Navigating a challenging landscape: The European battery sector's battle on three fronts

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Summary

The European battery cell manufacturing industry is currently facing pressure from three fronts: fierce competition from China, substantial subsidies in the United States under the Inflation Reduction Act (IRA), and a noticeable decline in electric vehicle (EV) growth. Each of these challenges, while of varying importance, threatens the viability and competitiveness of European battery production.

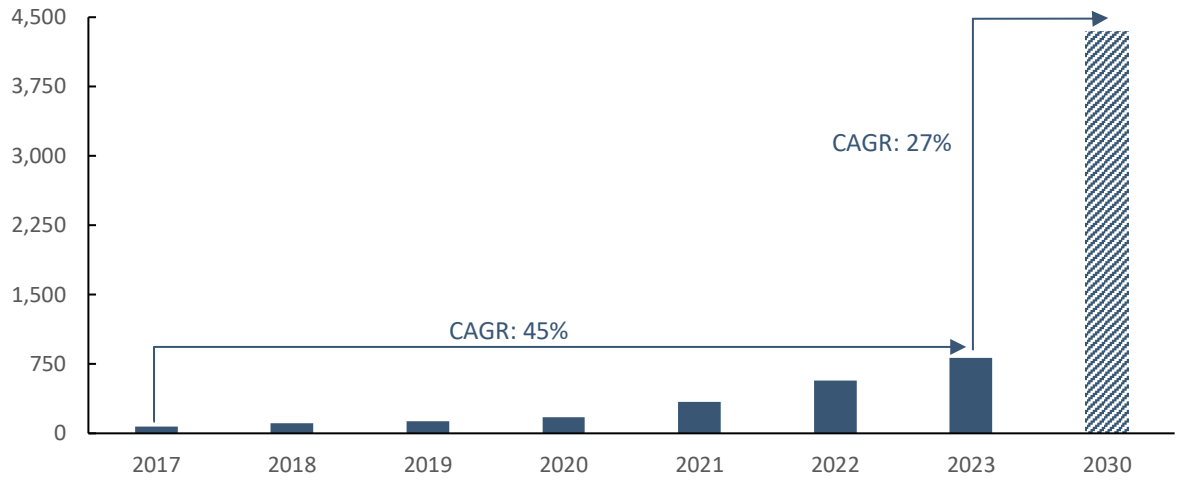
- **China, with its well-established and efficient battery supply chain**, continues to dominate the global market. This dominance, coupled with Chinese companies declining manufacturing costs and narrowing margins, puts significant strain on European producers struggling to remain profitable and hampering new investments.
- **Simultaneously, the U.S. has implemented aggressive subsidies** through the IRA, drawing potential European investments across the Atlantic and leading to a reallocation of planned production capacities.
- Lastly, **the decline in EV demand growth**, especially in the European market during the latter half of 2023 and the first half of 2024, exacerbates uncertainties, impacting future growth expectations and, consequently, excepted battery demand.

This research note delves into these three fronts, analysing their impact on the European battery sector and exploring potential strategic responses that the EU could adopt to mitigate these pressures. But first, we start by providing a brief overview of the global market for battery cells and the recent developments in the European industry.

From global trends to EU ambitions: analysing the battery market landscape

The global battery market has experienced substantial growth in recent years, driven primarily by the rapid adoption of EVs and to a lesser, but increasing, extent from the implementation of both utility and consumer scale energy storage systems (BESS). The graph below illustrates how global demand for lithium-ion batteries for EV and BESS applications has increased over the past seven years and expected demand in 2030.

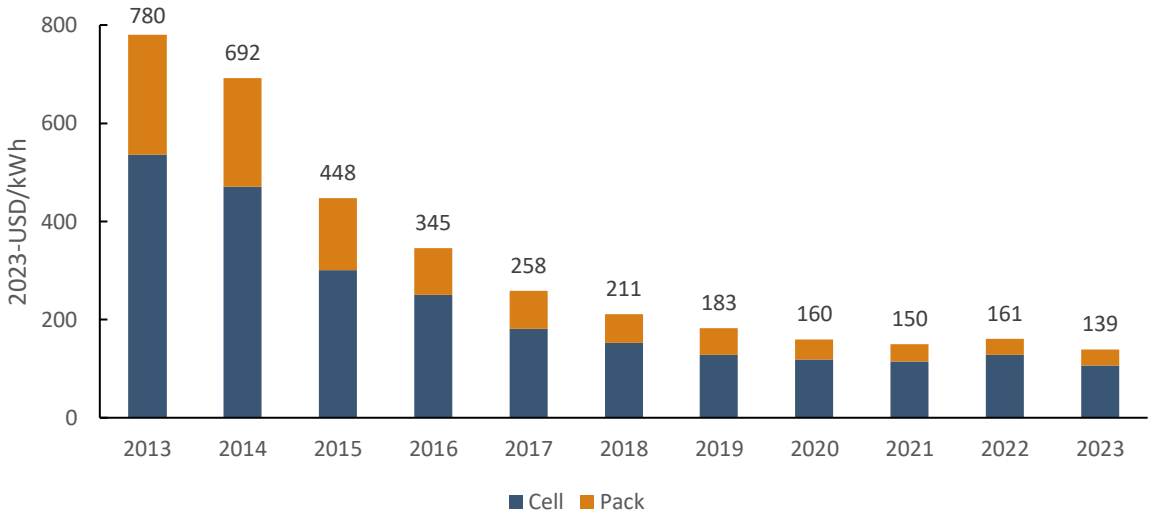
Figure 1: Global demand of Li-Ion batteries for EV and BESS applications. Source: IEA, BNEF & Menon Economics



As shown, the compound annual growth rate (CAGR) for global battery demand has exceeded 45 percent in recent years, an exceptional high rate of growth for an already established product. This growth is expected to continue for the remainder of the decade, with an annual growth rate of 27 percent. This would entail that the battery market for EV and BESS applications would be worth several hundred billion dollars in 2030, attracting the attention of numerous companies and countries looking to capture their share of this rapidly expanding sector.

This extraordinary growth in production has been accompanied by a steady decrease in the price per unit of storage capacity, which has fallen by approximately 16 percent per year. The graph below shows this price development over the past decade.

Figure 2: Global volume weighted average lithium-ion battery prices split between cell and pack price. Source BNEF



As shown, the global prices of lithium-ion batteries have dropped by more than 80 percent since 2013. This decrease has been driven by technological advancements, intense competition, and economies of scale across

the entire supply chain, from raw material processing to cell production. While this is an impressive achievement and a crucial step toward the decarbonization of the global economy, it has raised the entry barrier for new competitors that have yet to develop similarly optimized supply chains, production expertise, or economies of scale. Although not captured in the above graph, cell prices have seen a sharp decline during the end of 2023 and the first six months of 2024. This development is driven primarily by falling mineral prices and compressing margins, which have exacerbated the already tough market for new competitors. This point is discussed further in the following chapter.

The European battery ambitions

In this global context, the EU has set ambitious goals for the development of a robust and comprehensive domestic battery industry, including substantial parts of the supply chain, with minimal reliance on external suppliers. Central to this strategy is the Net Zero Industrial Act, which aims to scale up battery cell production to meet 90 percent of the EU's domestic demand by 2030.[1] This effort is tied to the broader push for electrification in the automotive sector, with a goal of 30 million EVs on European roads by 2030,[2] and a ban on the sale of new combustion-engine passenger vehicles and vans by 2035.[3] The EU's battery strategy, reinforced by the Critical Raw Materials Act, focuses not only on increasing cell production capacity but also on securing the entire supply chain. This includes extracting 10 percent of the EU's critical raw material needs domestically by 2030 and achieving enough material processing capacity and production of anode and cathode materials to cover 40 percent of domestic demand by the end of the decade.[4] By scaling up production and reducing dependency on non-European sources, the EU aims to build a competitive and resilient battery ecosystem that supports its long-term climate goals and strengthens its industrial base.

However, the European battery industry is at a critical juncture. The existing and rapid expansion of manufacturing capacity, particularly in China, poses a significant threat to European producers. China's existing manufacturing capacity alone far exceeds global demand and could meet its own projected demand in 2030. Still, it has already committed investments that would more than double its current capacity by the end of the decade. Furthermore, the EU's ambitious goals are being tested by the current global market dynamics, where competitiveness is increasingly determined by scale, cost-efficiency, and government support. The challenging market conditions for the European battery industry are already taking a toll on new entrants, with many companies scaling back their ambitions or abandoning their European plans outright. This is exemplified by companies such as Northvolt[5], FREYR[6], ACC[7], Britishvolt[8], and Italvolt[9], which have scaled back their ambitions or abandoned their European plans outright.

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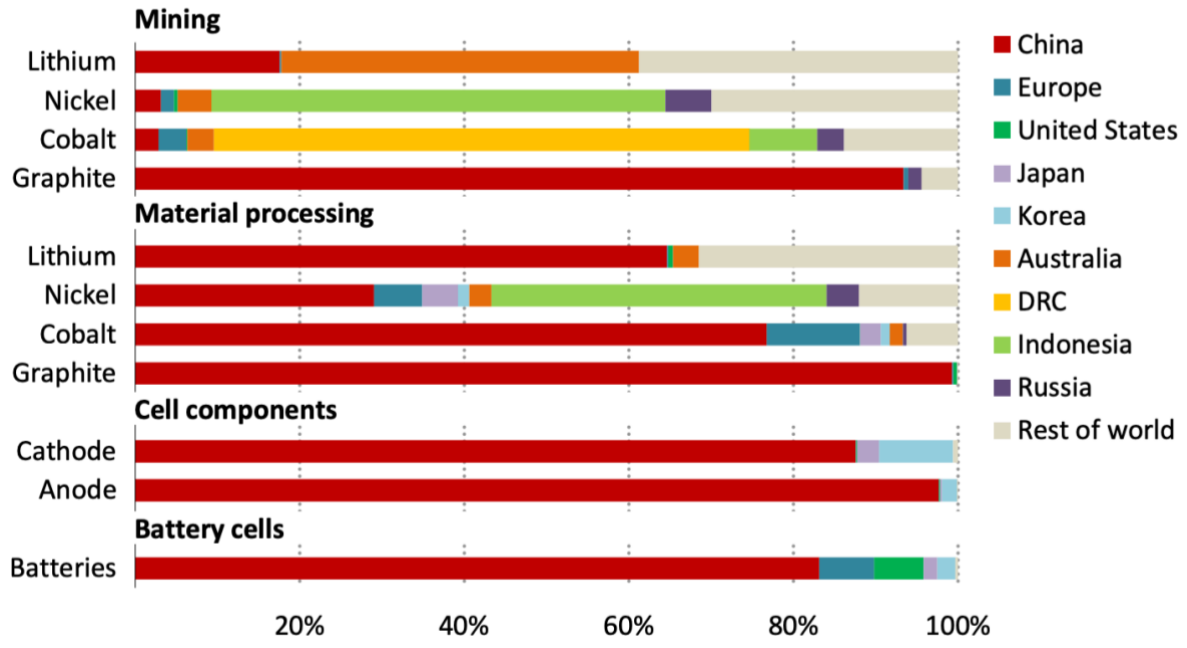
[1] *The European Parliament (2024)*
[2] *The European Environment Agency (2024)*
[3] *The European Parliament (2022)*
[4] *The European Parliament (2024)*
[5] *Rho motion (2024)*
[6] *High North News (2024)*
[7] *Battery news (2024)*
[8] *The guardian (2023)*
[9] *BEST (2024)*

China's market dominance: how low costs and robust value chains is shaping the global battery market

China is currently dominating the total global value chain. This dominance is a result of years of investments in all parts of the battery supply chain. The expansion has not exclusively been a manifestation of market forces, but partly been driven by a top-down approach through large governmental subsidies. The figure below clearly shows China's dominance in all parts of the battery supply chain.

Figure 3: Geographical distribution of the global battery supply chain, 2023. Source IEA

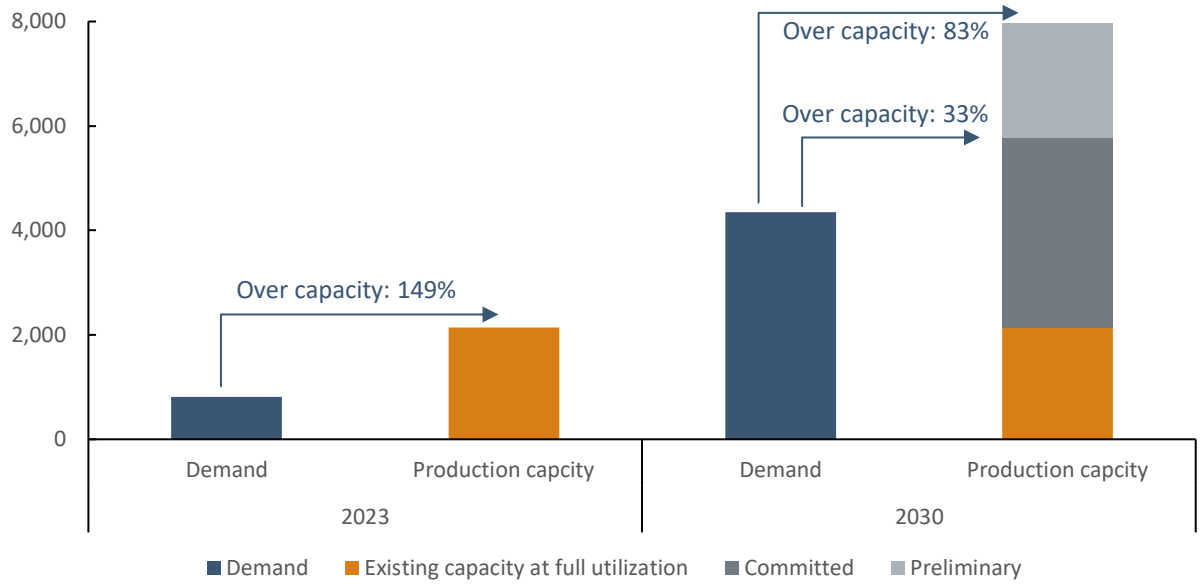


As shown above, China's dominance is particularly prevalent in the battery specific parts of the value chain, which consist of manufacturing of cell components and battery cells. In these parts of the battery value chain, China's market share stands for well above 80 percent of the global market. The Chinese dominance the battery industry has made the rest of the world reliant on Chinese imports, which is regarded as a significant geopolitical disadvantage.

China's heavy investments in battery cell manufacturing capacity has come at the expense of malalignment between supply and demand. As earlier mentioned, the compounded annual growth rate for global battery demand has exceeded 45 percent in recent years. However, this rapid demand growth has been met with an even faster expansion in global manufacturing capacity, of which China stands for close to 85 percent. As of 2023 the global manufacturing capacity exceeded global demand by more than 100 percent[10], positioning the industry in a state of overcapacity. The below figure shows global demand relative to global production capacity at full utilization[11] in 2023 and projections for 2030.

[10] *Mostly Chinese capacity is willingly underutilised, while EU and US producers have experienced production problems.*
[11] *Full utilization is set at 85 percent of nameplate capacity*

Figure 4: Global demand and supply of lithium-ion batteries for EV and BESS use in 2023 and projections for 2030. Supply is presented by degree of commitment[12] to investment plans. Source: IEA, BNEF & Menon Economics



A temporary overcapacity issue would not pose a significant threat to an industry in which demand is expected to increase with about 27 percent annually over the next seven years. However, data on planned expansion and investments in global battery cell production capacity relative to expected demand point to a world with continued overcapacity. As shown in the figure above the existing and committed manufacturing capacity is expected to exceed demand by 33 percent in 2030, not counting announced manufacturing capacity which is yet to conclude their final investment decision (FID). The size of planned battery manufacturing investments is therefore likely to make overcapacity a persistent issue for years to come.[13] This may lead to strategic underutilization of capacity and reduced profit margins, resulting in decreased returns on invested capital. This is especially problematic for new entrants, such as Europe.

Since the second half of 2023 and the beginning of 2024, battery prices in China have decreased sharply. This is mainly driven by two factors: a sharp decrease in mineral prices driving down manufacturing costs and the already mentioned excess capacity leading to compressed profit margins. The figures below show how Chinese cell spot prices, cell manufacturing costs and cell manufacturers profit margins have changed from March 2023 to March 2024.

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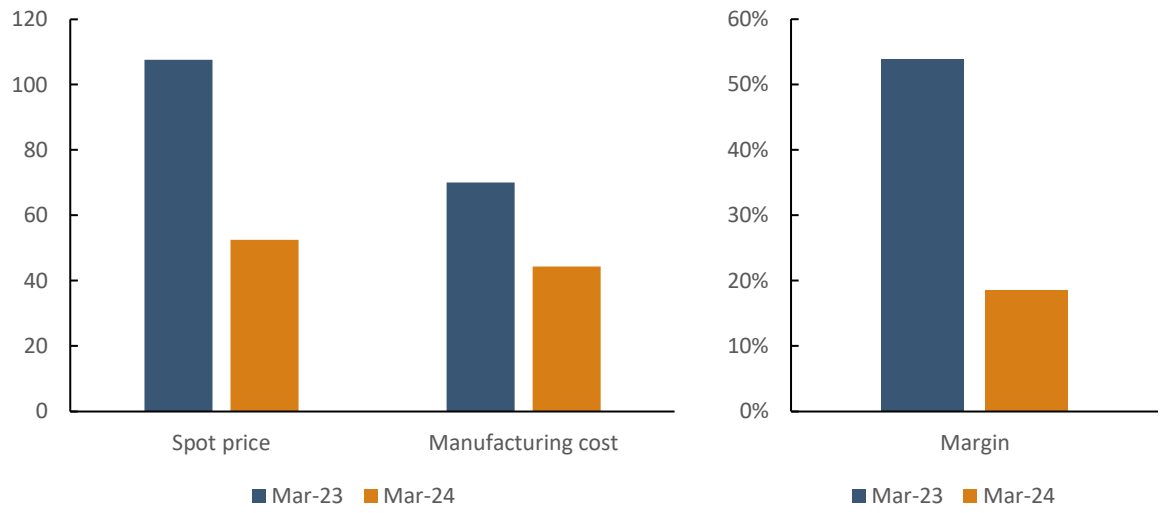
[12] Degree of commitment is divided in to, preliminary; no FID, committed; FID concluded, and existing capacity at full utilisation rate.

[13] In this research note, we refer to overcapacity as a state in which global production capacity exceeds demand to the extent that cell prices drop below a level that yields satisfactory return on capital. While lower expected returns on capital should reduce investments, market forces are likely to be subdued by political decision making.

Figure 5: Spot prices, manufacturing cost and profit margins for Chinese LFP cells. Source BNEF



As shown in the graphs above the spot price of Chinese LFP cells have decreased by more than 50 percent over this period. As earlier mentioned, this is due to two factors. Firstly, the manufacturing cost of LFP cells has decreased with more than 35 percent, largely driven by falling mineral prices. This is particularly true for lithium carbonate prices, one of the main cost components of lithium-ion batteries, which have fallen with almost 70 percent over the last 18 months.[14] Secondly, the excess production capacity, leading to a utilisation rate of around 40 percent, has driven profit margins from 55 percent to 18 percent.

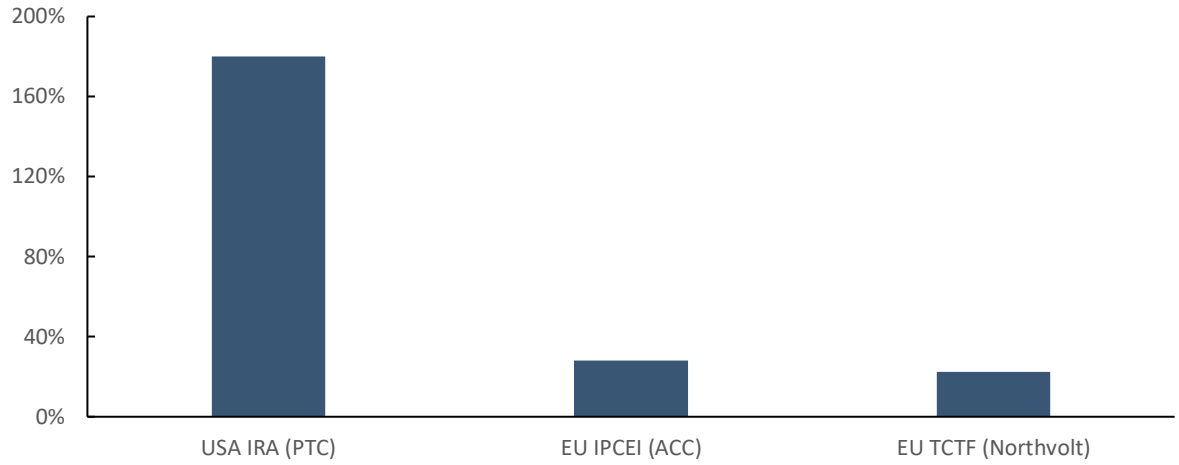
Although falling mineral prices may lower European manufacturing costs, the reduced profit margins at Chinese companies will not. This price drop poses a significant challenge for European manufacturers, who were already struggling to compete with Chinese producers when they enjoyed larger profit margins. If these low margins persist, which is a distinct possibility, some European companies may face insolvency or be forced to relocate production outside of Europe. Additionally, it could severely curtail new investments in European manufacturing capacity.

Drawing capital across the Atlantic: Inflation Reduction Act and European investments

The U.S. Inflation Reduction Act (IRA), passed in August of 2022, introduced a new dimension of competition for the European battery industry. The IRA offers substantial and universal subsidies to domestic battery cell and pack manufacturers, making the U.S. an attractive destination for battery industry investments. These subsidies are so significant that they have prompted a re-evaluation of the global landscape for planned battery manufacturing investments globally. To comprehend how large the subsidies under IRA are, we have calculated the size of IRA production tax credits relative to the subsidies awarded to flagship projects in the EU.

[14] *Fastmarkets (2024)*.

Figure 6: Net present value of subsidies for battery cell manufacturers relative to investment cost. Source: United States House of Representatives, European commission & Menon Economics



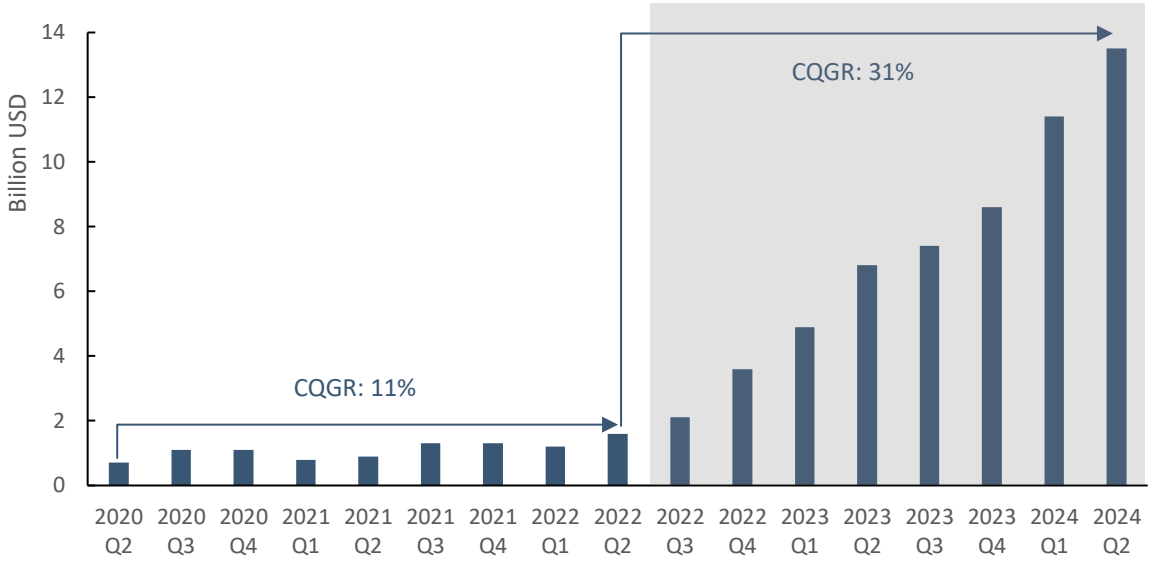
As shown in the graph the subsidies garnered through the Production Tax Credits (PTC) in the IRA, measured as the net present value of credits over the IRA period, are between 6 to 8 times higher than what flagship projects in the EU, such as ACC and Northvolt Drei, have been awarded. This underscores, just how large the subsidies in the US are, and the substantial effect it may exert on business decisions.

The EU Commission has responded to the threat of the IRA on its battery industry by temporarily relaxing its stringent state aid rules through the Temporary Crisis and Transition Framework (TCTF), allowing Member States to provide greater financial support and incentives for domestic companies in the green technology sector. With the TCTF modified in March 2023, the level of support can be significantly increased. Member States can now, under specific circumstances, offer state support matching those provided in other countries, although no Member State has yet provided subsidies that match those offered under the IRA. However, in contrast to the U.S., the application procedure remains complex and is assessed on a project-by-project basis.

In addition to the PTC for cell and pack producers, the IRA extends significant subsidies to both upstream parts of the battery supply chain and downstream uses, such as in EVs and BESS systems. Most of the subsidies downstream from cell producers are accompanied by domestic content stipulations, which strengthen the domestic upstream industry.

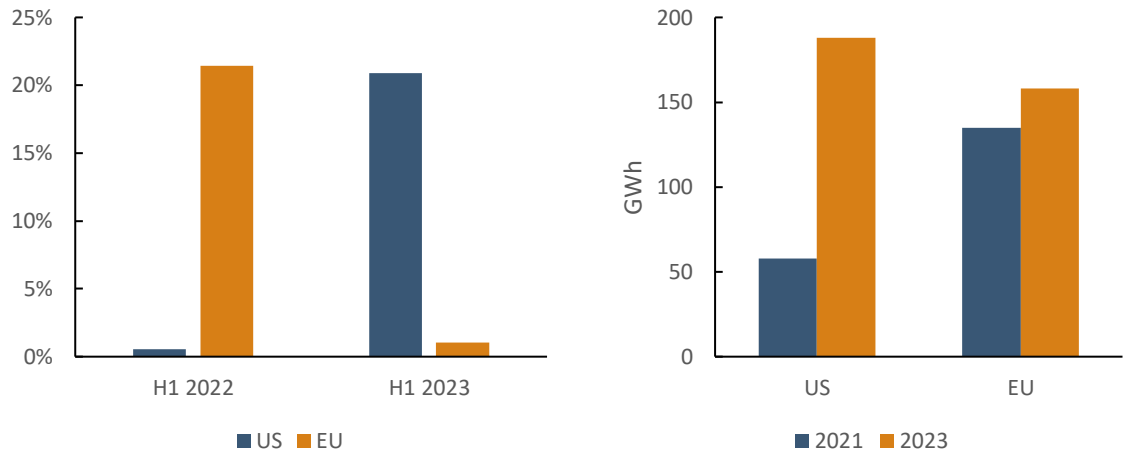
There is little doubt that the subsidies under IRA have had an immense effect on investments in the US battery supply chain. US investments in battery manufacturing prior and post to IRA is shown in the figure below.

Figure 7: Actual quarterly US investments in battery manufacturing in Billion USD. Grey area indicates period in which IRA where implemented Source: Rhodium Group & MIT CEEPR



As shown, U.S. investments in battery manufacturing have increased sharply since the inception of the IRA. Investments stood at USD 2.8 billion in the first half of 2022, before the IRA. By the first half of 2024, this figure had risen to USD 25 billion, a ninefold increase. A substantial share of these investments has been attracted from Asian producers, attracted by the production tax credits and to conform with the domestic content stipulations. The substantial increase in investments following the IRA has naturally led to significant growth in both planned and realised manufacturing capacity in the US, while having the opposite effect on EU manufacturing capacity, where growth has been subdued. Consequently, the IRA has significantly affected Europe's goal of becoming a leading region in the battery value chain. The graphs below show the development of both planned and realised manufacturing capacity in the wake of the IRA.

Figure 8: Left figure shows US vs EU planned cell manufacturing capacity growth in H1 before and after IRA, 2022 and 2023 respectively. Source: Benchmark Mineral Intelligence.
Right figure shows US vs EU established manufacturing capacity at year end 2021 and 2023. Source: Bruegel.



Before the implementation of the IRA, the growth in planned manufacturing capacity was significantly higher in the EU compared to the US. After its implementation, the opposite trend has occurred. The results are the same for established manufacturing capacity. At the end of 2021, before the IRA, the capacity in the EU was more than twice as high as in the US. By the end of 2023, the EU has seen minor growth, and US manufacturing capacity has surpassed that of the EU.

Although the above graphs provide a clear indication that the IRA has affected planned investments and realised manufacturing capacity in European cell production, they might not capture the full effect on European investments. Companies planning to establish production in Europe are still scrambling for subsidies from the EU or EU Member States, and if they do not achieve this goal, they may halt already announced plans. According to T&E (2024), 50 percent of planned European battery investments are now at risk of being delayed, cancelled, or redirected to other regions where the financial incentives are more lucrative.[15] As of now, most relocations of planned EU facilities to the US have come from Japanese and South Korean companies. However, some European companies, such as Freyr, have also decided to relocate their operations to the US.

The migration of capital and investment to the U.S. could have long-term consequences for the European battery sector, and potentially undermine the region's strategic goals of domestic control of the battery supply chain.

The effects of reduced EV demand on Europe's battery sector

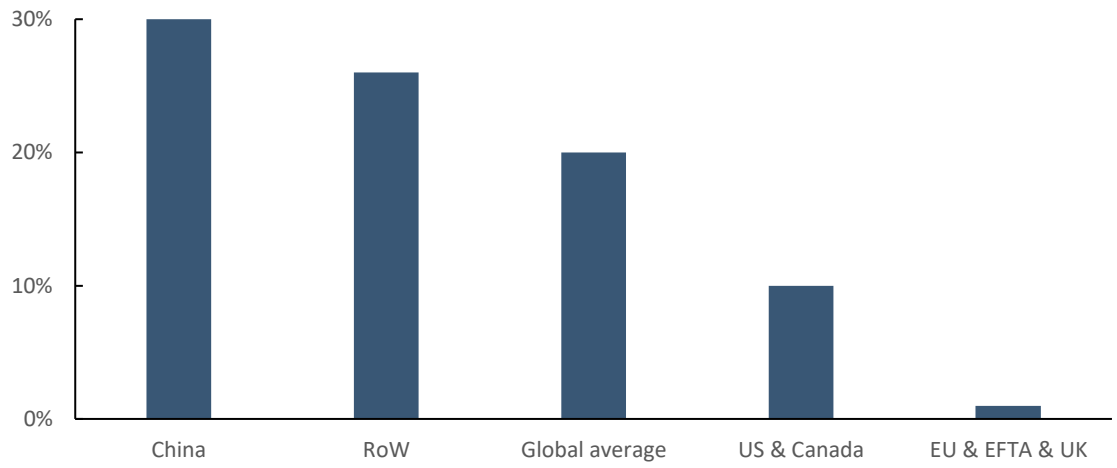
A third obstacle facing the European battery industry is the slump in EV demand since mid-2023, which is amplifying uncertainties for existing producers and potential new investors. A significant factor behind the recent slump is the limited availability of affordable electric vehicles. Many European automakers, including industry giants like Volkswagen and Volvo, have prioritised high-end electric models aimed at wealthier consumers, leaving the mass market underserved. While premium models continue to attract elite buyers, there remains a lack of affordable EV options for the broader population.

In addition, the reduction in government subsidies for EV purchases across Europe has further dampened demand. Germany, for instance, witnessed a dramatic 37 percent drop in EV sales in July 2024, signalling that many potential buyers are deterred by rising costs. This economic strain, coupled with inflation and increasing interest rates, has made EVs less accessible to average consumers, slowing overall market growth.

During the latter half of 2023 and the first half of 2024, EV sales in Europe fell short of expectations, leading to increased uncertainty about future growth prospects. This slowdown has direct implications for battery demand, as the automotive sector is the primary consumer of lithium-ion batteries. The figure below shows how EV demand growth in the EU, EFTA, and UK between H1 2023 and H1 2024 compares to other regions.

[15] *Transport & Environment (2024)*

Figure 9: Growth in EV sales H1 2024 relative to H1 2023, by region. Source: Rho Motion



The growth in EV sales in Europe in this period was barely noticeable at 1.3 percent. This came as a surprise, as the compounded annual growth rate of EV sales in Europe had been close to 50 percent over the previous five years. Europe also emerged as the region with the weakest growth in this period. A prolonged slowdown in growth in EV demand would create a ripple effect throughout the battery supply chain. Manufacturers are forced to reassess their production plans, while investors may become more cautious about committing capital to new projects. This uncertainty adds another layer of complexity to an already challenging environment for European battery producers.

While the slowdown in EV demand is expected to be temporary, its impact on the European battery industry could be lasting if it leads to reduced investment and capacity expansion in the near term. The industry must therefore navigate this period of uncertainty carefully, balancing short-term challenges with long-term strategic EU goals.

What now for Europe? Strategic responses to global battery industry pressures

In light of the pressures from Chinese competition, U.S. subsidies, and falling EV demand, the European battery industry must consider a range of strategic responses, if it is to maintain its long-term objectives. Whether those objectives are realistic or reasonable is a separate discussion, one that would need to balance national security considerations with economic costs and is beyond the scope of this note. In the following part we will delve in to three possible approaches: tariffs, subsidies, innovation & technology.

One potential strategy is to impose tariffs on Chinese batteries and related components, similar to those adopted by the U.S. These measures could help level the playing field for European manufacturers by narrowing the price advantage that Chinese producers currently enjoy. This approach is already partly in effect, as the EU has imposed tariffs ranging from 17 to 38 percent on Chinese EV manufacturers. However, this does not affect European EV manufacturers using Chinese batteries in their vehicle production, meaning it may not fully achieve its goal of strengthening the domestic battery supply chain. Additionally, in the short term, this could lead to higher prices for consumers. If this approach is not paired with subsidies comparable to those in the U.S., similar tariffs may also need to be applied to other regions with high subsidies, such as the U.S. This could be challenging, as trade relations between the U.S. and Europe have long been a cornerstone of free trade in the West.

Another strategy could involve increasing subsidies and financial support for the battery industry within the EU. This approach is now open for EU member states as the EU has relaxed its stringent state aid rules through TCTF. However, without an active implementation of subsidies by the member states themselves, the TCTF does not provide additional incentives to establish a robust battery value chain in Europe. This approach appears more viable than the tariff strategy, as building new supply chains takes years and this would avoid disrupting existing supply chains, which are crucial for the European automotive sector. Additionally, it would be less visible to consumers, as the fiscal burden would fall on governmental budgets and only indirectly affect households.

A third strategy for Europe is redirecting its effort towards focusing on developing next-generation battery technologies that offer superior performance. This would allow European producers to differentiate themselves in a crowded market, where they are already behind. Additionally, the EU might prioritise the development of niche products or specialised battery applications where European companies have a competitive advantage. This strategy does however require subsidies in the first phase to finance huge R&D budgets and might also impose a risk of not materialising in new viable battery technology.

The challenges posed by China's dominance and U.S. subsidies are not short-term disruptions, but fundamental threats to the viability of the European battery industry. If Europe is to secure its place in the global battery market and achieve the objectives outlined in the Net Zero Industrial Act and Critical Raw Materials Act, it will have to act decisively. This means accelerating investment in innovative technologies, recalibrating its subsidy frameworks, and strategically protecting its domestic market. These strategies are not optional but necessary components of a broader industrial policy if Europe aims to meet its ambitious battery sector goals.