

Green Industrial Policy

A Holistic Approach

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THE ISSUE

In the United States, the rise of the economic-climate agenda and green industrial policy has coincided with growing attention to supply chain resilience, economic security, and a deteriorating U.S.-China relationship. As a consequence, the interaction between trade, geopolitics, domestic economic policy, and climate policy demands a new holistic approach from policymakers and civil society to find more politically sustainable and effective policy solutions. More consideration should be given to the specifics of U.S. climate strategy when it comes to trade and international relations and how to integrate climate strategy with the Inflation Reduction Act and green industrial policy efforts.

EVALUATING TRADE-OFFS IN CLIMATE AND TRADE POLICY

The climate agenda has become inextricable from economic policy and, increasingly, geopolitics. The overlap between decarbonization and supply chain resiliency, the strengthening of domestic manufacturing, and national security has fueled the adoption of green industrial policy tools. Increased investment and policy focus on climate is a positive trend, as there is a significant gap in funding for clean energy globally, and some supply chains are shifting in response to U.S. policy, suggesting that de-risking may be working. However, increased trade barriers and misallocated investment could undermine the stability of the global trading system. Moreover, the conflation of national security, climate, and economic objectives could lead to unfocused policies, ultimately undermining the deployment of low-carbon technologies. This points to an urgent need to develop a new way of thinking that

better integrates trade, and all the political and economic issues that come with it, in the climate policy tool kit.

Nowhere is the nexus between economic, national security, and climate objectives more visible than in the Inflation Reduction Act (IRA). The IRA is the most ambitious climate regulation ever passed in the United States, providing incentives to promote the deployment of climate technologies, including renewable energy and electric vehicles (EVs). Since the IRA became law in August 2022, it has put in motion various bureaucratic and corporate actions that have been reshaping supply chains around the world.

The IRA's deployment of industrial policy tools targets at least three distinct policy objectives: revitalizing U.S. manufacturing, strengthening national security through supply chain resilience, and accelerating the energy transition. These objectives are broad and subject to interpretation, further complicating the law's implementation. The overlapping goals reflect the domestic

politics surrounding the IRA and other relevant laws, such as the Bipartisan Infrastructure Law (BIL). The coalescing around the IRA of groups advocating for domestic labor and manufacturing, energy and national security, and climate was a political revolution for climate policy that enabled the broad law to pass. However, implementing agencies, localities, and civil society are now finding that unusual bedfellows can lead to difficult trade-offs, especially when it comes to balancing national security and economic security objectives with the accelerating timeline needed to meet climate and environmental targets.

China is at the heart of these trade-offs. Competition with Beijing is central to national and economic security discourses in Washington, and China is a major producer of climate technologies and many of the inputs needed to make them. U.S.-China competition has become so all-encompassing that it now shapes policy in areas that were traditionally unaffected by China policy. For example, there is evidence of the use of forced labor in supply chains ranging from polysilicon to **fish**, which raises serious questions over just how much of the climate technology value chain is tainted by human rights violations and affected by the Uyghur Forced Labor Prevention Act. Similarly, U.S. renewable energy companies that rely on Chinese components are making contingency plans in case of a military conflict over Taiwan or if China were to restrict the export of critical minerals, a capability it signaled in 2023. Given the deep economic integration between the United States and China, and China's central role in the global value chain system, these trade-offs are particularly challenging.

Although the same de-risking terminology used for the semiconductor and artificial intelligence (AI) industries is applied when discussing climate technology, the challenges are different because Chinese companies hold an advantage for many technologies that are key to decarbonization. Over **80 percent** of solar panel manufacturing takes place in China, and the cost of making a panel in China is now **60 percent cheaper** than in the United States. The two largest lithium-ion battery producers are Chinese and are expanding rapidly thanks to their competitive products and prices. China is also a major source of raw and processed minerals; for example, it is responsible for refining between **60 and 70 percent** of all cobalt and lithium.

The importance of Chinese manufacturing for some key technologies such as lithium-ion batteries complicates

efforts to find alternative suppliers or enact a more traditional industrial policy approach that targets segments of the value chain more selectively or sequentially. In other words, factories in the United States may find themselves in an impossible position where they cannot qualify for subsidies if they use inputs from China, but where they also cannot find alternative suppliers of those inputs within the time frame set by the government. At the same time, they are competing against global prices set by hyper-competitive Chinese firms benefiting from large economies of scale. Policymakers, on the other hand, are setting tight deadlines and strict requirements because they are working on a compressed timeline dictated by the urgency set by climate change itself, increasing competition with China, and domestic politics, including potential shifts in priorities due to changes in leadership.

A further challenge is that these very trade-offs are playing out in other economies in ways that are already creating global governance challenges in trade and generating political friction. The green transition has the potential to create new jobs and industries, but in their efforts to capture this value and mitigate the potential disruption to legacy industries, governments are already escalating economic competition that risks initiating new trade conflicts. This trend could also lead to redundancies that void large-scale public investments and doom more companies to failure due to fragmented markets, high costs, and competition with increasing manufacturing capacity in China.

The IRA's mix of tax credits and location- and ownership-specific requirements is not unique and takes inspiration in some ways from China's policies, but it has created tension with many U.S. trading partners that accuse Washington of embracing a new form of protectionism. Although a race to subsidize green industries could have positive outcomes, it has failed to materialize in the way that advocates envisioned. Europe, for example, has struggled to keep up with U.S. investments. Policy coordination and maintaining some openness to globalized value chains could potentially reduce some of the wasteful spending that will inevitably arise. Domestic investment and measures to nourish domestic supply chains for technologies that have moved past the emerging stage, including solar and battery technologies, need to take into consideration the international dynamics affecting pricing and demand and the potential trade-offs of protectionist-like measures.

IDENTIFYING THE PROBLEM

Forward-looking decisionmaking must account for the impact of policy trade-offs to identify effective ways to manage risk and achieve goals. In the case of de-risking, trade, and climate policy in the United States today, the conflation of various issues has made the identification of risk complex. There are at least two unresolved issues that are central to charting a new approach to climate policy in the era of geopolitical competition; one concerns categorizing the risks associated with dependencies on China, the other identifying a more effective role for international cooperation.

NAMING THE RISK

The fusion of industrial policy, de-risking, and climate goals makes the identification of risk, and consequently its mitigation, particularly complex. **Michael Davidson and his coauthors** propose a useful framework to evaluate national security risks (including infrastructure and dual-use technologies) and economic risks (including domestic job losses, intellectual property violations, and supply chain disruptions) across various climate technologies. Identifying the nature of risk is helpful to find more targeted policy solutions. For example, the connected nature of many climate technologies creates vulnerabilities for infrastructure or data protection due to potential cyberattacks on smart grids or improper use of private data from a company or government. Tackling these kinds of risks, for example, through better data management regulation, should look different from measures to address potential supply chain disruptions due to overconcentrated supply chains or the economic risks linked to possible job losses.

Overall, the national security risks associated with China's role in climate technologies are lower than the economic risks. The risk of supply chain disruptions, both accidental and deliberate, is the most clear-cut vulnerability that flows from China's dominant position in many of these technologies, especially when it comes to critical minerals. For example, Beijing's move to introduce export controls for gallium, germanium, and graphite, which are crucial for the manufacturing of semiconductors with military applications, as well as batteries, clearly signaled a willingness to use economic tools for political ends.

The conflation of risk results in the adoption of blunt tools, which can have significant side effects. For example, green industrial policy—which includes tax credits and

subsidies along with trade barriers such as tariffs—is now being deployed to achieve de-risking and enhance economic security. This can be a winning approach for some industries by garnering multistakeholder support. Yet, there are industries that may not be realistically able to compete and will either fail or require continuous subsidization and protected markets. A different approach could identify the extent to which certain supply chains would need to be maintained domestically on national security grounds among those industries that are less likely to succeed. It could then allocate appropriate forms of support to keep certain factories in operation to retain scalable domestic production and rely on trade or foreign-owned factories to fulfill the remaining internal demand. At the same time, the government could find ways to reduce potential risk from foreign companies, including potentially requiring a higher level of compliance or transparency in exchange for access to the U.S. market.

At a broad level, de-risking in climate supply chains through supply chain diversification is a desirable goal. Reducing overreliance on a single producer (i.e., China) while supporting the development of alternative supply chains should enhance supply chain resilience by reducing chokepoints and the likelihood of disruption due to either disasters or government action to restrict trade flows. However, adding redundancy and creating alternative supply chains is a slow and costly process that will require sustained effort on the part of governments and companies. It also creates multiple operational challenges when the goal is to limit Chinese dependencies throughout the value chain across multiple industries at once. The cost of the IRA will add up to a remarkable sum over the next few years, but it is still unlikely to fully meet the gap in funding needed to achieve the energy transition. The **International Energy Agency** forecasts that global investments in clean energy will need to triple to reach the necessary USD 2.8 trillion by the early 2030s. As a consequence, the U.S. government would do well to prioritize its goals in terms of technologies and desired outcomes.

De-risking through supply chain diversification may also lead to some unintended consequences, including raising costs and potentially disrupting some value chains. Acknowledging these potential risks does not imply that policymakers should abandon current policies wholesale, especially given that underinvestment and limited economies of scale remain significant problems

for the energy transition. Rather, more detailed understandings of the trade-offs and more involvement from civil society in the debate can help address these negative impacts while the pursuit of policies to promote supply chain resilience and diversification continues. Better quantification of the trade-offs can also drive more frank discussions regarding whether certain costs are worth bearing given the risks involved.

For example, Washington is still in the process of evaluating the risk posed by Chinese companies operating outside of China or in collaboration with foreign companies, either through licensing or joint ventures. Given the internationalization of Chinese firms throughout climate technology supply chains, this is not a hypothetical question but rather one that is currently under scrutiny of policymakers, as will be discussed in later sections in the case of Mexico.

OPERATIONALIZING INTERNATIONAL COOPERATION

Many countries are grappling with the challenges of the economic transformation required by the ongoing energy transition. As a result, many are adopting trade and industrial policies to try and capture more of the economic benefits of decarbonization and mitigate its negative impacts. Given China's extraordinary impact on **manufacturing production globally**, and especially in the clean energy sector, green industrial policies and de-risking strategies around the world are shaping up in many cases as policies that directly target Chinese companies and **respond to Chinese economic policy**. This trend can take multiple forms, with some countries trying to attract Chinese investment, others introducing trade barriers, and some, such as the European Union, taking steps to potentially do both.

However, when it comes to the climate-trade nexus, it is not just cooperation with China that is challenging. The slow progress of talks between the United States and the European Union on the Global Arrangement on Sustainable Steel and Aluminum (GASSA), despite the two blocs being such close security allies, is instructive in highlighting the difficulties in cooperation. Nonetheless, finding a way forward on cooperation and coordination will be central to making progress on increasing the impact of current policies on supply chain resilience and climate mitigation and reducing trade tensions. De-risking

will require further building out partnerships with a host of countries, in both the developed and developing world. This is already taking place through current efforts to establish trade arrangements with countries that supply critical materials, but a much bolder and broader framework is necessary to capitalize on the de-risking, climate, and development nexus.

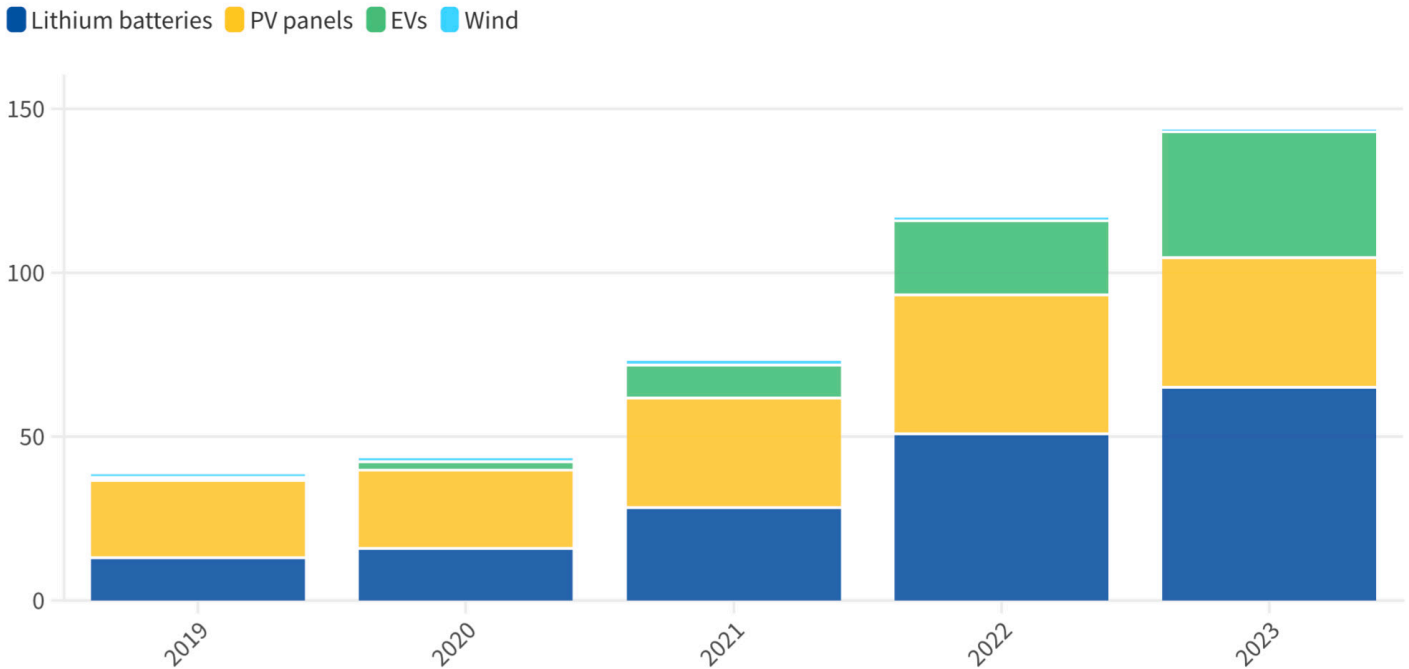
Deeper cooperation with partners and greater supply chain diversification should not preclude the possibility of some cooperation with China. Washington will need to engage Beijing to bolster global climate governance. This will require discussions over standards, agenda setting in terms of research and development (R&D) and deployment of technology, and far more creative thinking on how the two countries can help address urgent issues that so far remain underexplored, ranging from climate adaptation in the developing world to climate overshooting. Moreover, Chinese firms will likely continue to lead in key climate technology industries globally regardless of their eligibility for U.S. tax credits or tariffs. Ignoring their role and impact would mean overlooking significant players that help set global prices and standards.

Finally, the current U.S. administration seems to have largely renounced any efforts to change Chinese behavior. While in some areas this reflects a realistic assessment of the current political environment in China, it also means far less focus on trying to enhance corporate transparency and compliance or finding solutions to the spillover effects of trade on industrial policy. There may be opportunities to advance efforts to certify supply chains and incentivize firms to be more transparent, respect human rights, and lower their carbon footprint.

OVERLAPPING INTERESTS AND CONFLICTS

To find a way forward to solve the issues that lie at the intersection of climate, trade, and national security, it is important to identify the competing objectives and the overlapping and sometimes conflicting interests that complicate progress on climate change. At the heart of this is the resurgence of industrial policy. While by no means unknown in the United States, until recently there was little official recognition of the potentially positive role of industrial policy. This attitude has changed completely with the CHIPS and Science Act, the IRA, and, to some extent, the BIL.

Figure 1: Climate Technology Exports from China
USD, billions



Note: EVs include plug-in hybrid and battery electric vehicles. The HS codes used to look up and calculate EV exports are 870360 and 870380. The HS codes used to look up and calculate lithium-ion battery and wind generating set exports are 850760 and 850231 respectively. PV panel exports were calculated using HS code 854140 for 2019-2021 and 854143 for 2022 and after. Please reference the interactive web version for specific values.

Source: "Customs Statistics," General Administration of Customs of the People's Republic of China, accessed January 30, 2024, <http://stats.customs.gov.cn/indexEn>.

China is often viewed as the main model for industrial policy. Indeed, state support has been important for many climate technologies that are now an important export industry for China (see Figure 1). The value of solar panels, electric vehicles (EVs), lithium-ion batteries, and wind-generating set exports in 2023 added up to over 4 percent of China's total exports, up from 1.5 percent in 2019, according to the author's calculations using the latest Chinese customs data. By way of comparison, Chinese export of steel, iron, and related products in 2023 accounted for less than 5 percent of total exports. Given the size and diversity of China's exports, this share is fairly remarkable. It also means that it will be increasingly difficult to push the Chinese government to reign in these industries as they expand globally and companies consolidate their positions.

Despite a recent spate of studies on green industrial policy, there is still significant uncertainty over how it can coexist with the increasingly fragile global trading system. One approach is to reform World Trade Organization (WTO) rules to **better align climate and trade goals**. Among other

things, it would be helpful to identify terms and conditions for the deployment of green industrial policy and for tariffs on goods that are key for the energy transition. Yet, reforming the WTO could take years, while many of the issues surrounding trade in climate technologies and green industrial policy demand immediate attention. For example, the U.S. government is openly discussing introducing or raising import tariffs to counter manufacturing **overcapacity** in sectors such as the EV or solar industries. A surge in cheap exports from China could **undermine efforts** underway in the United States and elsewhere to build up competitive new industries and could lead to a situation where companies globally will have to either rely on government support or be forced to shut down in a wave of consolidation.

Industry consolidation can help achieve economies of scale and lower costs, but it is likely to benefit larger, more established firms with strong state backing, which are largely located in China. Such an outcome would only serve to further concentrate supply chains in China and undermine supply chain diversification efforts. There is a timing challenge as well: given the level of maturity

of some of the technologies involved, it is hard to envision building alternative supply chains without some involvement by current industry leaders. It is also harder to compete with companies that have a decade or two of existing experience, extensive manufacturing capacity, and a solidified market presence. And indeed, many of those Chinese companies are actively internationalizing and expanding their overseas production.

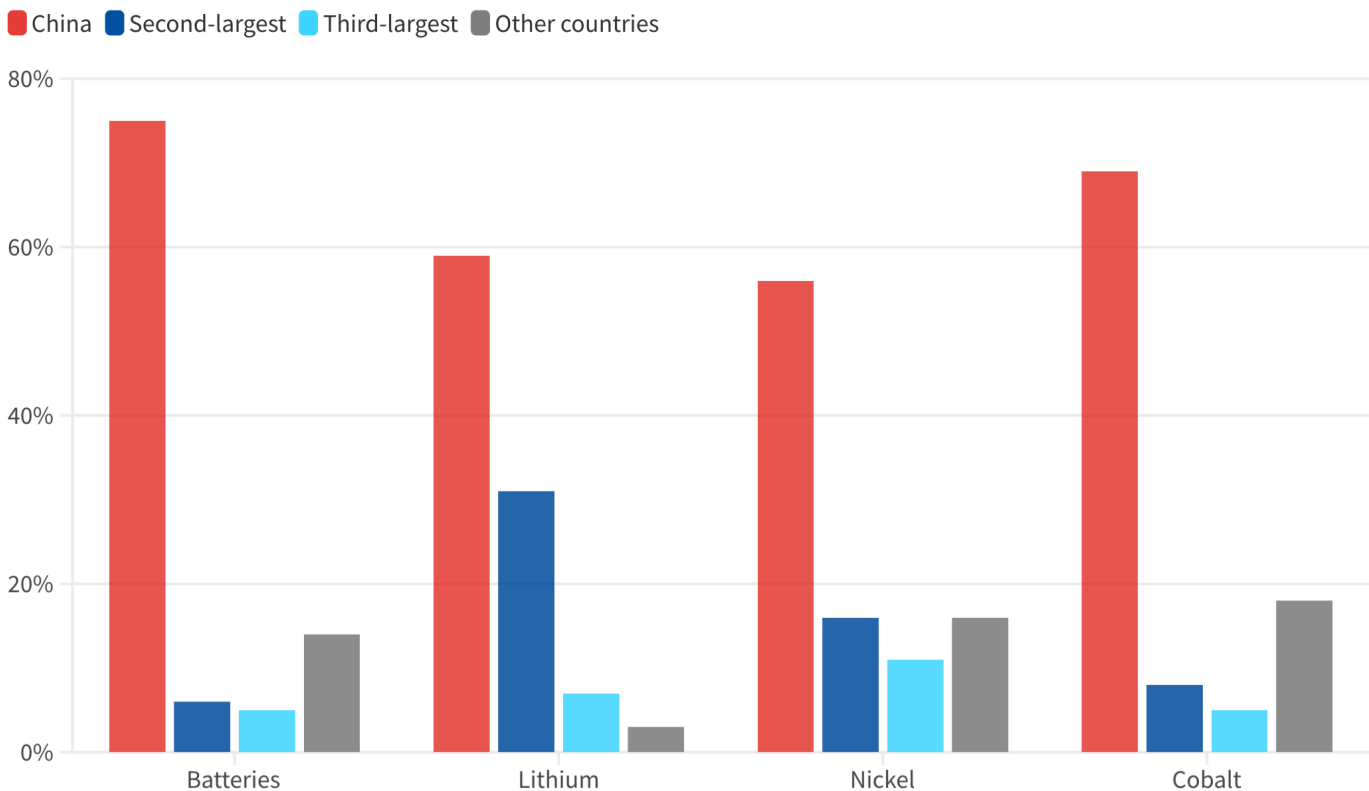
The implementation of the IRA faces many of the challenges outlined above when it comes to balancing domestic support for manufacturing with open trade and climate goals. In several key instances, the IRA is linked to provisions that require content sourcing that is either geographically circumscribed (e.g., to North America for automotive production or to countries with which the United States has a free trade agreement for the critical minerals used to produce batteries for EVs) or that introduces restrictions on sourcing for a Foreign Entity of Concern (FEOC). According to the **proposed guidance** issued by the Department of the Treasury in December

2023, that would include Chinese state-owned investment outside of China.

As a result, the IRA combines traditional industrial policy goals, such as expanding domestic manufacturing, with ones aimed at reshaping international investment and limiting certain types of Chinese investment. Specifically, this means that inputs such as minerals may be implicitly taxed at the same time as manufactured goods, something that typically industrial policy seeks to avoid so as to incentivize a segment of the supply chain. This is a particularly challenging trade-off given that climate technologies will need to become even cheaper to compete effectively with fossil fuels around the world.

In sum, the challenges of balancing domestic development goals and international trade, which have always existed, are now increasingly encroaching on the broader climate agenda. This will require policymakers and civil society to incorporate the international economic impact of domestic policies in the climate-economic realm in their analyses.

Figure 2: Concentration by Supply Chain Segment of Battery Industry in 2021
Percentage share



Note: Please reference the interactive web version for specific values.

Source: "Geographic Concentration by Supply Chain Segment, 2021," International Energy Agency, last updated January 12, 2023, <https://www.iea.org/data-and-statistics/charts/geographic-concentration-by-supply-chain-segment-2021>.

To better understand how the IRA is being implemented and how it is interacting with trade, de-risking, and climate policy, the next section will look more closely at some of the trends in implementation, including a comparison of the EV industry and particularly lithium-ion batteries, and some of the technologies promoted by the IRA that have yet to reach maturity.

THE EV INDUSTRY: THE COMING TRADE WAR?

The EV industry has quickly evolved from a niche topic to a major policy issue in Washington thanks to its importance in the Biden administration's climate strategy, the impact it is already having on the automotive sector globally, and the important role of Chinese companies in the EV value chain. The IRA has helped increase EV adoption in the United States, bringing the share of new auto sales to **9 percent** in the first half of 2023.

The growing importance of EVs and the extraordinary investments that companies are making in battery technology are also raising the stakes. The automotive sector is politically sensitive in many countries due to its importance for employment and growth—and this is particularly true in the United States. The automotive sector continues to be important for the U.S. economy—auto manufacturing employs more **than 1 million** people—and the industry accounted for over 2.5 percent of GDP in 2021 according to **one estimate**. Moreover, many of those jobs are heavily concentrated in states that are electorally important for U.S. elections, such as Michigan, and are politically well represented through labor unions. This means that Washington is strongly incentivized to preemptively protect the industry.

China and policy toward China are shaping EV promotion policy in the United States through at least two channels. First, many of the inputs needed to produce batteries are refined or produced in China (see Figure 2) or by Chinese companies. Battery production itself is also highly concentrated in China. As a result, the IRA has sought to incentivize domestic investment in battery manufacturing through various tax credits that have brought some success. Bloomberg New Energy Finance **estimates** that, thanks to the IRA, the United States' share of global battery manufacturing will increase from 4 percent in 2022 to 10 percent in 2025. Furthermore, between the passing of the IRA and December 2023, North America

attracted \$103 billion in investments in the EV sector. Many of those investments are from foreign companies, including at least one Chinese firm, Gotion, which is building a factory in Michigan despite some political opposition. A different licensing agreement, between Chinese battery maker CATL and American automaker Ford, has come under significant scrutiny from politicians as well.

The eligibility requirements of the clean vehicle **tax credit** are a particularly powerful tool at the disposal of the U.S. government to reshape supply chains. Buyers can qualify for \$3,750 if the applicable percentage (ranging from 50 percent in 2024 to 80 percent in 2027) of the critical minerals are extracted or processed in a country with which the United States has a free trade agreement or are recycled in North America. Another \$3,750 is available when an applicable percentage of battery components are manufactured in North America (ranging from 60 percent in 2024 to 100 percent in 2029). These tax credits can total up to \$7,500, though vehicles must also be assembled in North America.

In addition to the requirements outlined above, if a vehicle contains battery components manufactured by an FEOCs or, starting in 2025, critical minerals extracted, processed, or recycled by an FEOC, it will not qualify for the tax credits. The Department of the Treasury issued a proposed guidance to define an FEOC for the IRA in December 2023, while the Department of Energy issued **similar guidance** for FEOCs in the context of the BIL.

Both definitions set limits on entities owned by, controlled by, or subject to the jurisdiction or direction of a government of a foreign country that is a covered nation, including China. The ownership limit for an entity of concern cannot exceed 25 percent. The most common interpretation of this is a limit on state ownership or ownership by a government official, although the language could be interpreted more broadly. There are related restrictions on licensing agreements. The Department of the Treasury also included guidance on how to address subsidiaries and partial ownership stakes, perhaps reflecting growing awareness that the private sector in China is **increasingly connected** to the state sector through equity investments.

Even though the guidance's requirements will be challenging for many automakers to meet, they are less stringent than the FEOC definition in the CHIPS and Science Act, for example, potentially leaving a path forward

for some private Chinese companies outside of China to qualify. A likely immediate outcome will be corporate restructuring that may make ownership less transparent and raise the cost of auditing. On the other hand, however, this is already driving companies to more rigorously map their supply chains and providing one of the strongest incentives for supply chain diversification yet. The guidance is still receiving comments, but it is expected to be finalized sometime in 2024.

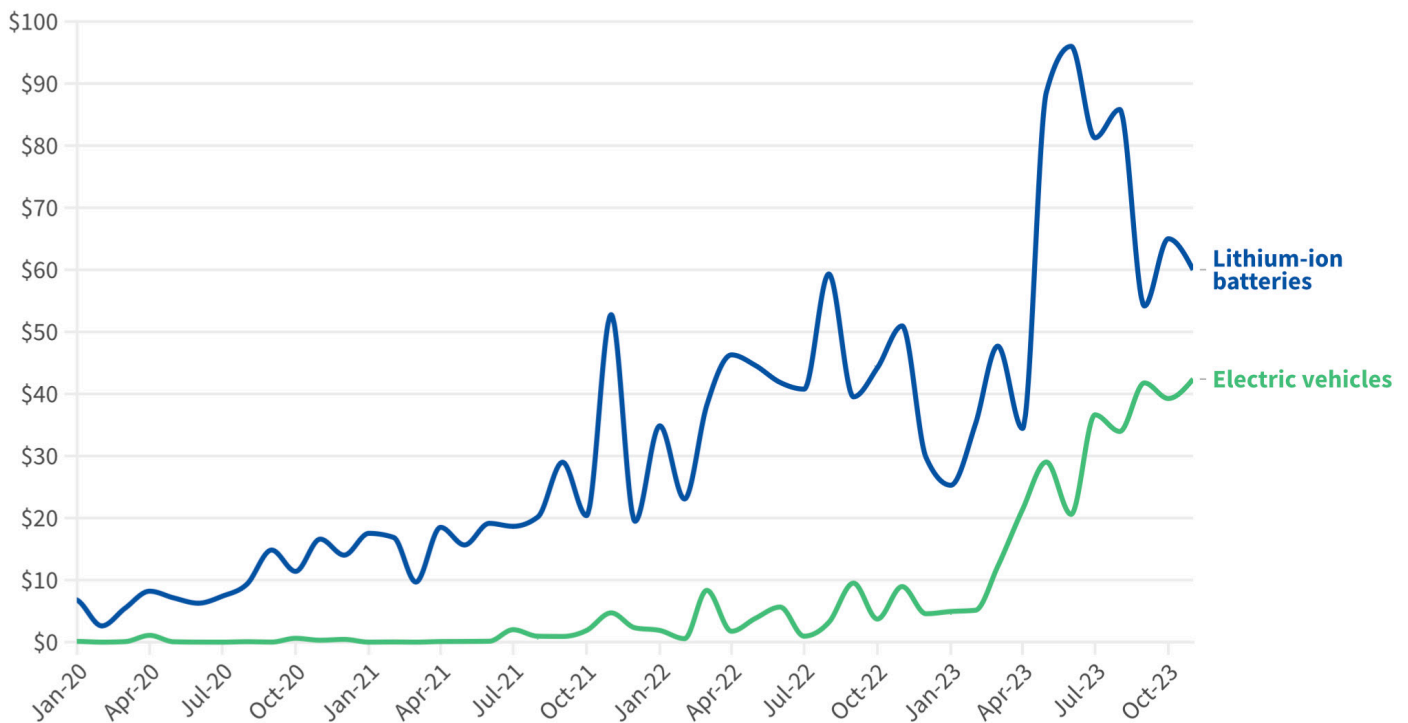
These rules are coming at a time when an increasing number of Chinese companies are internationalizing production to comply with IRA regulation and reduce their own political risk when it comes to accessing other markets that are wary of overreliance on China. This trend is visible in countries that supply critical materials and have free trade agreements with the United States, such as **Chile** or **Morocco**. Mexico, where the EV industry has taken off since the IRA was passed in 2022, is also increasingly attractive to Chinese automotive or battery companies hoping to qualify for battery component tax credits under the IRA or to avoid steep tariffs on exports from China. Sales

of Chinese-made cars, both EVs and internal combustion engine vehicles, in Mexico have also been on the rise.

Shipments of lithium batteries from China to Mexico have increased significantly, as one might expect given that increased EV auto assembly is taking place in the country to meet growing demand in the United States (see Figure 3). There are some concerns of transshipment practices whereby Chinese exporters may send goods to Mexico first to take advantage of favorable trade arrangements to side-step tariffs to enter the U.S. market. The data does not support this in the case of assembled EVs, although the practice may be more significant for specific components. A comparison of U.S. and Chinese customs data shows that the value of 2023 EV exports from China to Mexico was on average less than 10 percent of all of Mexico’s EV exports to the United States. **Chinese brands** are also increasingly popular in Mexico, in both the internal combustion engine and EV segments, indicating that most cars entering Mexico from China are in fact staying there.

A growing number of Chinese EV companies are reportedly discussing or have announced plans to build **factories in**

Figure 3: Battery and EV Exports from China to Mexico
USD, millions



Note: EVs include plug-in hybrid and battery electric vehicles. The HS codes used to look up and calculate EV exports are 870360 and 870380. The HS code for lithium-ion batteries is 850760. Please reference the interactive web version for specific values.
Source: “Customs Statistics,” General Administration of Customs of the People’s Republic of China.

Mexico in order to access the U.S. market. In her letter to the House Select Committee on the Chinese Communist Party, U.S. trade representative Katherine Tai **explicitly highlighted** concerns over Chinese entities setting up operations in countries to benefit from more favorable trade arrangements. Mexico is likely one of the countries that will be coming under more direct scrutiny in the coming months.

The second trend that is likely to become of increasing interest to policymakers in Washington is the rise of **Chinese EV exports** and the internationalization of Chinese companies. Indeed, the topic has already **been raised** by the House Select Committee on the Chinese Communist Party and Tai, whose letter in January 2024 indicated that EVs are being considered in the ongoing review of the Section 301 tariffs that will conclude this year.

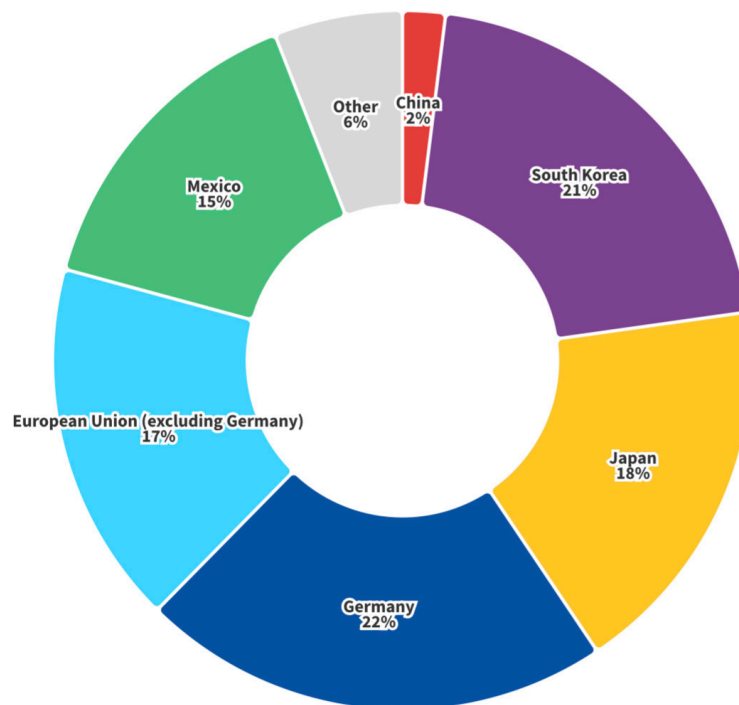
Some international manufacturers have been exporting vehicles made in China to the rest of the world, led by a wide margin by Tesla, which accounted for **37.3 percent** of EV exports from China between January and October 2023 and 34 percent for the whole of 2023. However, **well over half of EVs** exported from China are made by Chinese-owned companies, including BYD and SAIC.

Both trends are especially concerning to policymakers in Europe, the biggest recipient of Chinese EV exports, and have informed the decision to launch an anti-subsidy investigation into EV exports from China.

A comparison of the number of vehicles exported from China to the United States and Polestar sales indicates that the latter is the only car brand exporting EVs from China to the United States. Polestar (owned by Hangzhou-based manufacturer Geely) is scheduled to start production in North Carolina, potentially limiting its export numbers in the future. The limited volume of exports is due to the high existing tariffs (27.5 percent), ineligibility to receive IRA credits, and what was up until recently a sluggish market with high political risk for Chinese firms. This is notable because while exports from other countries have risen in response to growing demand after the passage of the IRA, exports from China have remained low (see Figure 5).

Regardless of current imports, policymakers in Washington are increasingly concerned that Chinese-made vehicles may enter the market over the next few years thanks to their extraordinary cost competitiveness. A company such as BYD sells in China and around the world

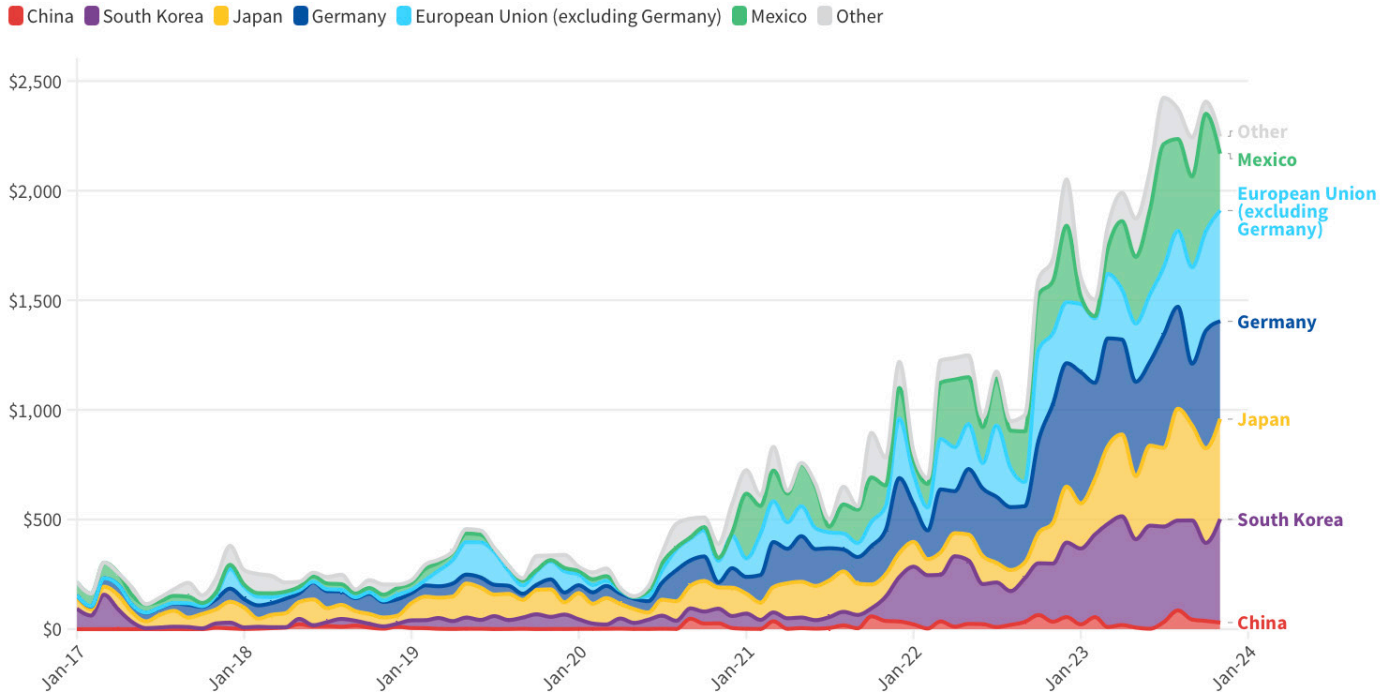
Figure 4: U.S. Imports of EVs in 2023 by Country Percentage share



Source: "International Trade (annual 2005 - present, monthly 2013-present)," U.S. Census Bureau, accessed January 24, 2024, <https://www.census.gov/data/developers/data-sets/international-trade.html>.

Figure 5: Origin of U.S. Imports of EVs

USD, millions



Note: EVs include plug-in hybrid and battery electric vehicles. The HS codes used to look up and calculate EV exports are 870360 and 870380. Please reference the interactive web version for specific values. Source: "International Trade," U.S. Census Bureau.

a variety of models priced under \$30,000. By comparison, the average price of an EV in the United States is \$47,000 according to **recent reporting**. It is conceivable that a firm such as BYD may decide it can compete with U.S. domestic EVs despite current tariff levels—especially if more North American-made models become ineligible for tax credits because they fail to comply with supply chain requirements for battery components, critical minerals, or FEOCs.

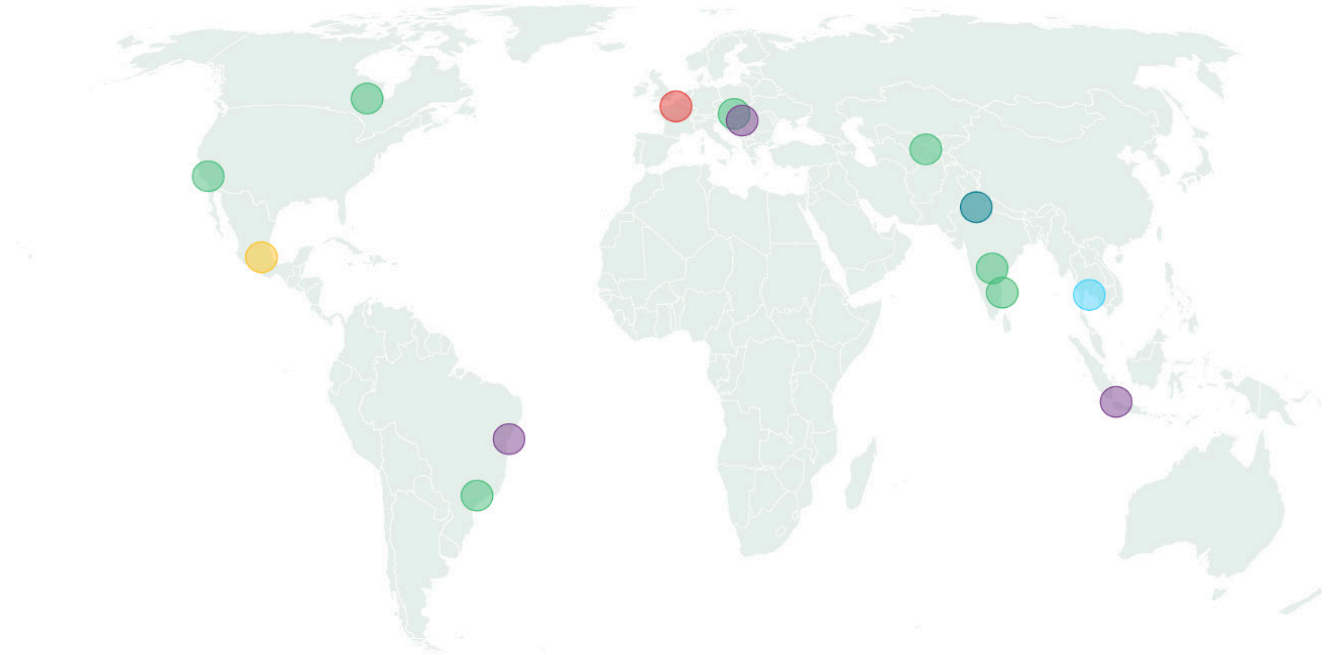
Perhaps even more important, however, is the entirely new competition that U.S. and other established carmakers will experience in third markets. Chinese companies are expanding rapidly in terms of their exports, foreign direct investment, and the number of markets they are entering. BYD's rapid expansion is instructive (see Figure 6). As of early 2024, the company has announced plans to open factories to manufacture EVs in at least three new countries (Hungary, Brazil, and Indonesia) on three continents, is constructing a fourth factory in Thailand this year, just launched production in Uzbekistan through a joint venture with a local partner, and is reportedly in talks with Mexican authorities over a large investment in the country. In addition to its EV passenger vehicle manufacturing facilities, BYD has electric bus factories in

the United States, Hungary, and Brazil. The company also manufactures solar panels (including in a factory in Brazil) and, importantly, batteries. Furthermore, it is expanding its investments upstream in the battery supply chain, to secure critical mineral resources in ways that can help strengthen the cost savings derived from its vertically integrated model, as well as downstream, by purchasing its own **roll-on, roll-off** car carrier.

BYD is in many ways in a league of its own thanks to its remarkable market share. It is now the largest EV manufacturer in the world, producing **3 million vehicles** in 2023 alone. BYD's international expansion is significant because of its scale but it is not entirely unique. Multiple Chinese companies, including Hozon and Great Wall Motors, are investing or exploring investments in overseas factories. This rapid international expansion is fueled by the increase in exports and growing demand for EVs around the world, as well as a response in many cases to activism on the part of host governments to attract new investment. Exports may also be fueled by overcapacity in China, which some observers think is driving an ongoing price war inside the country between leading EV manufacturers. A recent **official** document

Figure 6: BYD EV Factory Projects Abroad

■ Operating ■ Closed ■ Announced ■ Reported ■ Under construction ■ Status unknown



Note: This map does not include electronic equipment and car component manufacturing plants owned by BYD unless they also explicitly produce vehicles. Please reference the interactive web version for complete information.

Source: Author estimate based on company filings, government documents, and media reports.

issued by the Chinese government suggests that Beijing is highly supportive of the growing internationalization of Chinese EV firms as it can provide more opportunities for international cooperation and access to foreign markets.

The U.S. government will likely consider adopting new trade defense measures to prevent the entrance of Chinese EVs on the U.S. market over the coming year. This could help give U.S. manufacturers time to develop and market more competitive models, but it would also limit low-cost options for consumers who may continue to turn to internal combustion engine models instead. However, even without direct competition in the United States, Chinese companies will be competing head-to-head with U.S. firms in third markets, as they are already doing within China. Some direct competition may be helpful in spurring more innovation among legacy carmakers.

The importance of the automotive sector in the U.S. economy and on-road transport's high share of emissions complicate the scenario further. One potential path forward that is currently being tested by a handful of battery companies in the United States and by Polestar, a Chinese-owned brand, is localizing production in the

United States, similar to Japanese automakers in the 1980s. This choice will be complicated by the current political environment and by concerns that extensive industrial policy in China has a distortional effect. Ultimately, much will depend on how risk is assessed by policymakers and how cooperation is operationalized with partner countries and, potentially, with China itself.

LOOKING FORWARD

Economic security and de-risking are increasingly impacting climate policy and molding green industrial policy and trade policy in the process. This means that trade as well as national and economic security have entered the climate policy space. Policymakers and civil society organizations invested in climate policy will need to think holistically about green industrial policy and weigh risks and opportunities carefully. To this end, the following recommendations may be helpful:

1. As de-risking is implemented across large swaths of the green economy, policymakers and civil society should evaluate its success periodically as well as its costs. More surgical approaches may also be

considered in situations where the cost is found to outstrip the benefits. This requires cost-benefit analyses of various supply chains that incorporate risk, cost, and political considerations, as well as better definitions of what composes successful de-risking. In particular, policymakers will need better frameworks to assess the impact of Chinese companies internationalizing their production. More research and analysis of risks and benefits will be necessary to help understand this trend and how it fits into the climate, de-risking, and U.S. domestic economic agenda.

2. Innovation will continue to be an important pathway to improving security and carbon emission reduction. Ensuring continued support for attainable R&D efforts to make existing technologies less environmentally impactful and less reliant on Chinese supply chains will be valuable. For example, the fall in the price of lithium and lithium batteries could hamper efforts to find battery chemistries that utilize fewer minerals and more abundant or less polluting materials, such as solid state or sodium batteries. Similar issues exist for recycling, which is a more environmentally friendly solution that could also help reduce the impact of mining. Sustaining support for such efforts could be a double win for climate and national security.
3. There is significant space for enhancing current global governance mechanisms both bilaterally and multilaterally. For example, the United States could be key to pushing a climate-positive trading agenda globally, improving international dialogue on green industrial policy, and enhancing international coordination to establish traceable supply chains that account for the carbon footprint of production through WTO reform and other platforms like the G7, the G20, and IPEF. Such efforts should be of particular interest to civil society given its potential role in envisioning what such a regime would look like and convening semi-official dialogues to promote it.
4. Much of the emphasis on promoting manufacturing is linked to the expectation that this will continue to be a large source of stable employment. However, automation could affect the long-term employment

gains linked to green industrial policy, especially when labor-protecting measures are not put in place. Policymakers and civil society should engage in forward-looking thinking to evaluate possible scenarios and shape outcomes positively.

There are also areas where more trade-climate tension is on the horizon. Emerging technologies that are yet to be proven commercially viable at scale, such as hydrogen and green steel, may soon come into clearer focus, as will possible trade-offs. Climate advocates will need to be particularly careful to identify politically viable paths forward that are also desirable from a climate perspective, something that may be harder should climate-skeptic administrations come into power in the United States or elsewhere. Central to these discussions should be an analysis of what fair competition and openness to trade mean in an age of green industrial policy and efforts to shape the debate on economic security and its relationship to climate policy.

For years policymakers and civil society have debated and rightly advocated for more industrial policy action to promote decarbonization. Yet, as that world has begun to materialize, there has not been a strong enough vision for how to reconcile such an approach on a global scale, especially when trade is dominated by China, a country that the United States increasingly views as a competitor. This will be necessary in order to establish politically sustainable pathways to maintain support for the critical technologies that will need to become cheaper and more readily available in the near future. ■

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