ENABLING NORTH AMERICAN GRAPHITE GROWTH

A REPORT FOR THE NORTH AMERICAN GRAPHITE ALLIANCE

MARCH 2024

OXFORD ECONOMICS

ABOUT OXFORD ECONOMICS

Oxford Economics was founded in 1981 as a commercial venture with Oxford University's business college to provide economic forecasting and modeling to UK companies and financial institutions expanding abroad. Since then, we have become one of the world's foremost independent global advisory firms, providing reports, forecasts and analytical tools on more than 200 countries, 100 industries, and 8,000 cities and regions. Our best-in-class global economic and industry models and analytical tools give us an unparalleled ability to forecast external market trends and assess their economic, social and business impact.

Headquartered in Oxford, England, with regional centers in New York, London, Frankfurt, and Singapore, Oxford Economics has offices across the globe in Belfast, Boston, Cape Town, Chicago, Dubai, Dublin, Hong Kong, Los Angeles, Mexico City, Milan, Paris, Philadelphia, Stockholm, Sydney, Tokyo, and Toronto. We employ 600 staff, including more than 350 professional economists, industry experts, and business editors—one of the largest teams of macroeconomists and thought leadership specialists. Our global team is highly skilled in a full range of research techniques and thought leadership capabilities from econometric modeling, scenario framing, and economic impact analysis to market surveys, case studies, expert panels, and web analytics.

Oxford Economics is a key adviser to corporate, financial and government decision-makers and thought leaders. Our worldwide client base now comprises over 2,000 international organizations, including leading multinational companies and financial institutions; key government bodies and trade associations; and top universities, consultancies, and think tanks.

MARCH 2024

The modeling and results presented here are based on information provided by third parties, upon which Oxford Economics has relied in producing its report and forecasts in good faith. Any subsequent revision or update of those data will affect the assessments and projections shown.

To discuss the report further please contact:

Hamilton Galloway
hgalloway@oxfordeconomics.com

Oxford Economics
5 Hanover Sq, 8th Floor
New York, NY 10004
Tel: +1 646-786-1879

CONTENTS

EXECUTIVE SUMMARY

THE GLOBAL GRAPHITE MARKET

Global demand for graphite has expanded 52% in the last five years and is expected to grow another 70% over the next five years. This demand growth has largely been driven by increased demand for lithium-ion batteries (LiBs), driven by electric vehicle production. Demand for anode material—the form of graphite used in LiBs—is projected to almost triple in the next five years.

China currently dominates the global graphite market, and, barring concerted action, it will continue to do so. According to forecasts by Benchmark Mineral Intelligence, China supplied 72% of all graphite in 2023 and is projected to supply 65% of all graphite in 2028,. China accounts for an even larger share of the market for the high-purity graphite anode material used in batteries. In 2023, China controlled 92% of this market, and it is forecast to account for 86% of the anode material market in 2028, according to Benchmark. China dominates the production of both natural graphite, which is mined from the ground and later refined into anode material, as well as synthetic graphite, which is manufactured from petroleum.

According to Benchmark, China's supply of anode material exceeded global demand by 32% in 2023; however global demand is growing so quickly that it will catch up to this supply by 2024. Because of this rapidly rising demand, China continues to invest in graphite manufacturing despite its current overcapacity. The price of anode material made from synthetic graphite fell by 24% from 2022 to 2023 and is expected to fall by 38% from its 2022 peak by 2026. This rapid fall in prices and the convergence of the price of synthetic graphite with that of natural graphite is indicative of China selling its oversupply of graphite at prices that do not reflect the full cost of production.

RATIONALES FOR TRADE ACTION

The general economic argument for free trade is well established; however, trade protections can be justified under several conditions:

- **Infant industry protections** are justified when nascent industries face cost disadvantages owing to increased scale by established players, or declining costs from learning by doing. North American graphite producers face significant hurdles to obtaining investment in the face of excess Chinese capacity in graphite manufacturing. Securing a reliable source of graphite is also critical to the success of the growing North American LiB and EV manufacturing sectors as well.

- Trade protection can be justified as a response to **unfair trade practices** by the exporter, including dumping, government subsidies, unfair and harmful regulation, and forced technology transfer. China has a long and well-documented history of these practices across a number of goods, for example, in the case of photovoltaic solar panels in the 2010s. Chinese overcapacity in graphite production, combined with the falling price of graphite in recent years (the price of natural graphite fell 18% in 2023, while that of synthetic graphite fell 24%) suggest that the price at which China is selling graphite has decoupled from the cost of production.
- **Strategic protections** can be justified based on national security considerations. LiBs are a critical component of many emerging advanced technologies, including many with national security applications. Graphite has been designated a critical mineral for LiB production by three US government agencies, and the US government has made significant investments through grants and tax policy changes included in two US laws, the Infrastructure Investment and Jobs Act in 2021 and the Inflation Reduction Act in 2022, in increasing domestic graphite production.
- Poor **labor and environmental practices** provide another justification for trade action, both to limit the unfair advantage that firms with such practices enjoy, as well as to discourage the practices themselves. Chinese graphite producers generate substantial carbon emissions owing to inefficient industrial processes and an overreliance on dirty energy sources such as coal. They have also been linked to state-sponsored "labor transfer" programs affecting workers in the Uighur Autonomous region that have been described as forced labor.

GRAPHITE AND SECTION 301 TARIFFS

Starting in 2018, the US has applied tariffs (raised to 25% in 2019) on approximately $500 billion of Chinese goods, including many products made from graphite under section 301 of the Trade Act of 1974. These tariffs were not specific to graphite but were part of a broader tariff package in response to unfair trade practices by China.

However, in 2020, the US Trade Representative approved a request from EV manufacturers to exempt most graphite anode material used in batteries from these 301 tariffs since manufacturers argued that they were unable to source an adequate supply of graphite from non-Chinese sources.

While Benchmark forecasts corroborate the Chinese dominance of the global graphite market, this raises a chicken-and-egg problem: domestic graphite manufacturers cannot secure external investments and make the necessary internal investments to increase their future production absent protection from China's significant overcapacity in graphite manufacturing. Absent these protections, therefore, it will continue to be impossible for domestic LiB manufacturers to obtain graphite from non-Chinese sources.

1. INTRODUCTION

Graphite is a non-metallic mineral, which, like coal and diamond, is a form of pure carbon. Graphite is very resistant to heat and is relatively chemically inert, two properties that make it useful in certain types of manufacturing. Traditionally, graphite has been in high demand in the steel industry, where it is used in refractories (bricks that line blast furnaces), and for electrodes in electric arc furnaces; as well as in a number of other industrial processes.

Graphite is also a crucial component of lithium-ion batteries (LiBs), making up about 30% of LiBs by weight,[1] but accounting for only about 12% of their cost.[2] The recent and projected expansion in the demand for LiBs has resulted in a massive increase in both domestic and global demand for graphite. According to forecasts by Benchmark Mineral Intelligence, the demand for graphite is expected to grow 70% in the next five years, while the demand for graphite-derived anode material used in batteries is expected to nearly triple. Ensuring a reliable supply of graphite is critical for the manufacture of LiBs and for the production of electric vehicles (EVs), which are expected to increasingly dominate automobile production in the coming years.

This report, which was commissioned by the North American Graphite Alliance, a coalition of North American graphite producers, reviews the economics of the global graphite market, the arguments for trade restrictions in North America, and the recent institutional trade context. The remainder of the paper is organized as follows:

- Chapter 2 presents a quantitative overview of the global graphite market.
- Chapter 3 discusses the economic rationale for protecting North American graphite production against competition from Chinese graphite imports.
- Chapter 4 reviews this trade history.
- Chapter 5 concludes.

1 See, for example, https://elements.visualcapitalist.com/the-key-minerals-in-an-ev-battery/. The World Bank Group estimated that graphite accounts for approximately 54% by weight of the "mineral demand" needed for energy storage through 2050. See Kirsten Hund, Daniele La Porta, Thao P. Fabregas, Tim Laing and John Drexhage (2020). "Minerals for Climate Action: The Mineral Intensity of the Clean Energy Transition." https://pubdocs.worldbank.org/en/961711588875536384/Minerals-for-Climate-Action-The-Mineral-Intensity-of-the-Clean-Energy-Transition.pdf.

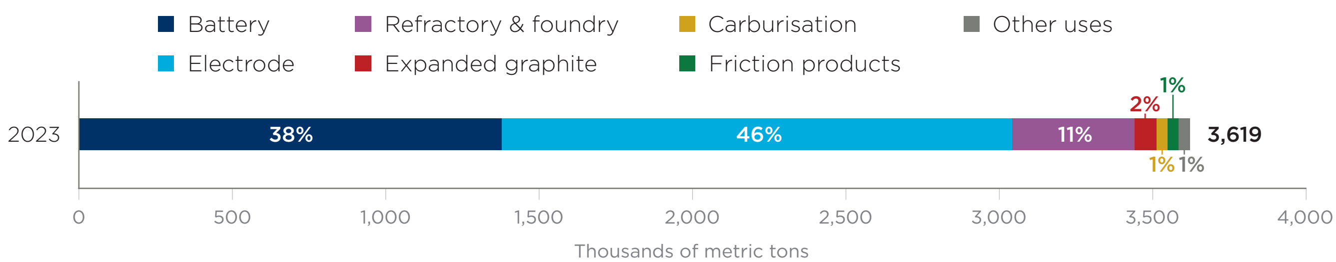
2 See, for example, https://www.visualcapitalist.com/breaking-down-the-cost-of-an-ev-battery-cell/. Most of the battery's anode is made from graphite, which accounts for most of the anode's approximately 12% share of the cost.

2. THE GLOBAL GRAPHITE MARKET

2.1 GRAPHITE DEMAND

Global demand for graphite is robust and has been rising over recent years. According to data from Benchmark Mineral Intelligence,[3] demand totaled approximately 3.6 million metric tons in 2023 (Fig. 1). The bulk of this demand was for three uses: almost half is for electrodes used in steel production, more than a third for use in batteries, and around a tenth for refractory and foundry materials. Other smaller uses for graphite included expanded graphite, which is used as a flame retardant; carburization; friction products; and graphite shapes, lubricants, and carbon brushes.

Fig. 1. Global graphite demand by use, 2023

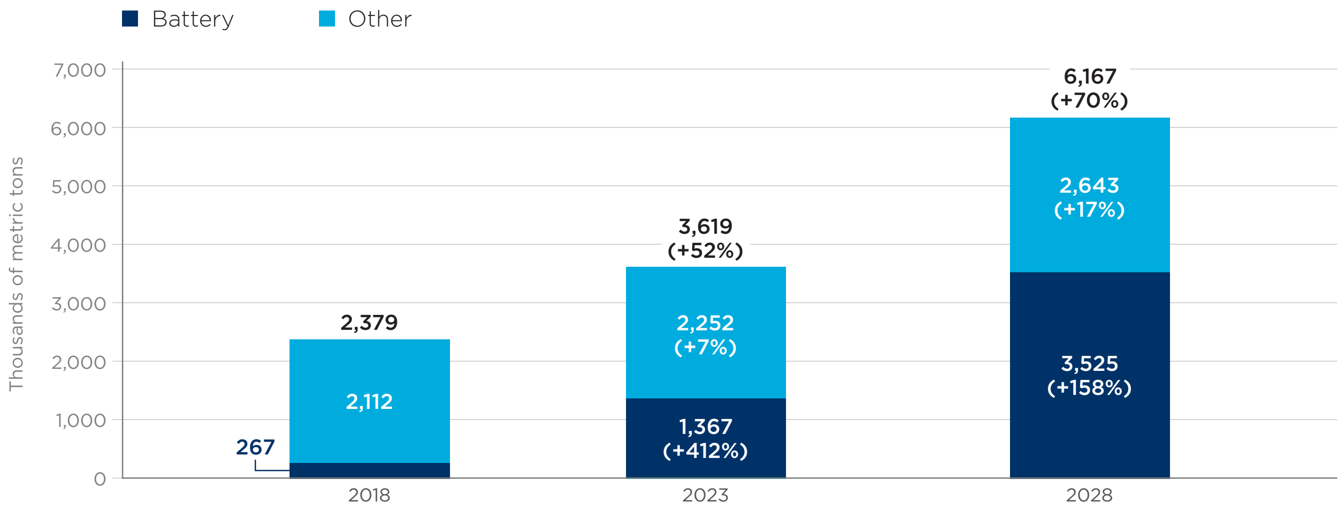


Source: Benchmark Mineral Intelligence, Oxford Economics

Global demand for graphite grew by 52% over the five years period between 2018 to 2023 and is forecast to grow 70% over the five-year period from 2023–2028 (Fig. 2). Most of this growth (89% of the growth over the last five years and 85% of the forecast growth over the next five years) is the result of increased demand for graphite in battery production.

3 Benchmark Mineral Intelligence forecasts, January 2024.

Fig. 2. Global graphite demand by use, 2018–2028



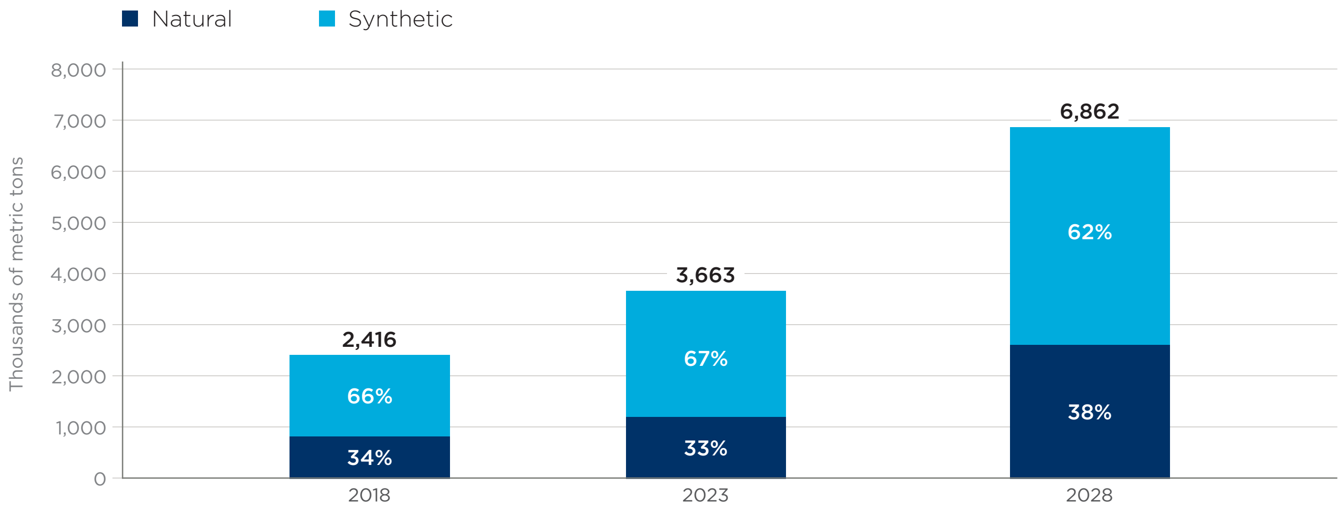
Source: Benchmark Mineral Intelligence, Oxford Economics

2.2 GRAPHITE SUPPLY

There are two sources of graphite: natural and synthetic. Natural graphite is mined from the ground as flake graphite and later processed in various ways depending on the specific chemical properties required. Synthetic graphite is manufactured from petroleum coke, which is a byproduct of the oil refinery business. Typically, synthetic graphite is of a higher purity than natural, although natural graphite can be processed to high levels of purity. Synthetic graphite is also typically more expensive than natural graphite. For this reason, synthetic graphite is used in the two applications of graphite that require the highest purity: electrodes used in steel production, which use exclusively synthetic graphite, and battery production, which makes use of both natural and synthetic graphite. The other end uses of graphite depicted in Fig. 1 typically use only natural graphite.

In 2023, approximately two-thirds of the graphite used globally was synthetic in origin, with the remaining third being natural. Natural graphite's share of the global graphite market is forecast to increase modestly from 33% in 2023 to 38% in 2028.

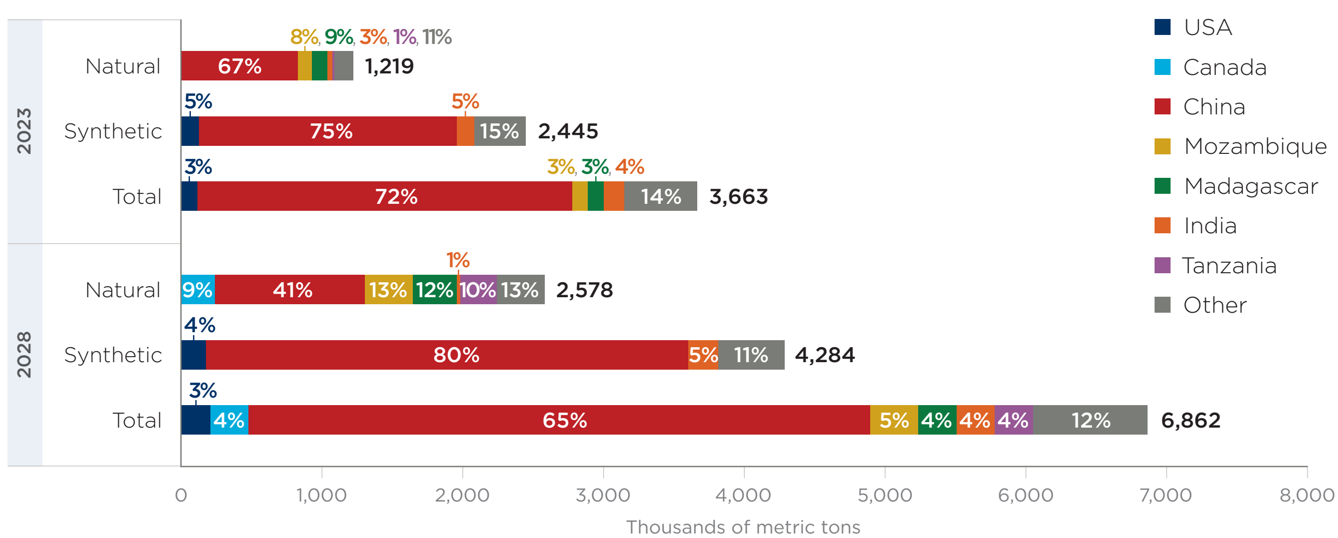
Fig. 3. Graphite supply by chemistry, 2018–2028



Source: Benchmark Mineral Intelligence, Oxford Economics

China dominates the supply of both natural and synthetic graphite (Fig. 4). In 2023, China supplied 67% of the natural graphite used globally and 75% of the synthetic graphite; or 72% of graphite overall. According to Benchmark's forecast, China's share of the global graphite market is expected to fall only slightly by 2028, to 65%, with its share of the synthetic graphite increasing slightly. The US's share of graphite production is expected to remain steady at 3% from 2023 to 2028, while Canada is forecast to increase its share of global graphite production from less than 1% to 4%.

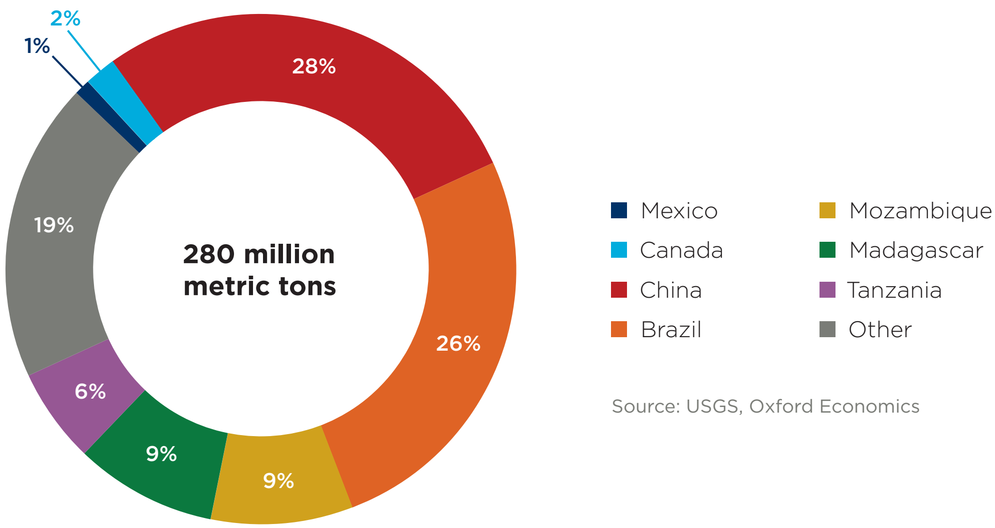
Fig. 4. Graphite supply by chemistry and geography



Source: Benchmark Mineral Intelligence, Oxford Economics

While China's status as the largest producer of natural graphite reflects significant deposits in the country—approximately 28% of global graphite reserves according to the US Geological Survey (USGS)—several other countries boast significant natural graphite deposits. However, graphite reserves in the US are believed to be small (and are not reported by the USGS), and other North American deposits account for only about 3% of global reserves (Fig. 5).

Fig. 5. Graphite reserves



Source: USGS, Oxford Economics

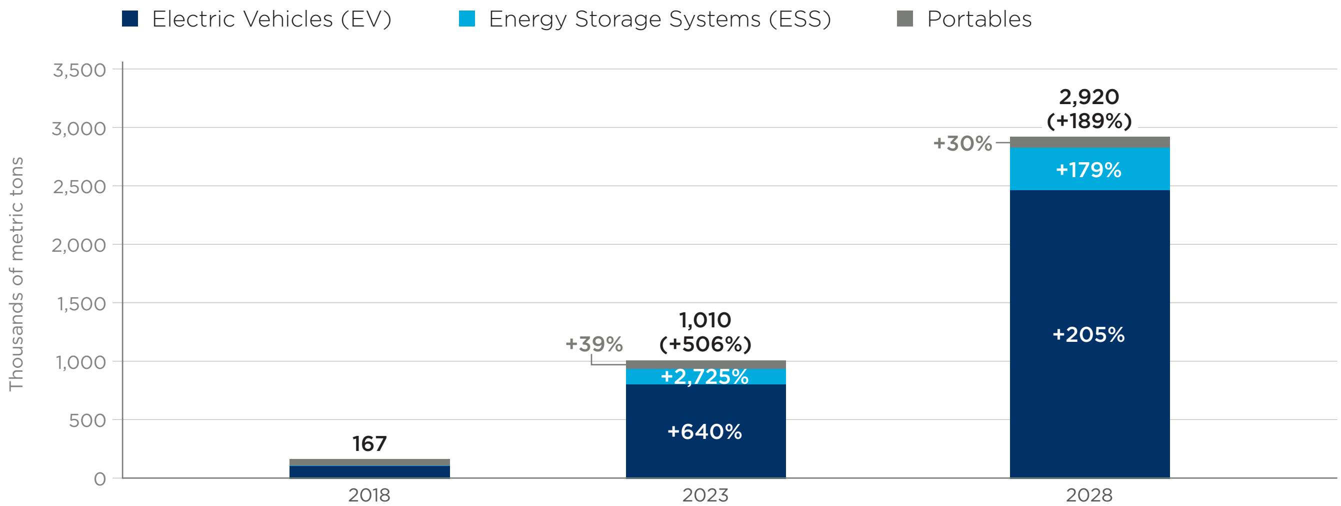
2.3 ANODE MATERIAL

In this section, we focus on graphite that has been processed for use in batteries, referred to as "anode material."[4] The demand for graphite anode material grew just over six-fold from 2018 to 2023 and is expected to more than triple between 2023 and 2028, according to Benchmark forecasts (Fig. 6). Most of that increase is the result of increased demand for EV batteries, although the demand for energy storage systems (ESS or grid storage) and for portable devices like cell phones also contributed to the increased demand. Beyond our five-year forecast window, some experts predict that graphite demand for ESS may exceed demand for EVs.

China currently represents just over half (52%) of the global demand for anode material, which is essentially its share of the market for manufacturing LiBs (Fig. 7). China's share of this demand is expected to fall modestly to 43% by 2028, with North America's share of the anode material demand increasing from 16% to 22%. However, these forecasts are dependent on these regions' continued ability to obtain the critical raw materials necessary for battery production, including graphite.

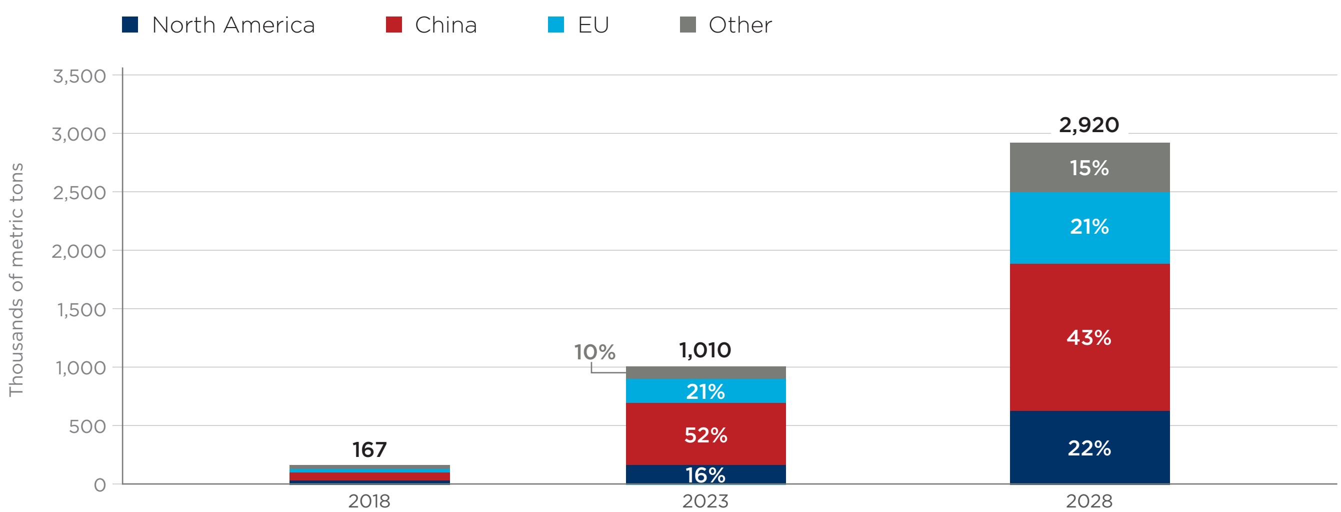
4 Natural graphite requires significant refining to be used in batteries. In this refining process for natural graphite, approximately half the graphite by weight is lost. Synthetic graphite is manufactured to need, so it does not experience this loss of material. Careful reading of the figures in this chapter will make this clear. Fig. 2 shows that, in 2023, the demand for graphite (both natural and synthetic) in batteries was approximately 1.367 thousand metric tons. Fig. 6, however, shows a 2023 demand for anode material of 1,010 thousand metric tons. The difference largely reflects the loss of material when natural graphite (which supplies approximately a quarter of the anode material—see Fig. 8) is processed into anode material.

Fig. 6. Anode material demand by end use, 2018–2028



Source: Benchmark Mineral Intelligence, Oxford Economics

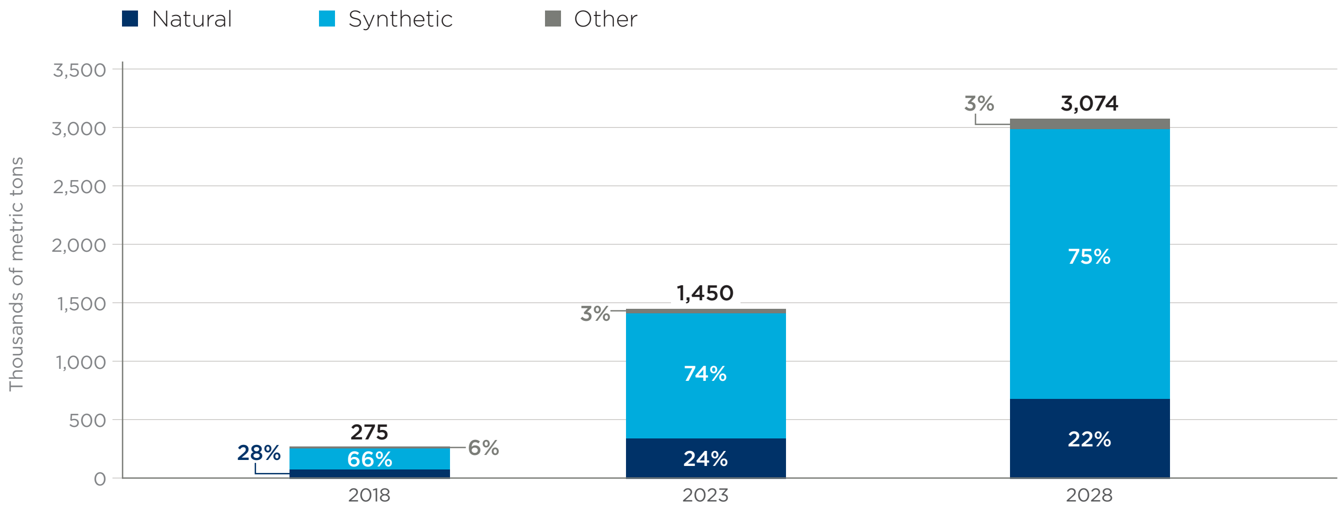
Fig. 7. Anode material demand by region, 2018–2028



Source: Benchmark Mineral Intelligence, Oxford Economics

In 2023, approximately 24% of the global anode material supply was made up of natural graphite, with 74% being synthetic graphite (Fig. 8). The remainder of the anode material market was made up of other anode materials, including graphite-silicon.

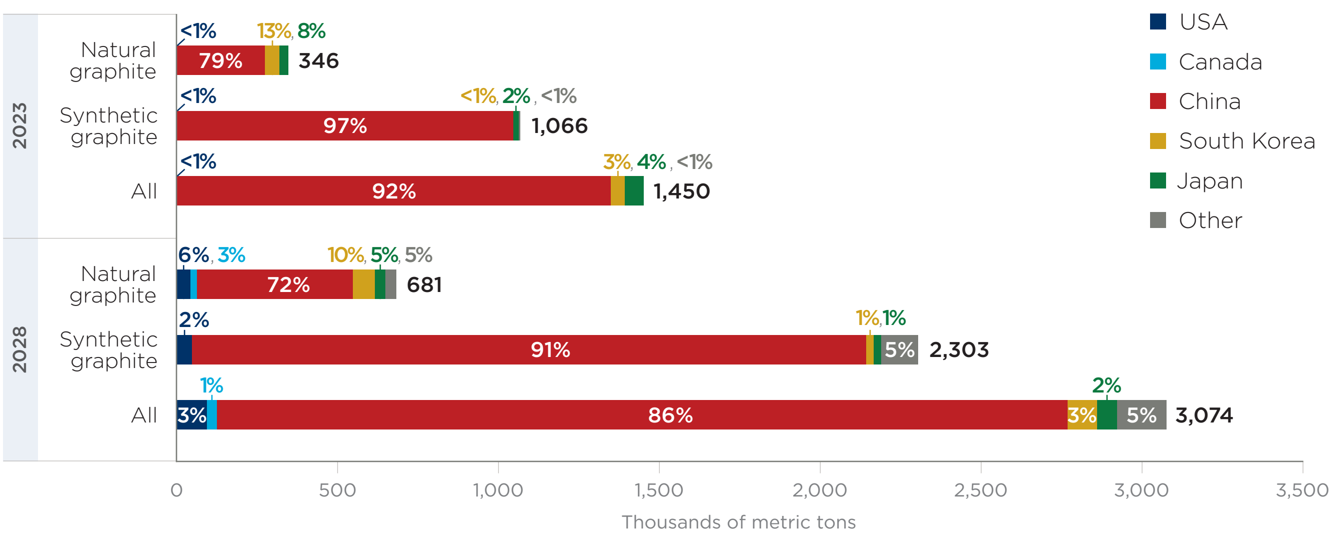
Fig. 8. Anode material supply by chemistry, 2018–2028[5]



Source: Benchmark Mineral Intelligence, Oxford Economics

China dominates the production of both natural and synthetic graphite anode material. In 2023, China produced approximately 79% of the anode material made from natural graphite, and approximately 97% of the anode material made from synthetic graphite. According to Benchmark, absent intervention, these shares are expected to fall only slightly by 2028, by which time the US is expected to account for about 3% of global graphite anode material production, and Canada for an additional 1% (Fig. 9).

Fig. 9. Anode material supply by chemistry and geography, 2023–2028

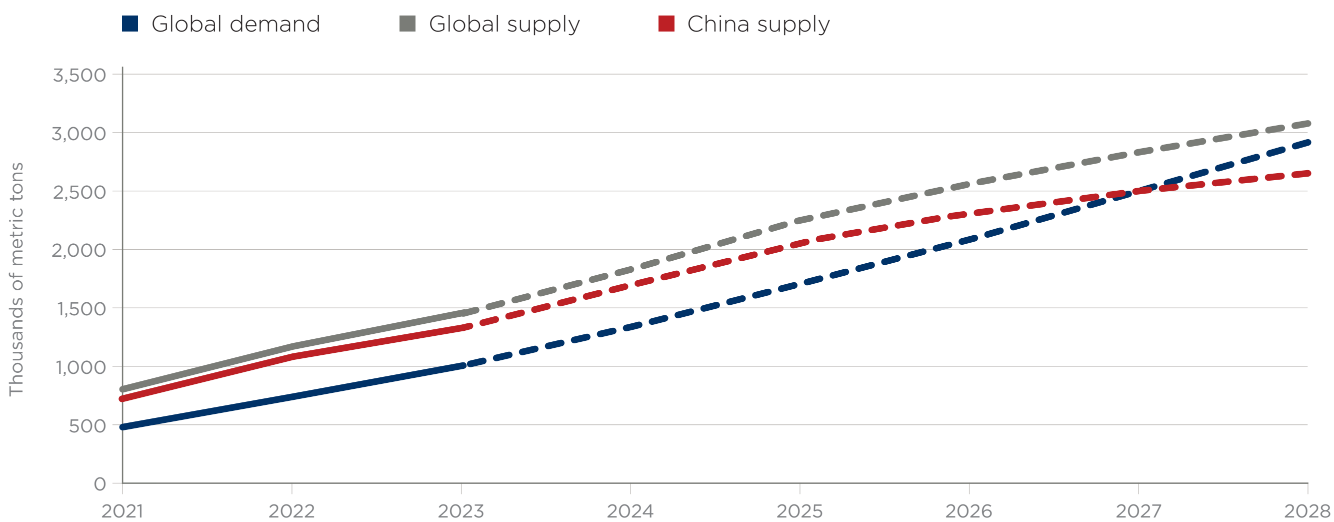


Source: Benchmark Mineral Intelligence, Oxford Economics

5 "Other" includes graphite-silicon.

Note that, in 2023, the supply of anode material of 1,450 thousand metric tons (see Fig. 8), significantly exceeded the demand for anode material of 1,010 thousand metric tons (Fig. 7), according to Benchmark data. While this large discrepancy may in part reflect measurement issues, it is indicative of oversupply in the anode material market in recent years, as China has invested to meet expected future demand for graphite (see Fig. 10). While Chinese supply of anode material was estimated to exceed global demand by 32% in 2023, demand is growing so rapidly that it is expected to exceed China's 2023 supply of anode material by the end of 2024. Thus, China continues to invest in graphite manufacturing despite its overcapacity in anticipation of dominating rapidly growing future demand.

Fig. 10. Supply, demand for anode material, 2021–2028



Source: Benchmark Mineral Intelligence, Oxford Economics

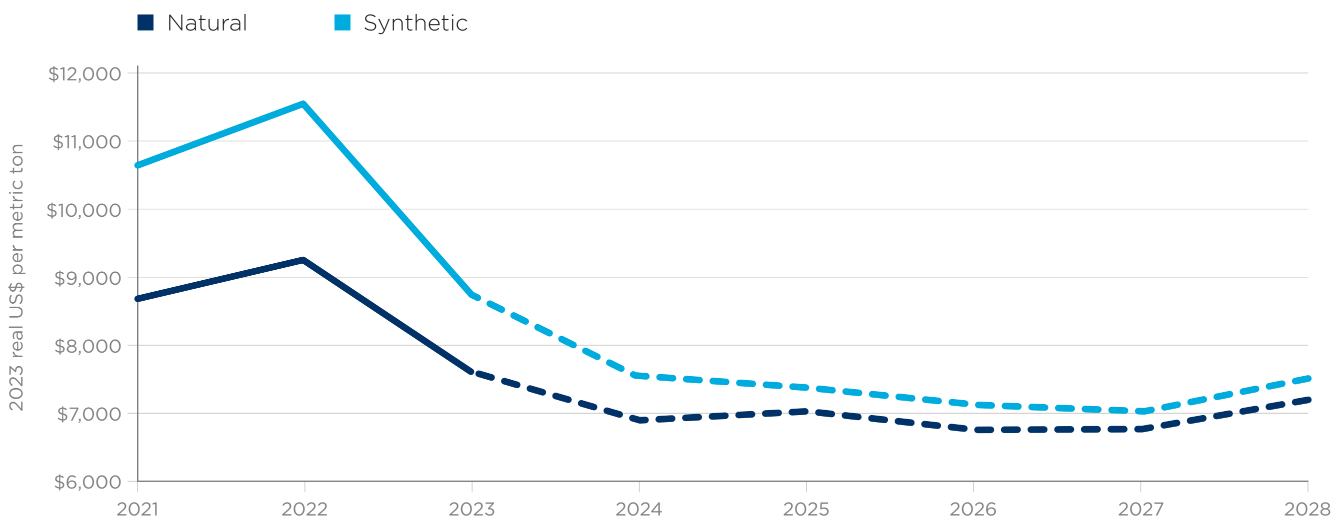
This Chinese overcapacity in the production of anode material is reflected in the price for anode material shown in Fig. 11.[6] After peaking in 2022, the price of anode material from natural graphite fell 18% in 2023 and is expected to fall by 27% from its peak by 2026. The price of anode material from synthetic graphite fell even more, by 24% in 2023, and is expected to fall by 38% by 2026. Within this category of high-capacity grade graphite anode material, the price premium for synthetic graphite—which is typically more expensive to manufacture than natural graphite is to extract and refine—fell from 25% in 2022 to 15% in 2023 and is expected to fall to 5% by 2025.

While a detailed analysis of the cost of production of anode material in China is not possible owing to the closed nature of Chinese industry, this rapid fall in prices and the convergence of the price of synthetic graphite with that of natural graphite—alongside the estimates of Chinese overcapacity shown in Fig. 11—is indicative of China selling graphite at prices that do not reflect the full cost of production, as part of an effort to capture future demand, as well as to dispose of excess supply.

6 This price represents the price for high-capacity grade anode material, which is the most widely used grade of graphite in LiBs. The price shown here is that prevailing in China, which, because of China's dominance of the anode material market (see Fig. 9), is the most representative price series for the global graphite anode material.

This is discussed further in the following chapter, especially in section 3.2 on unfair trade practices.

Fig. 11. Real price for high-capacity grade anode material by chemistry, 2021–2028 in China



Source: Benchmark Mineral Intelligence, Oxford Economics

3. RATIONALES FOR TRADE ACTION

The general economic benefits of free trade are long established. Notably, free trade between nations allows nations to specialize in sectors where they enjoy a comparative advantage and increases competition between producers. This results in benefits for consumers (lower prices[7] and more product variety[8]) and higher levels of productivity.[9]

There are, however, several conditions under which trade protection measures can be justified to benefit domestic businesses and consumers. These include infant industry protection, protection against unfair trade practices, and protections due to strategic concerns. Each of these rationales for trade protection is relevant to the case of the North American graphite industry:

- **Infant industries.** The North American graphite industry is in its nascency compared with the more mature Chinese graphite industry. During these early stages of development, domestic graphite producers may need temporary support and protection from Chinese competition in order to grow into self-sustaining competitive firms. A reliable supply of graphite is also key for North America's graphite, EV, and defense industries.
- **Protection against unfair trade practices.** The Chinese government has a well-documented history of engaging in unfair trade practices that harm US industry, and graphite is no exception. In 2017 the USTR conducted an investigation which determined that China engaged in trade practices which burdened US commerce across hundreds of products, including graphite. More recently, between 2021 and 2023 Chinese graphite supply has exceeded global demand and the price for high-capacity grade anode material fell sharply. This excess production and sharp fall in global prices are suggestive of subsidies and dumping in Chinese graphite and make it difficult for US companies to enter and operate in the market.
- **Strategic concerns.** Graphite is a key mineral for the rapidly growing EV industry and lithium-ion batteries which have important applications to military and advanced technologies. As such, tariffs are important to ensure the US develops and maintains domestic production capacity of graphite.
- **Labor and environmental protection.** Chinese graphite producers have higher greenhouse gas emissions than Western competitors owing to their greater use of coal power and relatively cheap, inefficient production processes. Firms in the Chinese battery supply chain have also been tied to state-sponsored "labor transfer" programs, which critics say amount to forced labor.

The remainder of this chapter explores each of these rationales for trade action in more detail.

7 Xavier Jaravel, and Erick Sager, 'What are the Price Effects of Trade? Evidence from the U.S. and Implications for Quantitative Trade Models' (August 2019). CEPR Discussion Paper No. DP13902, Available at SSRN: https://ssrn.com/abstract=3439455.

8 David Atkin, Benjamin Faber, and Marco Gonzalez-Navarro, 'Retail globalization and household welfare: Evidence from Mexico,' Journal of Political Economy, 126(1), pp. 1–73, 2018.

9 Daniel Trefler, 'The long and short of the Canada-US free trade agreement,' American Economic Review, 94(4), pp. 870–895, 2004.

3.1 INFANT INDUSTRY PROTECTION

Infant industries protection is deployed temporarily to enable domestic firms to build their capabilities. This can be particularly beneficial in high-value sectors, as higher levels of domestic production in these industries can contribute to higher rates of national economic growth.[10]

Infant industry protection was used extensively by advanced economies to help them industrialize. The United States had the some of the highest tariffs in the world during the 1800s and first half of 1900s to help it develop its industrial capacity.[11] Morev recent examples include South Korea and Taiwan, which rapidly developed selected high value industries using government subsidies and high import tariffs.[12,13]

There is a compelling argument for this type of protection in the graphite industry. The graphite industry has the potential to be a highly productive industry for the US. Graphite is a key input for a wide range of high-tech manufacturing industries including EV production, which is anticipated to be worth $1.6 trillion by 2030,[14] as well as other applications of LiBs.

US graphite manufacturers in their nascency are at a cost disadvantage compared with the more mature larger Chinese companies. This disadvantage arises from two key issues:

- Learning-by-doing and knowledge spillovers: graphite manufacturing is a complex industrial process. Firms learn to be efficient through years of experience and share these lessons with other domestic manufacturers through interactions and employee movements.
- Economies of scale: graphite manufacturing requires a high upfront fixed capital cost. This means the average cost per unit of output falls as production rises and larger firms tend to be more efficient than smaller firms.

Pioneering US graphite companies temporarily have higher costs as they learn through experience and grow to an efficient size. As they mature, they not only lower their own costs, but the costs of other US firms through knowledge spillovers. However, without government intervention, they cannot survive long enough and grow to a big enough size to compete with their Chinese counterparts. This means that too few US companies enter and operate in the market.

Temporary tariffs can provide the protection needed to correct this market failure. This may allow the US to develop a globally competitive US graphite industry in the long term, supporting valuable upstream high-tech manufacturing.[15]

10 For example, South Korea's automotive industry: Larry E. Westphal, 'Industrial policy in an export-propelled economy: lessons from South Korea's experience,' Journal of Economic Perspectives, 4(3), pp. 41–59, 1990.

11 Ha Joon Chang, 'Kicking Away the Ladder: Infant Industry Promotion in Historical Perspective,' 1. Oxford Development Studies, 31(1), 2003.

12 Ha-Joon Chang, "Bad Samaritans: The Myth of Free Trade and the Secret History of Capitalism," (New York: Bloomsbury Publishing), p. 14, 2008.

13 Jaedo Choi, and Andrei Levchenko, 'When industrial policy worked: the case of South Korea,' Vox EU, 2021.

14 https://www.fortunebusinessinsights.com/industry-reports/electric-vehicle-market-101678.

15 WTO, World Trade Report 2014: Trade and development: recent trends and the role of the WTO, Section F, p. 193, 2014.

GRAPHITE INDUSTRY AS A COMPONENT OF THE EV BATTERY SUPPLY CHAIN

China is the only country that has a complete value chain to produce electric vehicles (EVs) and EV batteries. Top-down government policies were important drivers of Chinese success in the development of EV production.

The Chinese government has prioritized the development of EVs since the 1990s. Initially, in the 1991–1995 five-year plan, the government wanted to consolidate and develop the traditional auto industry. The focus on the automakers led to the realization that it would be difficult for China to compete with Japanese or Korean automakers. As a result, the Chinese government decided to develop research on EV technology. By the early 2000s (specifically, the 2001-2005 five-year plan), EV development and production got the status of a national priority.[16]

The next goal was to develop a domestic market for EVs. In 2009, the Chinese government started providing subsidies for new EV purchases at central and regional levels. Between 2009 and 2022, the government spent over RMB 200 billion on subsidies and tax breaks for EVs.[17]

The battery is among the most important components of an EV, and accounts for about a quarter of its costs. In 2016, China employed an infant industry protection policy to support the initial development of the EV battery industry. This was done by introducing regulations on the standards of batteries, which effectively provided a "whitelist" of battery producers that met the standards and were eligible for EV subsidies; all producers on the list were domestic. This gave China time to develop its EV battery industry and its supply chain.

These policies fueled strong demand for raw materials needed for EV batteries, such as graphite, lithium, and cobalt. China did not have all the necessary raw minerals, but it spent years building manufacturing, processing, and mining facilities and securing control of minerals from other countries, such as cobalt in the Congo.

A strategy of specialized vertical integration undertaken by many Chinese companies further strengthened the EV battery supply chain and helped companies achieve competitive advantage and growth.[18] The EV battery supply chain consists of upstream, midstream, and downstream segments. The upstream segment includes mining and refining raw minerals. The midstream segment includes the production of battery cells, battery packs, and battery modules. The upstream segment includes battery storage and recycling. In the pursuit of growth, companies in upstream segments started developing operations in the midstream and downstream segments, such as battery recycling, while companies in downstream segments started investing in or forming joint ventures with companies in upstream mining and processing raw minerals.[19]

16 https://www.technologyreview.com/2023/02/21/1068880/how-did-china-dominate-electric-cars-policy/.

17 Ibid.

18 Xieshu Wang, Wei Zhao and Joël Ruet, 'Specialised vertical integration: the value-chain strategy of EV lithium-ion battery firms in China,' International Journal of Automotive Technology and Management, Inderscience Enterprises Ltd, vol. 22(2), pp. 178–201, 2022.

19 https://www.energytrend.com/news/20220921-29864.html.

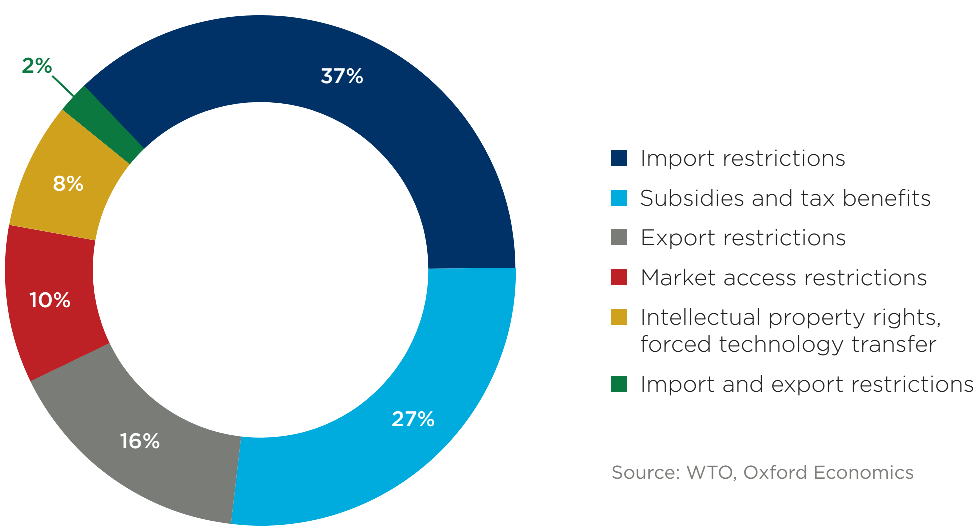
3.2 UNFAIR TRADE PRACTICES

US trade law and WTO agreements allow for tariffs to protect against unfair trading practices that harm domestic industry and consumers.[20,21] These unfair practices include:

- Dumping. This occurs when a foreign firm sells its goods at an unsustainably low cost to drive out potential domestic competition.
- Government subsidies. These lower the cost of production for foreign firms so they can undercut domestic business. There are two types of subsidies: direct, where a government actually pays the firm some amount of funds to support it; and indirect, where the government instead supports the firm through other means such as favorable interest rates for financing.
- Unfair and harmful regulation in commerce. This occurs when a foreign government enacts unreasonable regulations that affect commerce causing damage to domestic industry. For example, import or export restrictions.
- Forced technology transfer. This occurs when foreign governments implement laws, policies, and practices related to intellectual property, innovation, and technology that may encourage or require the transfer of domestic technology and intellectual property to foreign enterprises.[22]

The Chinese government has a long history of deploying unfair trade practices to protect their industries and capture market share for certain sectors. Since China joined the World Trade Organization (WTO) in 2001, 49 complaints have been filed against China, as shown in Fig. 12.[23]

Fig. 12. WTO trade complaints against China, 2021–2023



Source: WTO, Oxford Economics

20 9th WTO Ministerial Conference, Bali, (2023), 'Briefing note: Anti-dumping, subsidies and safeguards.'

21 Section 301 of the Trade Act of 1974.

22 The Office of the US Trade Representative, Executive Office of the President. (2018). "Findings of the investigation into China's acts, policies, and practices related to technology transfer, intellectual property, and innovation under section 301 of the Trade Act of 1974."

23 https://www.wto.org/english/tratop_e/dispu_e/dispu_by_country_e.htm.

China has extensively used subsidies and tax benefits to support industries that have export potential. An analysis of OECD data[24] revealed that between 2005 and 2019, the Chinese government provided the equivalent of 5.0% of GDP in subsidies to Chinese companies in priority sectors. Whilst some of this was through direct subsidies (0.7%), the majority of this support came through indirect subsidies (0.8% tax breaks, 2.6% below-market credit, and 0.8% below market equity).

This policy is expected to continue. In May 2015 China announced its Made in China 2025 (MIC 2025) industrial plan, which seeks to help China transition from an exporter of raw materials and low value-added labor-intensive manufactured goods to high-tech high value-added manufactured goods. The plan prioritized 10 key industries that would receive government support, including new energy vehicles (NEV), IT, robotics, biotech, and aerospace. The MIC 2025 plan also provides support for "new materials industries" that are part of the upstream supply chain for these 10 key industries. This includes support for the graphite industry as a vital input to EV production.

China has also implemented several other subsidy programs that support the production and refining of graphite. The European Economic and Social Committee (EESC) lists several examples:[25]

- The 13th Five-Year Plan for Development of Strategic Emerging Industries supports the development of strategic emerging industries, including the graphite industry.
- The imvplementation plan for the construction of a national new-type raw material base project in Liaoning Province names companies entitled for subsidies, including companies producing graphite products such as Dalian Hongguang Lithium Industry.
- The Catalogue for the Guidance of Industrial Structure Adjustment (2019) encourages special graphite (high purity, high strength), graphite ionization, and battery anode material. This catalog is used by the government as guidance for administering investment projects and formulating public finance, taxation, credit, import, and export policies.

As discussed in chapter 2, between 2021 and 2023 Chinese graphite supply has outstripped global demand by 40% and the real price for high-capacity grade anode material fell sharply by 18% for natural graphite and 24% for artificial graphite between 2022 and 2023 (see Fig. 11). This excess production and sharp fall in global prices suggest that Chinese graphite companies may be dumping excess graphite in global markets; making it difficult for US and other foreign competitors to enter the graphite market.

As it stands, the US government currently has antidumping (AD) and countervailing duty (CVD) orders on 99 Chinese products including Small Diameter Graphite Electrodes (SDGE), aluminum and steel products, solar photovoltaic products, magnesium products, and many more. For each of these products, the International Trade Administration conducted a formal investigation and found sufficient evidence that China was engaging in dumping and/or subsidies, harming US industry.[26]

24 Francois Chimits, 'What Do We Know About Chinese Industrial Subsidies?' CEPII Policy Brief, (2023-42), 2023.

25 https://www.eesc.europa.eu/sites/default/files/files/presentation_by_corina_hebestreit_-_ecga_on_critical_raw_materials_act.pdf.

26 https://legacy.trade.gov/enforcement/operations/scope/country/china/index.asp.

CASE STUDY:
SOLAR PANELS AND CHINESE TRADE

Solar power is becoming an increasingly important source of energy. By 2027, solar power is expected to account for over 20% of global energy production, overtaking coal as the largest source of energy worldwide.[27] Solar energy is generated using solar panels, also known as photovoltaic (PV) modules. PV modules are assembled by connecting a collection of cells.

In the early 2000s the US was a world leader in Solar PV manufacturing. However, between 2007 and 2011 Chinese PV shipments rose by more than 16-fold from around 900 MW to 15,000 MW, capturing over 60% of the global market.[28] At the same time global prices for Solar PV modules plummeted by 70%.[29]

US companies struggled to compete with the low-priced Chinese imports, with many forced to close operations.[30] By 2011, almost 75% of US PV modules were imported.[31] US manufacturers claimed that China was engaging in unfair trade practices, providing Chinese firms with subsidies and dumping solar cells in the US market damaging domestic US industry.

US trade policy

In response to what it found to be China's unfair and harmful trade practices, the US government put in place a series of tariffs aimed at protecting US domestic industry:

- 2012 & 2014: The US government put Antidumping (AD) and Countervailing Duties (CVD) on Chinese Solar PV modules and cells in response to Chinese subsidies and dumping.[32]
- 2018: the President imposed additional section 301 tariffs on a range of Chinese goods, including solar modules and cells.[33]
- 2018: the President brought in Section 201 safeguarding tariffs on all, not just Chinese, imported PV cells and modules. These tariffs were designed to be temporary, protecting manufactures whilst they developed their domestic capacity.
- 2022: the Section 201 tariffs were extended for four years.[34]

27 IEA, Renewables 2022, IEA, Paris https://www.iea.org/reports/renewables-2022, License: CC BY 4.0. Figure 1.8: Cumulative power capacity by technology, 2010–2027. IEA analysis based on World Energy Outlook 2022, 2022.

28 Paula Mints, Photovoltaic Manufacturer Shipments, Capacity, and Competitive Analysis 2010/2011. Palo Alto, CA: Navigant Consulting Photovoltaic Service Program, Report NPS-Supply. April 6. Paula Mints. Photovoltaic Manufacturer Capacity, Shipments, Prices, and Revenues 2015/2016. SPV Market Research, Report SPV-Supply 4, 2016.

29 Tracking the Sun, 2022 Edition, Galen Barbose, Naïm Darghouth, Eric O'Shaughnessy, and Sydney Forrester, Lawrence Berkeley National Laboratory, 2022.

30 https://www.greentechmedia.com/articles/read/the-mercifully-short-list-of-fallen-solar-companies-2015-edition.

31 Annual Solar Photovoltaic Module Shipments Report (2010–2022), (2023), The US Energy Information Administration (EIA).

32 International Trade Administration, (2012), Factsheet: Commerce Finds Dumping and Subsidization of Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules from the People's Republic of China, https://enforcement.trade.gov/download/factsheets/factsheet_prc-solar-cells-ad-cvd-finals-20121010.pdf. See also: https://www.usitc.gov/press_room/news_release/2015/er0121ll329.htm.

33 US Department of Energy, Solar Photovoltaics: Supply Chain Deep Dive Assessment, (2022), Response to Executive Order 14017, "America's Supply Chains."

34 US Department of Energy, Solar Photovoltaics: Supply Chain Deep Dive Assessment, (2022), Response to Executive Order 14017, "America's Supply Chains."

CASE STUDY: SOLAR PANELS AND CHINESE TRADE (CONTINUED)

Impacts of US trade policy

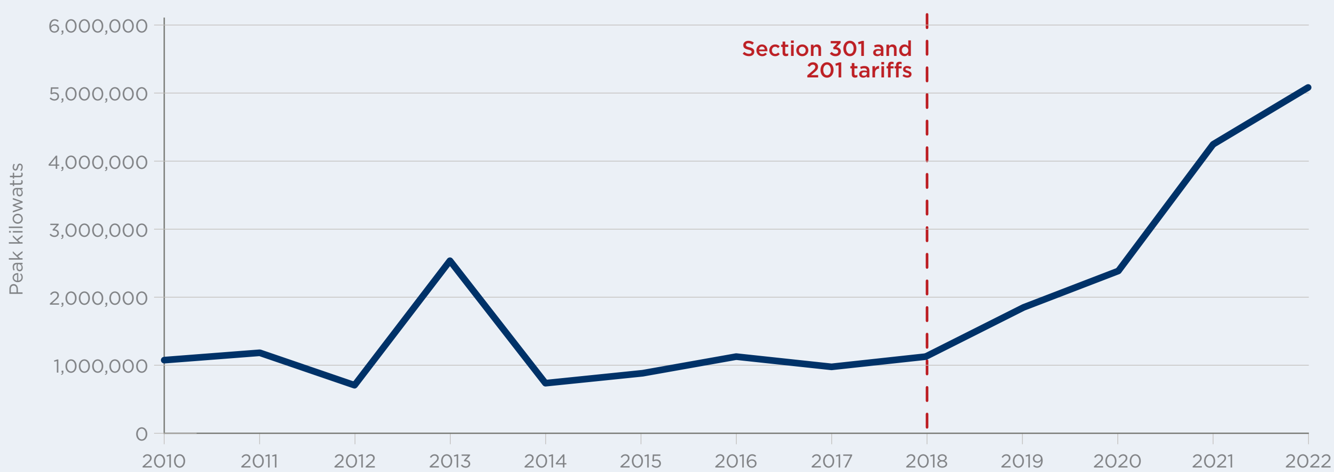
These tariffs have had a mixed impact on the US domestic solar manufacturing industry. Despite the tariffs in the first half of the decade, US PV module manufacturing was flat from 2010 to 2018 (see Fig. 13).

This underwhelming performance by US cell and module manufacturing was in part due to ineffective tariff design. In response to the US putting AD and CVD tariffs against cell and module imports from China, Chinese companies shipped their products through other southeast Asian countries to avoid any charges. By 2020, over 75% of US modules came from Malaysia, Vietnam, and Thailand.[35] After investigating these activities, the US government has put in measures to close this loophole, with tariffs planned on imports from Cambodia, Malaysia, Thailand, and Vietnam in June 2024.

Since the introduction of the additional section 301 and 201 tariffs in 2018, US PV module manufacturing has grown considerably (Fig. 13).[36] However, whilst domestic manufacturing capacity has increased, it has not been able to keep up with rising domestic demand and solar PV imports have grown sharply from 7.8 peak GW in 2018 to 27.8 peak GW in 2022. In 2022, domestic manufactures only supplied 15% of PV modules for the US, with the other 85% imported.

Overall, it is likely that the recent rise in US PV manufacturing has been driven by a combination of both rising domestic demand and tariff protections.

Fig. 13. US photovoltaic module shipments manufactured domestically, 2010–2022



Source: Annual Solar Photovoltaic Module Shipments Report (2010–2022), (2023), The US Energy Information Administration (EIA), Oxford Economics analysis

Note: 2018 domestic manufacturing value imputed based on 2018 imports and total available-for-shipping data.

35 US Department of Energy, Solar Photovoltaics: Supply Chain Deep Dive Assessment (2022), Response to Executive Order 14017, "America's Supply Chains."

36 Wood Mackenzie Power and Renewables/SEIA: US Solar Market Insight Q2 and previous US Solar Market Insight reports.

3.3 STRATEGIC PROTECTION

Trade protection to ensure the development of domestic production of products that are identified as of strategic concern has become more common in recent years. The rationale for protection in these instances is typically non-economic and often touches on the field of national security e.g., goods that have critical military applications and goods that are vital to supporting the day-to-day operation of a country.

Graphite is a strategically important material. It is a key mineral for the rapidly growing EV industry and lithium-ion batteries which have important applications to military and advanced technologies. Because of this, the US government has designated graphite a critical mineral.

GRAPHITE AS A CRITICAL STRATEGIC MINERAL

The US government maintains three lists of critical strategic materials; graphite is on all three:

- The US Geological Survey (USGS) uses two criteria to define what a critical strategic mineral is: (1) has a high risk of supply chain disruption, and (2) has an essential function in US economic development and national security. Under the Energy Act of 2020, the USGS assembles and revises the list of critical minerals every three years. The most recent such list from 2022 contains 50 minerals.
- The Department of Energy (DOE) lists a subset of the USGS critical minerals that serve an essential function in energy technology. Currently, the DOE list contains 18 minerals, including graphite.
- The Department of Defense (DoD) lists minerals that are vital in supporting military and civilian industry but are not produced in sufficient quantities domestically. Of the 50 critical minerals on the USGS list, 45 are also on the DoD list, including graphite.

The US government has taken measures to decrease US reliance on other countries, particularly China, and increase domestic production in the supply chain of critical minerals.[37] Several government agencies provide grants and loans for mining and refining of critical minerals, including graphite.

The US Department of Energy (DOE) received more than $2.8 billion in funding from the Bipartisan Infrastructure Law (2021) to finance 20 manufacturing and processing projects focused on producing battery-grade materials and batteries.[38] Out of the $2.8 billion, $487 million was granted to graphite anode material producers. Anovion received $117 million for the expansion of synthetic graphite anode material capacity,[39] Novonix was awarded $150 million for production of battery grade synthetic graphite, and Syrah Technologies LLC was granted $220 million for building a new refining facility to process natural graphite imported from Mozambique that can be used in batteries.

37 https://www.energy.gov/lpo/critical-materials-projects.

38 https://www.whitehouse.gov/briefing-room/statements-releases/2022/10/19/fact-sheet-biden-harris-administration-driving-u-s-battery-manufacturing-and-good-paying-jobs/.

39 https://www.energy.gov/sites/default/files/2022-11/DOE%20BIL%20Battery%20FOA-2678%20Selectee%20Fact%20Sheets.pdf.

GRAPHITE AS A CRITICAL STRATEGIC MINERAL (CONTINUED)

The DOE Loan Programs Office (LPO) provides loans to projects that are part of the supply chain for critical minerals. The types of projects supported by the Department of Energy include projects aimed at developing critical mineral processing infrastructure, components manufacturing, and critical mineral recycling. An example of such program is a $102.1 million loan to Syrah Technologies LLC issued in July 2022 for the expansion of its processing facility that produces graphite-based active anode material in Vidalia, LA.[40]

The Department of Defense (DoD) invoked the Defense Production Act to increase the production of critical strategic minerals. In 2023 DoD commissioned Graphite One, a Canadian company, to conduct a production feasibility study regarding natural graphite reserves in Alaska.[41] The $37.5 million agreement[42] includes funds for mining graphite in Alaska and processing it on a plant in Washington state to produce natural graphite anode material.

The US government implemented several programs that incentivize companies to increase demand for minerals produced outside China. Under the Inflation Reduction Act (IRA) of 2022, EV automakers qualify for critical minerals tax credit if a high percentage of materials used in battery production originates from the US or one of the countries that have a free trade agreement with the US. In 2023 40% of critical minerals had to be processed or mined outside "foreign entities of concern," in 2024 it increased to 50%, and it is scheduled to increase to 60% in 2025, 70% in 2026, and 80% in 2027.[43] US producers of cathode and anode active materials used in batteries and US producers of critical materials, such as graphite, are eligible for a 10% credit until 2030. According to the Congressional Research Service the estimated cost of tax credit associated with the Advanced Manufacturing Production Credit provisions of the IRA is $31 billion.[44]

40 Department of Energy, Syrah Vydalia, Loans Program Office, accessed 08 February 2024.

41 https://www.csis.org/analysis/chinas-use-graphite-export-restrictions-encourages-diversification.

42 US Department of Defense, 'DOD Enters Agreement to Expand Capabilities for Domestic Graphite Mining and Processing for Large-Capacity Batteries,' July 2023, accessed 08 February 2024.

43 https://www.orrick.com/en/Insights/2022/11/Section-45X-of-the-Inflation-Reduction-Act-New-Tax-Credits-Available-to-Battery-Manufacturers.

44 Ibid.

3.4 LABOR AND ENVIRONMENTAL PROTECTION

A final rationale for trade protection is to price in the impacts of poor environmental practices or worker protections. Where a country has robust environmental and workforce standards, firms in countries without those rules may have an unfair advantage, as they have lower production costs.

To level the playing field and to ensure that the negative impacts of poor labor and environmental practices are accounted for in the price of imported goods, governments may levy tariffs. This is particularly applicable in the case of greenhouse gas emissions contributing to climate change, where the negative environmental externalities are felt globally.

Both poor labor and poor environmental practices have been documented in China's graphite production. In the former case, some Chinese companies in the EV supply chain have been found to participate in state-sponsored "labor transfer" programs, which relocate workers from the Uyghur Autonomous region of western China to serve as factory workers.[45] US government officials have referred to such programs as "forced labor."[46] Media investigations have also noted "red flags for forced labor" in the production of graphite and other minerals critical for battery production.[47,48]

China's graphite production is also more polluting than that of Western competitors. Both synthetic and natural graphite production are energy intensive processes with significant greenhouse gas emissions that depend both on the specific industrial processes as well as the mix of energy sources that are used. China's graphite production is largely concentrated in areas of the country with low energy costs, such as Inner Mongolia, which relies substantially on dirty energy from coal.[49] Graphite production in Western countries, facing stricter permitting processes, generally invest more in energy-efficient production processes, and concentrate production in areas with a higher share of renewable energy sources.[50] Natural graphite production also has additional environmental considerations, such as habitat degradation and water contamination from the corrosive chemicals used in the purification process.[51]

45 Laura Murphy, Kendyl Salcito, Yalkun Uluyol, and Mia Rabkin (December 2022). "Driving Force: Automotive Supply Chains and Forced Labor in the Uyghur Region." Helena Kennedy Centre for International Justice at Sheffield Hallam University. https://www.shu.ac.uk/helena-kennedy-centre-international-justice/research-and-projects/all-projects/driving-force.

46 Thomas Kaplan, Chris Buckley and Brad Plumer (June 24, 2021). "U.S. Bans Imports of Some Chinese Solar Materials Tied to Forced Labor." *The New York Times*. https://www.nytimes.com/2021/06/24/business/economy/china-forced-labor-solar.html.

47 Evan Halper (September 18, 2023). "EV makers' use of Chinese suppliers raises concerns about forced labor." *The Washington Post*. https://www.washingtonpost.com/business/interactive/2023/electric-vehicles-forced-labor-china/.

48 Ana Swanson and Chris Buckley (June 20, 2022). "Red Flags for Forced Labor Found in China's Car Battery Supply Chain." *The New York Times*. https://www.nytimes.com/2022/06/20/business/economy/forced-labor-china-supply-chain.html.

49 Robert Pell, Phoebe Whattoff and Jordan Lindsay (June 2021). "Climate Impact of Graphite Production." Minviro whitepaper. https://www.minviro.com/resources/guides/climate-impact-of-graphite-production.

50 Benchmark Mineral Intelligence (November 24, 2022). "ESG of graphite: How do synthetic graphite and natural graphite compare?" https://source.benchmarkminerals.com/article/esg-of-graphite-how-do-synthetic-graphite-and-natural-graphite-compare.

51 Rijo Jacob Robin (August 31, 2022). "Challenges in Assessing the Environmental Footprint of Graphite-Anode Lithium-Ion Batteries." https://www.linkedin.com/pulse/challenges-assessing-environmental-footprint-rijo-jacob-robin/.

4. GRAPHITE AND SECTION 301 TARIFFS

Section 301 of the Trade Act of 1974 allows the US Trade Representative (USTR) to impose trade sanctions against a country that "violates trade agreements, acts in ways inconsistent with trade agreements, or take actions that are unjustifiable and burden or restrict US commerce."[52] Section 301 sets out three types of trade practices that can and should be protected against: (i) trade agreement violations; (ii) practices that are inconsistent with US international legal rights and that burden or restrict US commerce; and (iii) practices that are unreasonable or discriminatory and that burden or restrict US commerce.

In this chapter, we give an overview of the recent history of section 301 tariffs as applied to graphite imports from China. Then, in the context of the upcoming review of these tariffs, we summarize the key arguments for implementing 301 tariffs on graphite anode material.

4.1 SECTION 301 TARIFFS IN 2018

In August 2017 the USTR started an investigation into China's alleged unfair trade practices under section 301. In March 2018, the Trump administration produced a report that delineated four unfair trade practices employed by China:[53]

- Forced technology transfer by making US companies form joint ventures with Chinese companies to be granted market access into China.
- Failure to protect intellectual property.
- Market access restrictions due to discriminatory and nonmarket licensing practices.
- Government involvement in acquisition of the US assets to obtain new technology and intellectual property.

Shortly after publishing the report, the Trump administration announced that section 301 tariffs would be imposed on over $500 billion worth of imported goods from China. The list of affected goods was announced in four tranches between 2018 and 2019. Tranche three included natural graphite and synthetic graphite in various forms, graphite anode material, and other goods made of graphite (e.g., refractory ceramic goods containing by weight over 50% graphite).[54] The USTR imposed 10% tariffs on tranche three goods in September 2018 and raised them to 25% in May 2019.

52 Keith Belton, John Graham, and Suri Xia. 'Made in China 2025' and the Limitations of US Trade Policy (2020). Available at https://dx.doi.org/10.2139/ssrn.3664347.

53 Section 301 Tariff Exclusions on US Imports from China. Congressional Research Service (2024). Available at https://crsreports.congress.gov/product/pdf/IF/IF11582.

54 A complete list of goods covered by tranche three of 301 tariffs can be accessed at: https://ustr.gov/sites/default/files/enforcement/301Investigations/83%20FR%2047974.pdf.

The USTR also provided an opportunity for stakeholders to submit requests to exclude certain products from 301 tariffs based on the following criteria:[55]

- Are these goods available from other sources?
- Did the importer attempt to get goods domestically or from other countries?
- Will the tariffs cause significant economic damage to the importer or to the US economy?
- Are these goods strategically important to Chinese industrial programs, such as Made in China 2025?

Several companies, including EV producers such as Tesla, requested exclusion for graphite anode material, stating that the demand could not be met domestically or from other countries besides China. In May 2020, the USTR granted exclusions covering graphite anode material. Altogether, the USTR granted 6,804 of the 52,746 exclusion requests it received (about 13%), covering 516 product descriptions.[56]

In May 2022, the USTR began the statutory four-year review of the section 301 tariffs against China. As of February 2024, this review is still ongoing.

4.2 CHINESE EXPORT RESTRICTIONS ON GRAPHITE

In December 2023, China implemented export restrictions on certain graphite products, purportedly on national security grounds.[57] The new restrictions require Chinese graphite producers to obtain government permits in order to export graphite. It is not yet clear whether China intends to significantly curtail graphite exports in the immediate term, although such a move appears unlikely given China's significant graphite production capacity and strategic interest in maintaining dominance of the global graphite industry.

While real curtailment of graphite exports by China would seem to obviate the need for graphite import restrictions by the US, China's actual policy of requiring licenses for graphite exports only underscores the risks faced by continued reliance on Chinese graphite to supply North American LiB production. The Chinese government has put in place the tools it needs to quickly cut the flow of graphite to foreign battery and EV manufacturers.

55 Section 301 Tariff Exclusions on US Imports from China. Congressional Research Service (2024). Available at https://crsreports.congress.gov/product/pdf/IF/IF11582. Additional tariff exclusions were granted on medical-care products as a result of the COVID-19 pandemic.

56 Ibid.

57 https://asia.nikkei.com/Spotlight/Supply-Chain/China-s-graphite-export-curbs-take-effect-with-uncertainty-for-EVs.

4.3 ARGUMENTS FOR RENEWED SECTION 301 TARIFFS ON CHINESE GRAPHITE

There are several arguments for the reinstatement of section 301 tariffs on Chinese graphite anode material. Firstly, these tariffs would help counter any subsidies received by Chinese companies from the Chinese government and would protect against these companies dumping their product in the US. As discussed in section 3.2, there is suggestive evidence that both practices have been and are occurring in Chinese graphite.

Reintroducing 301 tariffs on imported Chinese graphite may have wider benefits. In line with the infant industries rationale set out in section 3.1, 301 tariffs could allow the US to develop a competitive graphite industry. It could also benefit national security by ensuring the US develops a more resilient global supply chain and domestic production capacity, a key input material for military applications and essential infrastructure. Additionally, pricing the externality of China's poor environmental and workforce protections in graphite production discussed in section 3.4 would help to level the playing field for US competitors, and, if successful at displacing Chinese production, would reduce carbon emissions, and might help reduce harmful forced labor practices.

The exclusion of graphite from US tariffs has helped China to continue to dominate the US graphite market, with downstream manufacturers reliant on Chinese graphite imports. In December 2023, China announced strict trade restrictions on graphite exports (see section 4.2). While it is too soon to know the impacts this will have on US manufacturers reliant on China as a source of graphite, it provides the Chinese government with the tools it needs to quickly curtail the supply of graphite. This has the potential to cause significant harm both to the US graphite industry itself as well as to downstream industries such as LiB and EV production.

While it will take time for US graphite capacity to ramp up, the presence of tariffs is important for US graphite manufacturers to secure offtake agreements with customers for the output from new facilities at reasonable prices. Especially in the current high-interest rate environment, such offtake agreements are critical to secure financing for the large capital investments needed to develop new domestic graphite production capacity.

Finally, it is worth noting that while graphite makes up roughly 30% the weight of LiBs, it only represents about 12% of their cost.[58] Thus, a 25% tariff on graphite anode material would be expected to increase the cost of a battery *no more than* about 3%.[59] As batteries represent approximately 25% of the cost of an EV,[60] this would represent no more than about a 0.75% increase in the cost of an EV.

58 See footnotes 1 and 2.

59 This represents an upper bound on the cost increase, as battery manufacturers may respond to the tariff, at the margin, by shifting to less expensive graphite that is domestic or imported from countries other than China or attempting to adjust production to use less graphite.

60 See, for example, https://elements.visualcapitalist.com/cost-of-electric-vehicle-batteries/.

5. CONCLUSION

China currently dominates the markets for both natural and synthetic graphite, and for the anode material made from graphite that is used in LiBs. Absent concerted intervention, China is expected to continue to dominate these markets.

This paper reviewed three rationales for trade action against Chinese graphite imports.

- Graphite production in North America represents an **infant industry** that cannot yet compete with much more established and larger-scale Chinese production. Graphite is also at the base of a larger ecosystem of emerging 21st-century industries built around LiBs. Graphite is an essential component of LiBs, which are critical to EV manufacturing and ESS power storage for the electricity grid.
- China has engaged in **unfair trade practices**. This has been widely documented in several industries, such as solar panel manufacturing. Chinese overcapacity in graphite, and falling graphite prices since 2022 are consistent with China selling graphite at below market prices in order to limit the entry of foreign competitors.
- Graphite has been identified as a critical mineral for LiB production. Ensuring a reliable supply of graphite thus merits **strategic protection** because of the importance of LiBs to the future of US industry, as well as their applications to national security.
- Chinese graphite producers have poor **environmental and labor** practices, including excessive carbon emissions owing to inefficient production processes and a heavy reliance on dirty coal power, as well as reports of participation in state-sponsored "labor transfer" policies that have been described as forced labor.

Since 2019, the US has imposed 25% tariffs on imports of many Chinese goods under section 301 of the Trade Act of 1974, including some types of graphite products. However, the import of graphite anode material from China has been granted an exemption from these tariffs after complaints from EV manufacturers that they were unable to adequately source graphite anode material without resorting to imports from China. While Benchmark forecasts corroborate the Chinese dominance of the global graphite market, this raises a chicken-and-egg problem: domestic graphite manufacturers cannot make the necessary investments to increase their future production absent protection from China's significant overcapacity in graphite manufacturing. Absent these protections, therefore, it will continue to be impossible for domestic LiB manufacturers to obtain graphite from non-Chinese sources.

OXFORD ECONOMICS

Global headquarters
Oxford Economics Ltd
Abbey House
121 St Aldates
Oxford, OX1 1HB
UK
Tel: +44 (0)1865 268900

London
4 Millbank
London, SW1P 3JA
UK
Tel: +44 (0)203 910 8000

Frankfurt
Marienstr. 15
60329 Frankfurt am Main
Germany
Tel: +49 69 96 758 658

New York
5 Hanover Square, 8th Floor
New York, NY 10004
USA
Tel: +1 (646) 786 1879

Singapore
6 Battery Road
#38-05
Singapore 049909
Tel: +65 6850 0110

Europe, Middle East and Africa

Oxford
London
Belfast
Dublin
Frankfurt
Paris
Milan
Stockholm
Cape Town
Dubai

Americas

New York
Philadelphia
Boston
Chicago
Los Angeles
Toronto
Mexico City

Asia Pacific

Singapore
Hong Kong
Tokyo
Sydney
Melbourne

Email:
mailbox@oxfordeconomics.com

Website:
www.oxfordeconomics.com

Further contact details:
www.oxfordeconomics.com/about-us/worldwide-offices