

THE GEOPOLITICS OF BATTERIES

Chinese Export Controls on Cathode Technology: The EU Must Increase Insight into Supply Chains

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In July, China's Ministry of Commerce imposed licensing requirements for the fourth generation of lithium iron phosphate (LFP) cathode technology. A few months later, as part of its October 9 export control package, Beijing went a step further by adding third-generation LFP technology. China has since suspended its October controls but left the July licensing requirements in place. This DGAP Memo examines how China's evolving economic security tools reinforce its dominance in the battery sector through greater visibility into global supply chains. It recommends that Europe and Germany should respond by improving their own visibility.

European sovereignty in battery technology is slipping. A [recent study by McKinsey & Company](#) estimates that, based on current trends, Europe and North America combined would hold somewhere between five to ten percent of global production capacity across the four key components of batteries – anodes, cathodes, separators, and electrolytes – by 2030. Data from Fraunhofer ISI shows that, by 2024, Chinese companies owned between roughly 75 and 85 percent of market share in all these components (Figure 1).

Therefore, when China imposed export controls on battery technology in July and October 2025, it was no coincidence that it primarily did so by restricting one of these components: cathode technology, in particular lithium iron phosphate

(LFP) technology. It placed two different generations of LFP technology on two different export control lists. Only the restrictions on the third generation of this technology were lifted as part of an agreement reached at the meeting between US President Donald Trump and Chinese President Xi Jinping that took place in Busan, South Korea, on the sidelines of a summit of the Asia-Pacific Economic Cooperation (APEC) on October 30, 2025. Licensing requirements for the fourth generation remain in place.

These developments directly impact European and German energy storage sovereignty. As I explain below, they give China greater visibility into global battery supply chains and greater control over the licensing of battery joint ventures, exports, and other forms of

trade and tech transfer involving Chinese companies. I argue that Europe needs to deal with this dominance now by boosting visibility into its own battery supply chains, and I provide recommendations for European and German policymakers on how they can begin to do so.

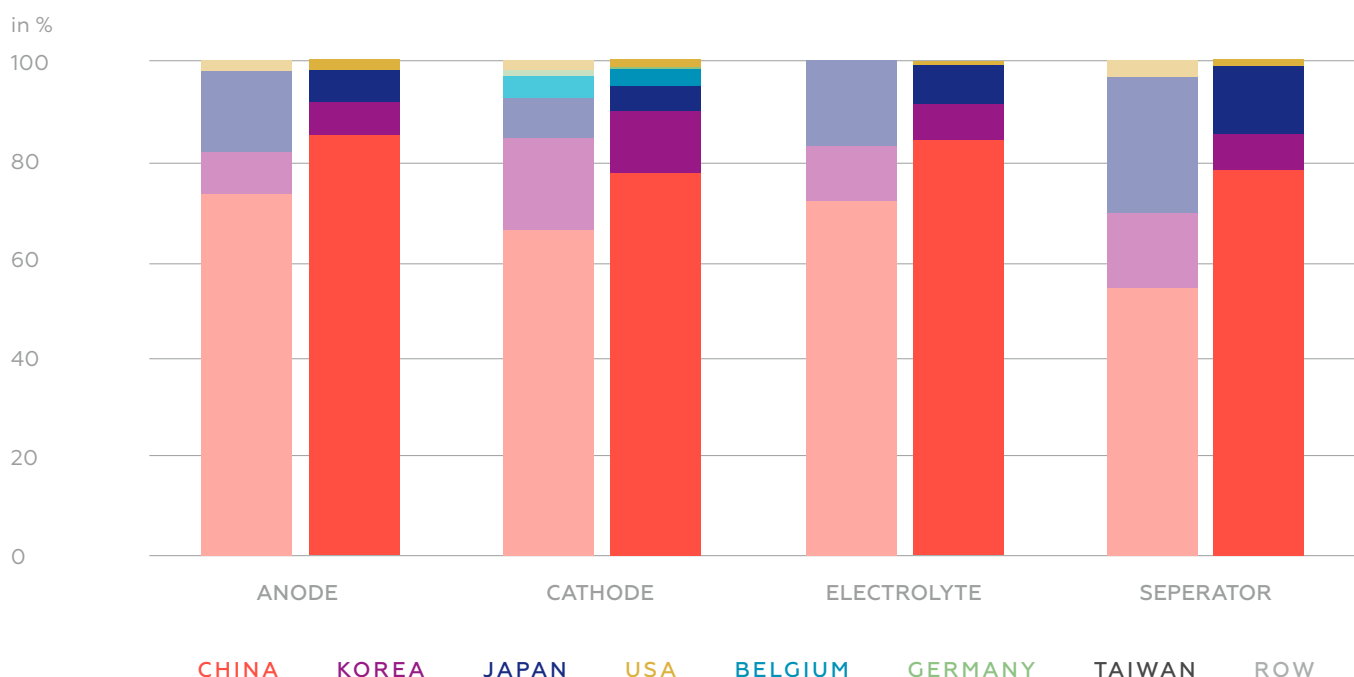
A CHRONOLOGY OF CHINESE RESTRICTIONS ON BATTERY TECHNOLOGY

In 2025, China expanded its tool kit to control the global supply of not just critical raw materials and rare earth magnets but also battery technology. These new controls impact one area of battery technology in particular – so-called

Figure 1: China's Growing Global Market Share in Battery Cell Components

A battery cell's performance and safety – its charging, discharging, and energy density – depend on four components. The **anode** and **cathode** act as the battery's opposite poles. They are separated by a thin membrane called the **separator** that allows ions to pass selectively, creating a useful electrical current. An **electrolyte** connects these elements. China plays a dominant and growing role in all these components.

Market Share Battery Materials 2022/2024



Source: Fraunhofer ISI

lithium iron phosphate (LFP) cathode active material. As China has come to be a world leader in this technology, it has also become dominant in the battery systems that currently power electric vehicles (EVs).

China aims to maintain its dominance of battery value chains to leverage dependencies of other countries on its own technology. Considerations to leverage these advantages are therefore part of a longer strategic outlook. Taken together, the developments chronicled in this section and in Figure 2 show that China views battery technology transfer as a matter of economic security – and that the state actively supports the global expansion of Chinese firms using tools Europe lacks.

Currently, Europe is particularly dependent on China's battery technology.

JULY 15, 2025: KEEPING THE EDGE IN LFP CATHODE TECH THROUGH EXPORT RESTRICTIONS

Since at least 2023, China's Ministry of Commerce had been considering controls on battery technologies. In July 2025, it officially placed LFP cathode technology in its catalog of prohibited and restricted exports. A ministry spokesperson [described](#) the move as a way to uphold the "economic security of the nation" while promoting international cooperation. Earlier, on January 2, 2025, the government had released

draft adjustments for public consultation. Then, in interviews with [Xinhua](#) and the [Global Times](#), Zhang Jiangfeng, vice president of the lithium branch of the China Nonferrous Metals Industry Association, said the rules would maintain advantages of Chinese companies expanding overseas.

Taking a closer look at the compaction density of the LFP powders referred to in the July restrictions is revealing. By setting the threshold of their compaction density at 2.58 grams per cubic centimeter (g/cm³), these restrictions effectively target only the fourth generation – i.e., the latest generation – of LFP (see info box below for an overview of LFP generations).

GENERATIONAL DEVELOPMENT OF LFP TECHNOLOGIES

The **compaction density** of LFP powder shows how tightly it can be packed into a given space. Measured in grams per cubic centimeter (g/cm³), it is closely related to how much energy a battery can store.

Each new generation of LFP batteries has improved this density:

- **First generation:**
2.3 g/cm³ or higher
- **Second generation:**
2.4 g/cm³ or higher
- **Third generation:**
2.5 g/cm³ or higher
- **Fourth generation:**
2.6 g/cm³ or higher

Three months later, in September, Chinese battery manufacturer Contemporary Amperex Technology Company, Limited (CATL) unveiled a new battery line, the Shenxing PLUS Line. This line is based on fourth-generation LFP technology and marketed specifically for Europe. Promising a longer life span and better safety, these batteries [established](#) themselves as alternatives to nickel-manganese-cobalt chemistries. LFP cathodes are now among the fastest-growing battery types in China and Europe, an outcome rooted in China's deliberate strategic [shift](#) toward LFP technologies a decade ago that laid the foundation for its current dominance.

OCTOBER 9, 2025: MORE CONTROL OF FUTURE MARKETS THROUGH INCREASED LICENSING

The ongoing trade and tech war between the United States and China provided

the pretext for Beijing to take several more steps. In October 2025, the Chinese government issued sweeping battery licensing requirements, including those on LFP technology. It dropped the threshold of LFP compaction density from 2.58g/cm³, which captured so-called fourth generation LFP tech, down to 2.5 g/cm³, which also includes the third generation.

Not only does this licensing requirement capture a larger slice of the LFP battery market, but it now also includes military use and proliferation considerations in LFP technology transfer abroad. The new lower threshold is part of the Chinese Export Control List rather than the catalog of prohibited and restricted technologies governed by the Foreign Trade Law. Licensing requirements through the former include scrutiny by the Chinese Central Military Commission while licensing through the latter generally do not.

The most striking inclusion in the October controls is a simple benchmark for gravimetric energy density. The [updated](#) export controls note a threshold for lithium-ion (Li-ion) batteries with an energy density at or above 300 watt-hours per kilogram (Wh/kg). This [captures](#) the very high end of the current [EV battery](#) market. Additionally, because the Li-ion battery industry is slowly moving toward higher-density batteries, the updated controls will capture an ever-greater share of this market. More importantly, such high-density batteries are used in the aerospace industry where the weight of applications requires greater consideration and thus higher energy density batteries. Consequently, these updated licensing requirements affect the batteries that are more likely to be used in electric vertical take-off and landing (eVTOL), drones, and other aircraft that have both civilian and military applications.

It is worth noting that China's shift from thresholds that are based on performance (by setting a certain energy

density threshold) rather than on chemistry (by identifying certain technical improvements in powder compaction in LFP tech) signals a degree of confidence in being a player in a wide variety of future battery chemistries. This should give innovators and planners who advocate leapfrogging certain battery technologies pause (see Memo 1 on the myth of leapfrogging in battery tech).

The [updated](#) restrictions also home in on other aspects of the battery chain, including graphite anode materials and technology to manufacture battery cells and their components. This development shows that any technology transfer that occurs with Chinese companies above the set threshold can be scrutinized by the Chinese government and potentially denied. For Europe, this means that China has more insight into the global activities of its companies than European governments do.

Indeed, these controls impose new licensing requirements that allow for the collection of granular supply chain information across a large part of the battery value chain. Therefore, they create an information asymmetry between European governments and Beijing in key negotiations, for example those related to joint venture partnerships.

BEYOND NOVEMBER 7, 2025: REFORMS OF THE FOREIGN TRADE LAW AND LICENSING UNDER IT

On November 7, roughly one week after the Trump-Xi meeting in South Korea on October 30, China's Ministry of Commerce [suspended](#) restrictions that it had issued a month prior. The agreement notes a [one-year pause](#) on restrictive actions by both the United States and the People's Republic of China. Given that the agreement merely involves a pause and no commitment to permanently remove controls, these measures could return in one form or another, including in a way that impacts Europe.

Figure 2: China’s Export Controls in LFP Battery Technology

LFP GENERATION (BY COMPACTION DENSITY)	CHINESE TECHNOLOGY CONTROLS	SELECT CHINESE LFP PRODUCTS COVERED	KEY APPLICATIONS
1st: 2.3 g/cm³	Not controlled	· T601 (2.2 g/cm³), LBM/Lopal Tech · L3.7D1 (2.3 g/cm³), LBM/Lopal	· Cold environments · Electric scooters · Base stations
2nd: 2.4 g/cm³	Not controlled	· S27 (2.48 g/cm³), LBM/Lopal Tech	· Electric vehicles
3rd: 2.5 g/cm³	Export Control List (Oct. 9, 2025)	· Endurance 1 – S401 (2.55 g/cm³), LBM/ Lopal Tech	· Electric vehicles
4th: 2.6 g/cm³	Catalog of restricted and prohibited technologies (July 15, 2025)	· Endurance 1 – S501 (2.65 g/cm³), LBM New Energy Technology Company/Lopal Tech Note: CATL is a major customer and uses this product for its Shenxing PLUS battery line	· Electric vehicles

2.50 g/cm³
Suspended as part of
Xi-Trump Agreement
on Oct. 30, 2025

2.58 g/cm³
Still in place

Source: Ministry of Commerce of the People’s Republic of China (MOFCOM) and author’s research of corporate websites and media reports

The July 15 controls on LFP technology, however, were not suspended. This means that, despite the outcome of the Trump-Xi meeting, licensing requirements under the Foreign Trade Law for fourth-generation LFP technologies – i.e., those at or above 2.58 g/cm3 compaction density – will remain in place. This licensing requirement will capture important activity, including, for example, future licensing with Chinese companies such as Lopal Technologies, Shenzhen Dynanonic, and Fulin Precision that make LFP cathode active materials at such compaction density.

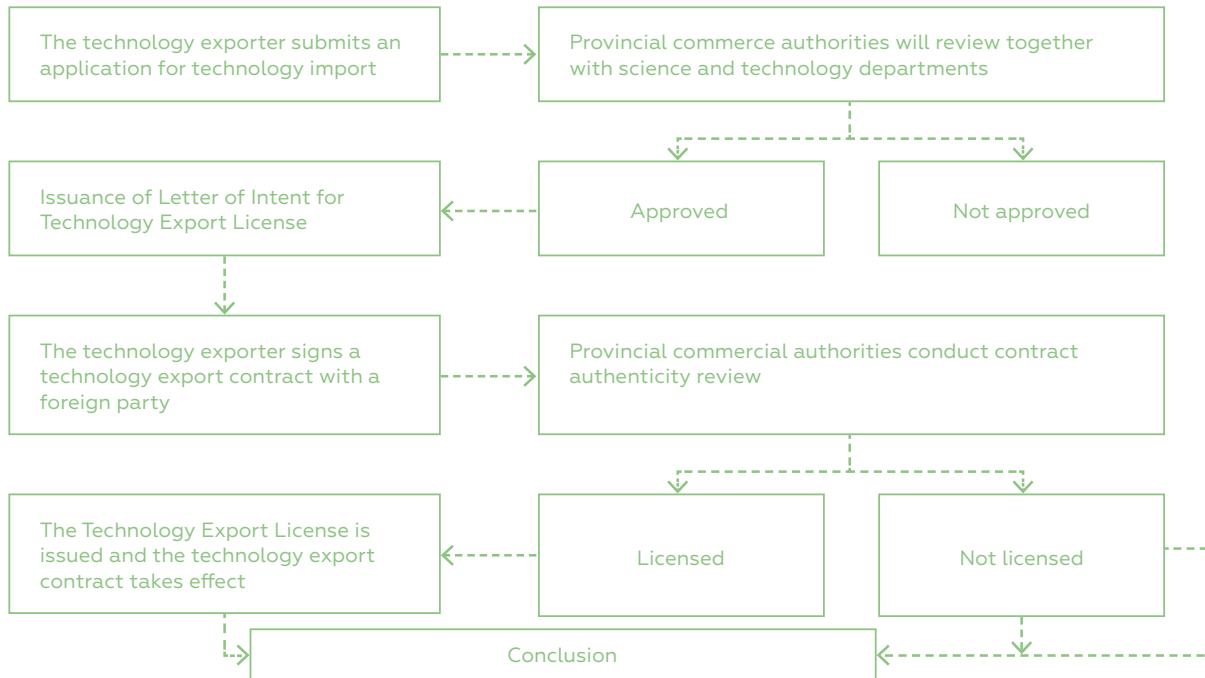
Under China’s Foreign Trade Law, the export control process allows authorities to scrutinize contracts and agreements involving foreign companies. Firms apply for a Technology Export License through provincial commerce departments that review the application together with local departments of science and technology. Among many critical tasks, provincial commerce departments oversee the designation of high-tech firms, making them

eligible for additional government support. Meanwhile, science and technology departments at the provincial level manage talent recruitment programs. As a result, the licensing process involves scrutiny and consolation of key parts of China’s broader science and technology strategy (see Figure 3 on the LFP licensing process).

The Foreign Trade Law – last updated more than 20 years ago – is now [undergoing](#) major reform to expand the use of export bans and strengthen China’s [ability](#) to assert itself in trade and technology competition with the United States and Europe. According to an initial [assessment](#) by Wang Jian, professor in the School of International Trade and Economics at Beijing’s University of International Business and Economics, the original law focused on promoting export while new revisions will focus on protecting national security. This assessment indicates a shift in emphasis from open trade to security – although the latter was not necessarily absent before.

The current form of the Foreign Trade Law intends to impose restrictions where the “safeguarding of national security, public safety, and ethics” is at stake. Its role is also [explicitly](#) seen as supporting the “establishment of a particular domestic industry.” In the past, when China began to demonstrate global competitiveness in industries that also involved a security dimension, those industries were subsequently included in the catalog of technologies restricted or prohibited from export. For example, this was done with light detection and ranging (LiDAR) systems in [2024](#). Such systems help autonomous cars and drones navigate their environments.

In the future, the Chinese government may place new technologies on this list that it believes could help its companies achieve global leadership. These include solid-state batteries (see Memo 1 on where China stands in solid-state battery development). Such a development would undermine the long-term efforts of Europe and Germany to de-risk.

Figure 3: Licensing Process for LFP Technologies Under the Foreign Trade Law

Source: Websites of the [Chinese Ministry of Commerce](#) and the law firm [King & Wood Mallesons](#)

POLICY RECOMMENDATIONS FOR EUROPE AND GERMANY

Given their high dependence on Chinese battery cell components, Europe and Germany need to address energy storage sovereignty with greater urgency. China's significant market share in battery cell manufacturing gives it the opportunity to put pressure on or deny access to key battery supplies. To respond, Europe and Germany need to take the following steps:

- **See the entire battery value chain as a strategic asset.** Policymakers in the European Union and Germany must recognize that China treats control over the entire battery value chain as a national security priority. They should adopt a similar approach in their own industrial and innovation strategies – particularly as Europe looks to rearm by incorporating production capacities for use in military applications.

They should do this by working with industry to assess whether European sovereignty is best advanced through independent LFP supply chains, investment in alternative chemistries, or a balanced combination of both.

- **Treat supply chain information as a strategic asset.** China's expanding licensing regime gives Beijing detailed insight into global supply chains, strengthening its ability to impose future controls. European and German industry must recognize that China has greater visibility into global supply chains than domestic authorities in Europe do. Bridging this gap through closer data and intelligence exchange between industry and government will be key for maintaining energy storage sovereignty.
- **Recognize future battery chemistries as a strategic asset.** Europe should plan for the possibility that China will impose restrictions that go

beyond current LFP technologies to encompass next-generation batteries with energy densities above 300 Wh/kg. The October 9 controls, now suspended, already include such all-encompassing energy density thresholds. Europe should develop ways to counter China's application of the catalog for prohibited and restricted technologies or the Export Control List. For example, it could impose reciprocal measures, challenge the legal validity of such controls in international courts, or stockpile materials.

- **Prepare now.** Investment, diversification, and coordinated policy action will be key for maintaining competitiveness and technological autonomy. All three of the previous points can be addressed by taking action now to forge manufacturing and innovation partnerships with countries such as Japan or South Korea that are home to globally competitive battery companies.



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national License.

The sweeping new export controls China issued in October 2025, which cover much of the battery value chain, underscore the need for energy storage sovereignty in Europe. China made the move amid mounting turmoil in Europe's battery sector marked by the bankruptcies of high-profile firms such as Northvolt and BMZ Germany. In response, DGAP's Center for Geopolitics, Geoeconomics, and Technology has launched this series of memos that examines the geopolitics of batteries.