. T&E analysis of the maturity of the 50 gigafactories announced so far - including finance, permits and wider links to the US - shows that almost 70% of those are at high and medium risk. This is 1.2 TWh of cell capacity, equal to 18 million electric cars.¹³



Source: T&E analysis, company reports

Figure 10: Risk assessment of European battery cell production capacities in 2030

Europe must act or risk losing it all. That means smart industrial policy and support are urgently needed to react to the US IRA and China's years' long dominance.

Europe needs a strong green industrial agenda. That's the aim of the newly announced Green Deal Industrial Plan. To work, it should be centred on:

1. **Strong climate agenda:** Europe should lock-in ambitious Green Deal Fit for 55 policies, including the 2035 engine phase-out for new cars and vans (questioning only creates uncertainty for investors), and introduce similar policies for trucks to phase-out fossil trucks in 2035-2040 latest.

¹³ Assuming an average car battery size of 65 kWh.

2. **Focused support:** Clearly **prioritise the battery value chain** - including cell and component manufacturing, critical metals refining and processing - in the upcoming **Net Zero Industrial Act** and financing. This should introduce minimum production targets for companies producing in Europe (via tax breaks or grants to scale up manufacturing), fully uphold Europe's environmental acquis, and remain focused on the most value-added parts such as cathodes and cathode precursors. Batteries are at the heart of electric vehicles' (up to a third of the value) and renewables' scale up. Losing this value chain to Asia or the US will undermine Europe's strategic resilience and exclude the bloc from the industrial and jobs benefits.
3. **Green simplification agenda** to simplify permitting and approval processes for the battery value chain projects across Europe. Europe needs to reduce the length of permitting processes, digitalise and simplify the approvals and increase expertise and skills in local and national authorities. For priority projects, deadlines to issue approvals should be set at EU level depending on the sector (shorter for battery cells and metals processing, longer for mining). In order to fast track best-in-class battery value chain projects, each member state should appoint a project team/contact person within their government to advise the project and process approvals in parallel. All social and environmental safeguards must be ensured, not watered down, and local communities properly engaged - this is the only way for this industry to have a social licence to operate.
4. Make the **financial support as simple and accessible as in the US**. This means simple tax breaks and production aid for best-in-class battery value chain projects, e.g. by introducing a max EUR/x (tonne or GWh) incentive. Europe should also reward an accelerated implementation of the carbon footprint, circularity and due diligence provisions in the new EU Battery regulation by targeting subsidies at those companies leading the pack in terms of sustainability. Additional public funding should be accompanied by relevant sustainability, social and other conditions.
5. **Make it truly European.** Additional funding at EU level to support successful projects directly, e.g. via an EU auctions system as is currently planned for hydrogen projects under the Innovation Fund, which would help build a successful and cost-effective battery value chain in Europe. In the short term, the Recovery and Resilience funds, including the REPowerEU chapters under national recovery plans, should be made available to grant companies to directly scale up production. In the mid/long term, the European Sovereignty Fund should have sufficient additional resources to become a major investment tool focused on fast-tracking clean technologies in support of the EU green deal agenda.

Wherever we talk about battery manufacturing in Europe, the question of raw materials availability comes up. T&E believes Europe will need a mix of 1) global responsible sourced imports (but local processing, just like China is doing), 2) innovation and circularity, and 3) sustainable domestic extraction; to secure those.

On the latter, T&E analysis shows that some local potential for critical metals, notably lithium, exists in Europe. Priority should be given to sustainable projects and technologies, e.g. geothermal lithium via

direct extraction. Fast tracking best-in-class green projects, streamlining permitting (with communities on board), as well as targeted funding support, are all necessary to capture this value chain in Europe.

The **Critical Raw Materials act** can be a vital part of the answer. It should:

- Set high-level supply targets by 2030, backed up by a list of “Strategic Projects” (in conformity with high social and environmental standards) that are then fast-tracked across the bloc.
- Special focus should be on refining & processing (via a European goal of 50% by 2030), as well as on scaling the European recycling capacity and extracting metals from existing mining waste sites across Europe.
- Strategic partnerships, especially with Asian and African nations, should underpin the global dimension and help bring higher ESG standards and expertise to the Global South.

China’s dominance and the US IRA pose a serious risk to Europe’s ambition in the battery value chain. But if Europe acts quickly and overcomes its inertia by introducing a targeted, strong and sustainability focused framework, it can still keep in the race.

Further information

Julia Poliscanova

Senior Director, Vehicles and Emobility

Transport & Environment

julia.poliscanova@transportenvironment.org

Analysis:

Alina Racu

Batteries & Metals Analysis Manager

Transport & Environment

alina.racu@transportenvironment.org

Annex 1

The T&E methodology for assessing gigafactory projects at risk examines 50 plants that have been announced until now in Europe and assigns a risk category (low, medium, high) to each phase of each plant. The risk category is calculated based on a scoring system that takes into account six equally weighted factors, each with a rating of 0 to 2, where 0 is low risk and 2 is high risk. A project scoring between 0 and 4 total points would have a low risk rating, while one scoring between 8 and the maximum 12 points would be considered at high risk.

The risk factors considered in the analysis are:

1. Secured funding
2. Secured location
3. Construction status & permits
4. Investments from European OEMs or support from the EU institutions
5. Already planned projects in the US
6. Cooperation with the US OEMs.

To illustrate, we assessed Northvolt's plant in Heide, Germany at medium risk due to the fact that on the one hand, the company has received financial support from a European OEM (Volkswagen) which gives its projects overall more certainty, but on the other hand we understand that the construction in Heide has not yet started and the company publicly stated that they may prioritise a US factory over the one in Germany, following the US IRA announcement.

As a disclaimer, the data and information used for this analysis are from publicly available sources (until February 2023) and the in-house expert judgement of the low, medium or high risk based on that.