An Industrial Policy Renaissance

The challenges and opportunities of going green

IISD REPORT

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1.0 Introduction

Industrial policy is enjoying a renaissance—a redemption since the years of the Washington Consensus, when the narrative, if not the actual practice, was that governments could not pick winners, and should go no further than creating fertile regulatory environments for investment.

A dominant theme of that relatively recent global trend is green industrial policy, which adds new elements to the list of social objectives pursued by traditional industrial policy, including industrial decarbonization, a shift to a circular economy to reduce material consumption, and support for new technologies and goods that either solve environmental problems or have preferable environmental impacts in use.

Such policy, if it succeeds, ticks many boxes. First, it responds to environmental crises, such as climate change, pollution, and biodiversity loss. Importantly, green industrial policy has the potential to respond in a way that promises to create prosperity by capturing the market share in the burgeoning green markets of the future, thereby muting public concerns about the costs of action. It can also serve as a means for countries to become less dependent on imports of certain important goods, such as fossil fuels and critical minerals; in the former case, benefiting national balance of payments, and in the latter case, responding to a concern for security of supply, born in part by the COVID pandemic but kept alive by growing geopolitical friction.

Because industrial policy focuses on fostering competitive firms capable of gaining global market share, it can entail negative impacts for foreign competitors (even though green industrial policy may also bring welcome global environmental benefits). Adopted at the scale we are witnessing today, it may significantly impair development prospects for others, including developing and least developed countries that have less capacity to enact similar policies. The question becomes: How can we arrive at a place that maximizes the potential national and international benefits of green industrial policies while minimizing their downsides, particularly given the development pathways of developing and least developed countries?

The more specific question that motivates this paper is: What role might there be for trade policy and multilateral trade rules to help address the economic, environmental, social, developmental, and geopolitical tensions inherent in the rising use of green industrial policy? To be clear, in posing that question, we do not assume that trade policy alone can solve these challenges. But its salience and potential are clear; the fundamental rationale for international cooperation on trade policy is the understanding that all countries can benefit from agreement on norms and rules of conduct in trade and trade-related policies. This paper marks the launch of a suite of work by the International Institute for Sustainable Development (IISD) that will explore what constitutes effective industrial policy at the national level. This work will continue from there to consider possible negative and positive impacts for others, asking how global governance institutions might find an appropriate balance between protecting global welfare and allowing countries space to develop effective policy. In particular, IISD will focus on the challenges faced by developing countries, both in navigating the impacts of industrial policies by major trading partners and in identifying opportunities to employ

their own industrial policies. The primary audiences for this work are the trade policy-making community and those responsible for crafting industrial policy.

The paper begins by defining what we mean by green industrial policy. Section 3 then recounts a brief history of thinking on industrial policy more broadly and green industrial policy specifically, and Section 4 surveys the trends in the use of those policies, describing their recent resurgence. Section 5 then considers the implications of those trends, enumerating the impacts and tensions inherent in the current use of such policies. Section 6 concludes by synthesizing the key questions that follow from the preceding analysis—questions that will help frame IISD's research and efforts going forward.

2.0 What Do We Mean by Green Industrial Policy?

Green industrial policy refers to a specific form of industrial policy—one that pursues environmental, as well as social and economic, objectives.[1] Industrial policy, in general, refers to government intervention to change the economic structure of a country in the pursuit of societal objectives. While traditionally, the main objectives had been to increase economic growth and improve national competitiveness and employment[2] (i.e., narrowly defined economic objectives), a range of additional objectives is currently gaining importance. These objectives include industrial decarbonization to curb global warming and the shift to circular economies to reduce resource consumption. Moreover, economic resilience and strategic autonomy from other nations, even though they are not entirely new objectives, moved to the centre of industrial policy as geopolitical frictions increased and unprecedented supply chain disruptions occurred. Last but not least, the rise of China is significant—and has been widely attributed to its strategic, subsidy-driven approach to industrial policy. This seismic shift led to a new wave of industrial and trade policy action and counteraction aimed at protecting domestic industries in other economies and curbing China's increasing dominance in many industries.[3]

Keeping the above in mind, we define green industrial policy as government interventions that alter the economic structure of a country to maintain or increase national wealth (traditional industrial policy), but which also aim to avoid overstretching the carrying capacity of the global ecosystem.

To avoid a common misunderstanding, industrial policy—whether green or not—is not restricted to manufacturing industries. While there are good reasons for strengthening manufacturing industries, industrial policy aims to improve the production structure more broadly and is frequently used to develop and upgrade promising new non-manufacturing sectors (e.g., in modern agriculture and in services like software development or tourism).[4] Also, it should be noted that the boundaries between manufacturing and other sectors, especially services, are increasingly blurred.[5]

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[1] Lütkenhorst et al. (2014) define green industrial policy as encompassing any policy measure aimed at aligning the structure of a country's economy with the needs of sustainable development within established planetary boundaries.

[2] For example, in the industrial policy definition by Pack & Saggi (2006).

[3] Chang (2002) observed that countries use a wide range of interventionist industrial policy when they try to catch up with the leading economies of their time, but try to prevent other countries from using the same instrument once they themselves are among the leaders. Today, the United States is deploying a range of policies (e.g., export bans) to prevent China from catching up in semiconductor technologies, which China counters with export restrictions on critical raw materials and other measures.

[4] See "Industries without smokestacks" (Newfarmer et al., 2018).

[5] Developing capabilities in artificial intelligence is a core concern in advanced industrial economies, whereas developing countries try to exploit more labour-intensive digital services, such as business process outsourcing. Also in agriculture, countries incorporate technological advancements to develop entirely new high-value activities, using agrarian resources for bio-based materials and energy sources, from biodegradable plastics to sustainable aviation fuel.

Green industrial policy emerged in response to growing environmental challenges—most importantly, global warming—but also the depletion of natural resources, loss of biodiversity, and other environmental threats stemming from the current forms of industrialization (see the concept of planetary boundaries: Rockström et al., 2009). The transition toward a resource-efficient, low-carbon economy has far-reaching implications for the structure of economies. Entire economic subsystems need to change—for example, the energy system, all industries running on fossil fuels, the transport system, and agricultural production. The aim is thus a deep structural transformation of all national economies.

Given that objective, green industrial policy has a number of unique characteristics (Altenburg & Rodrik, 2017). Generally, it is much more interventionist than traditional industrial policy, as it steers investments away from less desirable (i.e., polluting) toward desirable (i.e., green) activities. Hence, green industrial policy makes a normative distinction between "good" and "bad" technologies. Likewise, the type of demand is not regarded as a given; instead, regulations and incentives aim to change demand to more sustainable patterns. Internalizing externalities through taxes and pricing is one way to shift demand—and finance. Given the urgency to achieve green transformation within a short period of time (i.e., to limit global warming to within 1.5°C or 2°C above pre-industrial levels), green industrial policy aims to accelerate the transition to low-carbon practices beyond what would happen by relying on the market alone. This is why the emphasis is not only on helping to develop cleaner alternatives, but also on subsidizing their deployment. Green industrial policy proactively phases out undesirable technologies—something traditional industrial policy has never done. In some cases, green industrial policy creates entirely new markets (e.g., for renewable energy, electric vehicles, and green hydrogen[6]), developing supply, demand, and trade infrastructure from scratch. In such cases, when complex productive systems need to be transformed, public sector coordination becomes indispensable.

All this needs to be achieved without losing sight of the traditional industrial policy objectives. Societies will not tolerate green structural transformation if it leads to the relocation of energy-intensive industries to other countries or if the additional cost of internalizing environmental externalities is too high. The challenge is thus to "green" national economies in a way that enhances, rather than reduces, competitiveness and employment creation.

Overall, green industrial policy thus pursues a range of additional objectives and uses new policy instruments that need to be harmonized with the traditional set of industrial policies. Table 1 illustrates some of these new objectives and the characteristics of the instruments to achieve them while being conscious of the potential for overlap.

[6] Green hydrogen requires huge investments in renewable energy projects, electrolyzers, seawater desalination, hydrogen-ready pipelines, and power stations, and it profoundly changes downstream industrial processes such as steel-manufacturing (Altenburg & Strohmaier, 2025).

Table 1. Green industrial policy: Additional objectives and characteristic new instruments

Additional objectives	Characteristic new instruments
Internalization of environmental externalities	Pigouvian taxes, cap-and-trade systems, and fossil fuel subsidy phase-out
Policy-led, coordinated, transformative long-term change in sectors	Sector-specific roadmaps, consensus building and coordination bodies, and foresighted infrastructure planning
Phasing in new sustainable industries, ramping up non-existent markets	Directional research and development (R&D), missions, feed-in tariffs, green bonds, and environmental standards
Phasing out unsustainable industries	Regulatory bans, scaled emission standards, and bonus-malus taxes
Acceleration to avoid overstepping of Earth system boundaries	Roadmaps, R&D missions, deployment subsidies
Demand-side management to shift to sustainable consumption	Green procurement, eco-standards, labelling requirements, behavioural interventions

Source: Altenburg et al., in press.

Green industrial policies vary greatly across countries, and almost all have implications for international trade. For example, China heavily subsidizes the development of green technologies and then subsidizes the export of excess capacities; the United States offered huge subsidies to lure green investors into the U.S. market; and the European Union uses emissions trading as its main decarbonization instrument and applies border carbon adjustments to protect its own compliant producers from imports from countries with lower (or no) carbon prices. The fact that there is no common framework for green industrial policy results in market fragmentation. Trading partners need to cope with inconsistent norms and standards, and complying with those in one jurisdiction may exclude them from—or undermine their cost competitiveness in—others. Unprecedented levels of subsidies mean there is no level playing field for businesses in different countries. The global marketplace is hampered by increasing border charges imposed by the leading economies, as well as new conditionalities. Different priorities and practices of green (and non-green) industrial policy make it ever more difficult to reach a shared understanding on what the world's trade and investment regimes should be encouraging—or discouraging—and how.

3.0 The Evolution of International Thinking on Industrial Policy

Industrial policy has—in theory and practice—gone through several phases of upswing and rejection. Among the first proponents was Alexander Hamilton in the United States, who challenged the conventional wisdom of his time that suggested sticking to comparative advantage (in agriculture, in that case). Hamilton advocated for tariffs and subsidies to build a state-of-the-art manufacturing industry (Sylla, 2024). In a similar way, in 19th-century Germany, Friedrich List argued that latecomer countries (which Germany then was relative to Great Britain) could only become economically competitive and prosperous if national industries were shielded from foreign competition and nurtured until they reached maturity to compete with the previously leading nations (List, 1841). While the United States and Germany managed to become technology leaders following Hamilton's and List's advice, most national economies remained stuck in the belief in progress through comparative advantages. To this day, the debate between neostructuralist pro-industrial policy and neoclassical rejection continues to characterize the discussion in economics and in practice.

In developing countries, industrial policy became popular with the work of Hans Singer and Raúl Prebisch (1949) from 1949 onwards. Both worked in the United Nations (UN) system and—independently of each other—developed the concept of "deteriorating terms of trade." They argued that developing countries are generally exporters of primary goods whose oversupply leads to falling prices, whereas prices for imported manufactured goods tend to increase relative to primary products. Moreover, commodity exports are impacted by above-average price volatility. Consequently, both suggested proactive policies to build manufacturing capacity—either via import substitution based on protective tariffs or geared toward export promotion using subsidies.

The hypothesis of deteriorating terms of trade has often been tested, with mixed results. In fact, in some cases, the prices of manufactured goods—think of garments and consumer electronics—have fallen relative to many commodities. Yet, other arguments have been put forward to make the case for economic diversification away from commodities. Importantly, this thinking suggests that investing in manufacturing capabilities contributes to the accumulation of versatile stocks of knowledge that can be recombined in manifold ways, thereby accelerating diversification into ever more sophisticated products, enabling countries to reap innovation rents (Hidalgo & Hausmann, 2009).

Between the 1950s and the 1970s, most developing countries pursued import substitution policies. While those were often successful in terms of economic diversification and building up manufacturing industries, the way they were generally implemented suffered from several problems. Firms shielded from international competition mostly failed to innovate and often produced at suboptimal scales of production. Guaranteed price levels enabled big firms—often subsidiaries of transnational corporations or domestic oligopolies—to pocket enormous rents, creating an incentive for rent-seeking by lobbying the respective governments to maintain high tariffs (Krueger, 1974) without any conditionality to improve firm performance. As a result, export competitiveness did not develop, whereas the newly built manufacturing

firms demanded increasing imports of intermediary and capital goods, leading to growing fiscal and trade deficits and ultimately unsustainable levels of debt (Irwin, 2021).

While import substitution thus became unviable in most developing countries, some notable exceptions exist. Several East Asian countries, in particular South Korea and Taiwan, successfully combined import substitution with export promotion. The key difference that made their industrial development strategy successful was the pressure they put on firms to become competitive: protection was granted only in exchange for proven competitive and export performance (Amsden, 1989; Wade, 1990).

The failure of import substitution led to a phase of total rejection of industrial policy starting in the late 1970s and early 1980s. With politicians like Margaret Thatcher in the United Kingdom and Ronald Reagan in the United States advocating for radical market reforms, privatization, and the scaling down of public sectors, the "Washington Consensus" became the prominent ideology and was imposed on developing countries via structural adjustment programs. Industrial policy disappeared from the discourse for almost a decade—yet again with notable exceptions. Some countries, especially in East Asia and Europe (notably France and Germany), continued their industrial support programs, and even the United States, in practice, continued to apply industrial policies to protect and upgrade specific parts of their economies, even though they were ideologically disguised (Wade, 2014).

During the 1980s and 1990s, two arguments were repeatedly used against industrial policy. First, that governments "should not pick winners," as a market-based entrepreneurial search is the best way to decide when investments are promising and when they are not, whereas "bureaucrats" do not understand the market. Second, that government intervention unleashed a dynamism of rent-seeking, and both bureaucrats and industrial lobbies would then trick the state into creating policy rents in their own favour.

More recent debates point to the fact that such risks can be minimized through smart policy design. Modern industrial policy is about orchestrating a private-public search process to identify broad industrial development trajectories that serve the best societal interests. Governments have good reasons for prioritizing certain sectors over others and providing "directionality" (Mazzucato & Penna, 2016), with permanent feedback loops with the private sector. They are well-advised to promote clean and discourage polluting industries; they may see the long-term benefits of creating promising new industries that would never emerge without active coordination, such as Europe's investment in Airbus. Dynamic knowledge spillovers may justify sector targeting. Korea's early investments in electronics capabilities, for example, created the basis for unprecedented industrial opportunities at a later stage. Likewise, they may promote specific industries to enhance strategic autonomy and become less dependent on certain trading partners.

The risk of political capture—when powerful interests influence policies to their own advantage—is a more serious problem, and the history of industrial policy projects is, in fact, littered with cases of it. Yet again, keeping such risks under control is a matter of policy design. Continuous monitoring and evaluation, disciplines imposed upon beneficiaries, transparent tendering of projects, sunset clauses, competition among providers of public services,

organizational separation of funding from implementation, and monitoring by third parties all reduce the risk of political capture (Altenburg et al., 2008).

In view of increasing foreign debt and policy-induced misallocation of resources, the Washington Consensus aimed to impose fiscal discipline, trade liberalization, privatization, and the deregulation of economies more broadly (Williamson, 2008). In terms of inflation reduction and macroeconomic stabilization, it was quite successful (Birdsall et al., 2010). Yet, for the economic development objectives that ultimately matter—such as increasing per capita income, reducing poverty, and improving income distribution—the results were disappointing (Birdsall et al., 2010; Krugman, 2008). Views differ on whether this was due to faulty implementation and neglect of complementary reforms (e.g., Archibong et al., 2021) or whether the agenda was fundamentally wrong in terms of its assumptions of what drives economic development (e.g., Stiglitz, 2004). Especially when looking at industrial development and technological learning, the Washington Consensus record is poor, as it did not allow governments to invest in industry targeting, technological learning, and the state capabilities needed to drive economic structural transformation. As a result, the performance gap widened between East and Southeast Asian countries that managed to circumvent Washington Consensus conditionalities and the Latin American and African countries that generally followed the Consensus-style reforms (Schweickert & Thiele, 2004).

In view of these insights, industrial policy made a comeback, at first in a light-handed form. Dani Rodrik (2004, 2008) was particularly influential, as his version of an evidence-based, not overly interventionist form of industrial policy became the new mainstream. At the World Bank, then-chief economist Justin Lin invented the concept of New Structural Economics, conceptually based in neoclassical thinking, but justifying a pro-industry deviation aimed at exploiting what he calls "latent comparative advantages" (Lin & Monga, 2011). Neostructuralist proponents of industrial policy, however, criticized their light-handed approaches for not addressing deeper market failures, advocating a more proactive, market-creating version of industrial policy (Chang & Andreoni, 2020).

In the last 10 to 15 years, yet another—and quite radical—turn emerged in the way industrial policy is used, justified, and implemented. Two trends are strongly challenging the previous consensus on light-handed industrial policy (Altenburg et al., in press).

First is the recognition of the need for deep economic transformations to tackle decarbonization and other environmental challenges. As shown in Section 2, this transformation requires strong government intervention because of pervasive environmental externalities requiring interventions to internalize them (prices, bans, standards). Also, there is a need to create and shape entirely new markets (Mazzucato & Penna, 2016) and the related need to provide directionality, subsidize new technologies and infrastructures, subsidize new industries, and discourage old ones. Such green industrial policy approaches are manifested in national and regional Green Deals, decarbonization, and circular economy action plans.

Second is geopolitical rivalry, techno-nationalism, and supply chain disruptions. National economies increasingly emphasize new objectives, such as securing national supplies and protecting national industries in times of imperfectly functioning international markets. Geopolitical rivalry, especially between the United States and China—and, to a certain extent,

with Europe (and more recently Russia)—has resulted in a wave of protectionist policies using trade embargos against rivals. Examples include supporting national champions in strategic industries (such as semiconductors), banning foreign acquisition of strategic technologies (e.g., industrial robotics), and prohibiting the use of foreign technologies that are considered relevant for national security.[7] Mercantilism is back on the agenda, partly for good reasons, but also with all its risks of inefficiency, arbitrary interventions in markets, and political capture. Global supply chain disruptions stemming from the COVID-19 pandemic, Russia's invasion of Ukraine, and other events further underlined the need for market interventions in favour of strategic autonomy. All of these trends created a new political legitimacy for putting national interests first and intervening in markets to become more independent. In many of the world's largest economies, these objectives are increasingly overshadowing concerns about trade restrictions reducing public welfare and state intervention, encouraging political capture, and reducing allocative efficiency.

Greening and techno-nationalism are hybridized in practice (Altenburg et al., in press), for example, in the U.S. Inflation Reduction Act (IRA) and the European Union's new Clean Industrial Deal. While both stem from very different logics—the initial impetus of greening industries was to preserve public goods, whereas techno-nationalism is essentially a beggar-thy-neighbour policy to maximize national benefits even when they reduce the welfare of other countries— they have important commonalities when it comes to industrial policy. Ultimately, both require much deeper involvement of the state and societal stakeholders in shaping the economy, thereby shifting even further away from the initial understanding of markets as the key institution guaranteeing productive efficiency.

[7] Evenett et al. (2024) document the recent increase of distortive techno-nationalist industrial policies; see Ryan & Burman (2024) for a qualitative assessment of the Huawei case.

4.0 Where Are We Now? An overview of recent green industrial policies through case studies

The global proliferation of green industrial policies, noted in Section 2, is reshaping international trade dynamics, introducing both opportunities and challenges. Governments worldwide are increasingly deploying on-budget subsidies, tax incentives, and regulatory measures to promote clean energy and sustainable industries. Although industrial policy, and in particular green industrial policy, is not meant to be zero-sum, the scale of government intervention and the ambitious scope of each economy's "new" industrial policy have the potential to give rise to trade tensions and questions about fair competition (Ilyina et al., 2024).

Since 2020, direct government support for green industrial sectors has expanded rapidly, especially in clean energy, agriculture, and manufacturing. According to the Organisation for Economic Co-operation and Development (OECD, n.d.), government support to agriculture across 54 economies averaged USD 842 billion annually from 2021 to 2023, yet only 12.6% of that support targeted long-term productivity and sustainability through services such as innovation and infrastructure investment. China has come to dominate global solar and wind value chains, accounting for more than 80% of solar module production and over 70% of global production capacity for key wind turbine components (OECD, 2025, p. 12). More widely, in 2023 alone, over 2,500 industrial policy interventions were recorded globally, with one third aimed at competitiveness, and the rest driven by climate, supply chain, and security goals, with most measures involving subsidies or export support (Ilyina et al., 2024).

Climate-focused measures and policies aim, on their face, to drive the transition to a low-carbon or net-zero economy, and in the process, reshore (in the deindustrialized West) or develop (in the rest of the world) economies sustainably. However, this new green industrial policy is not a silver bullet. The success of these measures—for climate and development purposes—depends on complementary factors such as market readiness, technological realities and innovations, and a stable international trade environment backed by respect for, and adherence to, the rule of law to effectively stimulate sustained economic activity, none of which may be assumed.

To clearly understand the current state of green industrial policies, it is helpful to unpack the situation through case studies in China, the United States, the European Union (EU), Canada, Brazil, and South Korea.

China: Aggressive industrial policies with global implications

China is widely seen to have had the most ambitious, overt, and successful industrial policy in the last half-century. The implementation of Deng Xiaoping's "It's glorious to be rich" grand strategy has lifted 800 million Chinese citizens out of poverty in the span of 4 decades.

In 2015, China announced "Made in China 2025" (MIC2025). The goal of these ambitious industrial policy measures was to make China a leader in global high-technology manufacturing. The policy was subjected to intense criticism by China's trading partners (McBride & Chatzky, 2019), and it effectively erased any official mentions of the policy in 2018, even as it continued to implement the core of the policy by

- reducing reliance on foreign technologies,
- enhancing its domestic production and innovation through tax benefits and other subsidies, and
- implementing market barriers for foreign companies to compel them to localize their production (Boullenois et al., 2025).

The strategy has led to uneven results. In some areas, such as the electric vehicle (EV) sector, Chinese auto companies now make up over half the domestic market (Boullenois et al., 2025, p. 47). In other areas, China still lags behind—notably in the semiconductor sector, where it continues to depend on foreign firms to produce high-end chips (Boullenois et al., 2025, p. 53) (despite the over USD 39 billion invested through its National Integrated Circuits Industry Development Investment Fund [Semiconductor Industry Association, 2021, p. 3]).

China has not, however, remained immune from changes in global priorities. As might be expected, parallel to the implementation of MIC2025 industrial policies, China's government(s) and increasingly affluent middle class have turned their attention from industrial bread-and-butter issues to climate change and similar new concerns (as well as to new opportunities in the markets of the future coming with them). Policies that have led to massive overcapacity in steel, aluminum, and polysilicon are now being retooled to turn China into a global leader in green technologies.

China's commitment to renewable energy has significantly influenced its economic growth. In 2024, clean energy sectors contributed approximately 10% to China's GDP (USD 1.9 trillion), underscoring the country's strategic shift toward sustainable industries (Myllyvirta et al., 2025). Through initiatives such as its 14th Five-Year Plan,[8] the country has heavily subsidized EVs, solar panels, and wind turbines (Asian Development Bank, 2021). These subsidies are estimated to be between three and nine times higher than those of the United States and Germany (Bickenbach et al., 2024, p. 7).[9] This approach has helped China dominate global markets in solar panels and EV batteries (and soon, EVs). Nevertheless, China's ambitious—and successful—global strategy has also spurred international trade tensions. The EU and the United States have raised concerns about China's subsidies, arguing that they create unfair competition and distort global markets (Busby et al., 2024, pp. 2–3).

United States: The global industrial policy war

U.S. attempts to contain China's industrial policies—or, at least, the global effects of those policies—were not successful in reducing overcapacity in China or reviving domestic

[8] See also Bian et al., 2024, pp. 3–4; Asian Development Bank, 2021.

[9] Kiel Institute, 2024.

manufacturing. After the trade-restrictive disruptions of the first Trump Administration, the United States shifted its approach to industrial policy dramatically. The IRA, enacted in August 2022, represents the most significant investment in climate and energy not just in the country's history but, arguably, in global history (Bivens, 2023).[10]

The IRA allocated approximately USD 369 billion over 10 years to support renewable energy, pollution reduction, and environmental justice (UNCTAD Investment Policy Hub, 2022). Key provisions included tax credits for clean electricity, electric vehicles, and energy-efficient home improvements (McKinsey & Company, 2022).[11] Since its enactment, it has resulted in USD 161 billion in clean energy disbursements, with utility-scale solar and storage dominating at USD 108 billion (solar leading at USD 71 billion and storage at USD 37 billion). At the same time, governmental expenditure in sustainable aviation fuels rose 1,655% to USD 14 billion, carbon management reached USD 7 billion, and clean hydrogen rose to USD 8 billion—collectively growing from 2% to 18% of all clean energy investments in this segment (Bermel, 2024, p. 7–8).

However, the return of President Trump to office, backed by a Congress that does not share the same concerns about climate change as the previous administration, does not bode well for either the IRA or its ambitious objectives. While this shift will not mark the end of industrial policy in the United States, with global tariffs going into effect to ostensibly reshore iPhone assembly (Godoy et al., 2025) and t-shirt and towel manufacturing (Christopher, 2025), a root-and-branch reorientation of objectives and priorities is expected.

The One Big Beautiful Bill, signed into law on July 4, 2025, significantly modified many of the green industrial policies of the IRA. In an Executive Order signed on July 7, 2025, the administration announced the U.S. policy as "rapidly eliminat[ing] the market distortions and costs imposed on tax-payers by so-called 'green' subsidies'" (The White House, 2025). Examples of these changes include

- the repeal of consumer-focused credits for electric vehicles and buildings;
- the phase-out or restriction of power generation and other business-related credits and expanded clean fuel and carbon dioxide sequestration credits (Muresianu, 2025);
- wind and solar projects having been made ineligible for the clean electricity investment tax credit and production tax credit, unless the project enters service by December 31, 2027 or begins construction within 12 months of the law's passage (Muresianu, 2025)[12]; and
- identification of "foreign entities of concern," which targets the involvement of individuals and organizations associated with countries like China and Russia, which are made subject to additional restrictions and barred from claiming credits or directly influencing organizations claiming those credits.

[10] See also U.S. Environmental Protection Agency, 2025.

[11] McKinsey & Company, 2022.

[12] See also Jack Andreasen Cavanaugh et al., 2025.

Congress is currently considering rolling back key IRA tax credits, such as the advanced manufacturing tax credit (45X), which could well have a negative impact on the growth of the renewable energy sector in the United States (Senate Committee on Energy & Natural Resources, 2025).[13]

The EU: The Green Deal Industrial Plan

The European Green Deal aims to make the EU climate-neutral by 2050 (European Commission [EC], 2020). It includes a comprehensive set of policies to promote clean energy, sustainable industry, and biodiversity. The Green Deal Industrial Plan enhances the competitiveness of Europe's net-zero industry by creating a supportive environment for scaling up manufacturing capacity for net-zero technologies through the Net-Zero Industry Act (EC, 2023). As part of this broader strategy, the EU has also introduced the Carbon Border Adjustment Mechanism (CBAM), which imposes a carbon price on imports of carbon-intensive goods, such as steel, cement, and fertilizers, to align the carbon prices of imported products with EU domestic prices. The CBAM entered a transitional phase in October 2023, with full financial obligations coming into effect in 2026 (EC, 2025a; Gabbatiss & Song, 2024).

Despite its ambitious goals, the Green Deal faces internal challenges. Following elections in summer 2024, prominent parties within the EU have pushed to repeal the 2035 ban on the sale of combustion engine cars (Abnett, 2024; Mathiesen et al., 2024), which most recently led to the EC agreeing to relax emissions targets for 2025 and fast-track the review of the 2035 law (Dahl et al., 2024). Additionally, the EC has agreed to delay and simplify major parts of the Green Deal under pressure from member states and industry (Nguyen & Le Cacheux, 2025).

In February 2025, the EU unveiled the Clean Industrial Deal in response to U.S. and Chinese industrial policies. One focus of these new policies is to support energy-intensive industries in decarbonizing and electrifying while increasing protections against unfair competition. The second focus is on increasing investments and competitiveness in the clean-tech sector. The deal proposes to do this through financial incentives, streamlined regulation, and strategic procurement. So far, the EC has proposed a number of measures, including launching the European Investment Bank, with EUR 500 million for renewable power purchase agreements for the long-term purchase of electricity generation by small- and medium-sized enterprises, midcaps, and energy-intensive sectors. The European Investment Bank will also include a EUR 1.5 billion "Grids Manufacturing Package" to support European grid and energy infrastructure manufacturers (EC, 2025b).

These developments highlight the difficulties in balancing environmental objectives with economic competitiveness. The EU's experience underscores the need for flexible and adaptive policies that can accommodate the diverse interests of member states while pursuing overarching climate goals.

[13] See also Colman & Mathiesen, 2025.

Canada: Green subsidies and market realities

Canada's Federal Budgets of 2023 and 2024 introduced significant investments in (or expenditure on) green technologies, among which were the Clean Technology Investment Tax Credit and the Canada Green Buildings Strategy (Department of Finance, 2024). These initiatives aim to decarbonize the economy and promote sustainable growth. Whether these initiatives continue will depend on how they fit into the priorities of the newly elected government (Liberal Party of Canada, 2025, pp. 44–46).

In Budget 2021, Innovation, Science and Economic Development Canada was given a CAD 8 billion Strategic Innovation Fund to help create a Net Zero Accelerator (Innovation, Science and Economic Development Canada, 2023, p. 15) with three distinct pillars:

- decarbonization of larger emitters,
- industrial transformation, and
- clean technology and battery ecosystem development.

As part of this initiative, investments in critical minerals projects—such as Rio Tinto Fer et Titane's production capacity for scandium (CAD 511 million) and E3 Lithium's lithium production facility (CAD 87 million)—were touted as being part of a wider strategy to place Canada as a leader in the green industry by positioning it as an important supplier for the critical minerals essential to the clean energy technology sector (ISED Canada, 2023, p. 23).

The Liberal government's platform included a plan to create a CBAM, similar to the EU model, to "promote fair competition with … trading partners" (ISED Canada, 2023, p. 15) and to extend the full value of the Carbon Capture Utilization and Storage Investment Tax Credit to 2035 with the intention of becoming a leading hub for carbon removal and sequestration technology. To that end, the new Liberal government has signalled its intention to make Canada "the world's leading energy superpower in both clean and conventional energy" (Government of Canada, 2025).

In the EV market, CAD 52.5 billion in investments came in between October 2020 and April 2024 for the EV supply chain (Giswold, 2024). Notably, the federal and provincial governments have provided investment and government support for the creation of battery plants across various provinces for Honda (CAD 15 billion), Volkswagen (CAD 7 billion), Northvolt (CAD 7 billion), and Stellantis (CAD 5 billion) (Giswold, 2024). While Stellantis's NextStar Energy facility started module production in the fall of 2024 at its Windsor, Ontario, plant, many of the EV projects have been affected by external factors and wider uncertainty. Northvolt filed for bankruptcy protection in the United States and scaled back its operations, including partial shutdowns and sales of some of its other factories. Despite this, it insists that the construction of its EV battery plant in Quebec will move forward, albeit with some delays (Yakub, 2024).[14]

Market realities, however, have forced a recalibration of Canada's ambitious plans. Honda Canada announced a 2-year postponement of its CAD 15 billion EV investment project in

[14] See also Cowan, 2025; Lamb, 2025.

Ontario, citing a slowdown in the EV market and reduced profitability due to U.S. tariffs on Canadian exports (Hughes, 2024). The case of Canada demonstrates how governmental support alone cannot guarantee industrial success. Factors such as market demand, international trade dynamics, and supply chain considerations play crucial roles in the viability of green industrial projects.

Brazil: A new industrial policy for a new world

On January 24, 2024, Brazil launched Nova Indústria Brasil (NIB) (Guerra et al., 2025, p. 6), an industrial policy with the goal of modernizing its industrial infrastructure up to 2033 to reverse precipitous and premature deindustrialization (The Economist, 2022). Mission 5 of the plan focuses on bioeconomy, decarbonization, and energy transition and security.

The NIB mobilizes substantial financial resources, with over BRL 300 billion allocated through public institutions like the National Bank for Economic and Social Development and the Funding Authority for Studies and Projects to support innovation, infrastructure, and industrial modernization (Presidência da Repùblica, 2024). As of early 2025, the initiative had already attracted BRL 3.4 trillion in combined public and private investments, contributing to a 3.7% growth in Brazil's manufacturing sector in 2024 (Demirkol, 2025). The policy emphasizes the importance of environmental sustainability, aiming to reduce industrial CO_2 emissions by 30% per unit of value added and increase the share of biocombustibles in the transportation energy matrix by 50% (Federative Republic of Brazil, 2024, p. 11). The new industrial policy is not just about "neoindustrialization"; it has a specific direction as it integrates technological innovation, environmental sustainability, and social inclusion. The ongoing disruptions in Brazil-U.S. trade and, in particular, the somewhat unusual use of tariffs to effect changes in domestic criminal procedures, may well accelerate the reorientation of Brazil's trade relations (Phillips, 2025). This shift has the potential for far-reaching consequences in the structuring of Brazil's sustainable development policies.

South Korea: Reflections on the 2020 Green New Deal

South Korea launched its Green New Deal in July 2020. It was a multi-year strategy focusing on decarbonization, green innovation, and job creation. Backed by KRW 73.4 trillion (approx. USD 61 billion), it aimed to create 659,000 jobs by 2025 through "investments in" (i.e., "government expenditure on") renewable energy, EVs, green infrastructure, and hydrogen technology (International Energy Agency, 2021).

In 2023, the South Korean government announced an additional USD 313 billion (KRW 420 trillion) in loans to support carbon offset projects and help industries transition to low-carbon production (Yeon-woo, 2024). In the EV sector, South Korea unveiled a USD 7 billion package to reduce reliance on Chinese supply chains and realign sourcing toward partners compliant with IRA requirements in the United States (Heejin, 2024). South Korea's measures are not limited to subsidies. Regulatory frameworks such as the Korea Emissions Trading Scheme—one of the world's largest emissions trading schemes—help advance the double objectives of the country's new industrial policy, covering 525 firms and 68% of national greenhouse gas output (EC, 2020, p. 2; Joo et al., 2023). Hydrogen also plays a

central role in Korea's green industrial strategy. The Ulsan Green Hydrogen Town, with KRW 250 billion in public–private investment, integrates hydrogen across industrial, transport, and residential applications (Smart City Korea, 2024).

However, some observers have been critical of the lack of "greenness" of South Korea's new industrial policy, as it continues to provide support in various forms to fossil fuels.[15] Taken together, these initiatives represent a layered, complex, but evolving industrial policy that aims for sustainability but is also shaped by global trade pressures, supply chain realignment, and domestic economic challenges.

Comparative Insights and Policy Implications

These case studies demonstrate that there is more than one possible solution to the twin challenge of greening and competitiveness. China has continued to deploy the same tried-and-tested measures it has successfully used in the past 4 decades to build new industries. The EU has focused its approach on carbon pricing to steer investments toward green sectors, with less direct support for green R&D. Meanwhile, in the United States, trade, industrial, and sustainable development policy is in a state of extreme flux. Tax credits continue to be the instrument of choice, coupled with protectionist measures to counter Chinese subsidies—and disrupt global trade (Greer, 2025). At the same time, the United States appears to be moving away from disciplines on polluting industries.

There are at least two additional layers of complexity. First, in an age of dwindling government resources, aging populations, and significant potential challenges to future workforce prosperity as a result of third-generation AI-driven robotics, both inter- and intra-sectoral competition for government support is likely to intensify. Second, along with the erosion of the semblance of common ground for green industrial policies since the early 2020s, the institutions of global trade are facing what might well be an existential crisis.

Industrial policy requires long-term stability to bear fruit. A green industrial policy needs more than that. Canada's experience with the consumer carbon tax and the massive policy reversals of the new U.S. administration on climate change and global cooperation demonstrate the need for a relative degree of domestic policy consensus for the successful implementation of major "green" policies. The challenge should not be underestimated: Canada's consumer carbon tax provided a consumer rebate that resulted in a net benefit to 80% of Canadian households (Anmar et al., 2024), and yet it was repealed when fierce critics succeeded in making the policy widely unpopular. None of the observable positive effects (Reshoring Initiative, 2023) of the U.S. IRA ultimately saved its champions from political defeat. In the EU, hard ambition is already giving way to softer targets in the face of political realities.

[15] The estimates vary. The IMF's numbers rely on an idiosyncratic methodology (as in Black et al., 2023, p. 27). On-budget support appears to be around USD 1 billion (Chen & Gençsü, 2019).

5.0 Possible Implications

Previous sections in this report have described in depth, including through some brief case studies, the current trends in green industrial policy, the history that precedes them, and the drivers that impel them. This section aims to unpack some of the key implications: What do those trends mean for global environmental objectives? What do they mean for achieving sustainable development, especially in developing and least developed countries? What do they mean for the world's trade policy community?

The starting point is cataloguing the sorts of economic and environmental impacts that can be expected to result from green industrial policy—impacts that highlight the tensions inherent in the practice of such policy in a world where national economies are tightly interconnected by trade and investment, where inequity and poverty endure, and where we face environmental challenges that are global in scale.

Economic Impacts

To the extent that green industrial policy is successful, a first-order impact will be that a clutch of countries most able and willing to pursue it may come to dominate the sectors they have chosen to support. In particular, this may be the case in sectors where comparative advantage is driven by costly research and innovation and high capital outlays, where success will translate into effective barriers to entry. The importance of research and innovation tends to be relatively greater for firms competing for green markets, given the relative newness of their products and technologies and the dynamic state of play that entails. EVs are a good example, with competitive advantage gravitating to a few manufacturers that have leadership positions in battery innovation, such as BYD, and to manufacturers that have cut deals with innovative leaders, such as CATL (Urquhart, 2025). High entry costs can also be a barrier to entry, with advantage accruing to firms that have invested heavily in charging infrastructure, such as Tesla, and firms with costly established dealership networks, such as Hyundai. Those barriers mean that in such sectors, the result of successful industrial policy will be dominance of the market by relatively few players.

This scenario is economic good news for willing and able states—those with the political will to engage in industrial policy and the fiscal capacity to do so. However, this is a small group (Juhász et al., 2023). Assuming that states will choose to support firms in sectors that have the most significant market potential and help them capture the high-rent portions of value chains, the implication is that success by those few states will crowd out the ability of others to achieve similar economic benefits. This will increase international inequality and aggravate efforts to alleviate poverty. It may also lead to increased geopolitical tension, both among the few leaders and between them and other states from whom trade and investment in high-value sectors is being diverted. As well, dominance by one or a few states in significant sectors or parts of value chains may give rise to concerns around security of supply, leading to on-shoring, friend-shoring, and techno-nationalism.

The scenario of economic dominance by the few, however, offers at least some opportunities for others to pursue their own industrial policies or to derive benefits from the new order,

depending on their circumstances. Comparative advantage in some sectors is based on the presence of resources, as in the case of critical minerals, the burgeoning demand for which looks to be a boon for many resource-rich developing countries. Indeed, there may be a shift in the locus of some legacy sectors to new hosts; for example, if iron comes to be made by techniques that use renewably generated hydrogen—which is challenging to transport—then countries with plentiful renewable energy resources may become the new dominant iron producers, separating the traditional locational marriage of iron and steelmaking (Steelwatch, 2025).

As well, there may be a need for specialized adaptations of technology appropriate for tropical climates that will naturally be developed in the Global South. There may also be significant parts of the dominated value chains that are not easily traded—services such as project development; design, engineering, and construction; and operation and maintenance of solar generating systems must all be delivered locally.

Of course, industrial policy is not always successful. In fact, the proper exercise of industrial policy must be willing to accept inevitable failures and respond accordingly by withdrawing support when it becomes clear that the subject of support will never be able to compete unaided. In such a scenario, the economic implications are quite different. Any fiscal support must be counted as a loss in such a case; however, as noted above, the proper exercise of industrial policy should be ready to accept some losses.

The more problematic impacts are on those other countries that experienced trade and investment diversion as a result of the support granted to that sector. Even where industrial policy is successful, those countries feel the negative impacts of diverted investment; however, in cases where, despite the evidence, support is not withdrawn in a timely manner, those negative impacts are more unfortunate since they are completely unjustified.

The inability to withdraw support at the "right" time (i.e., when it becomes obvious that the supported sector/firm/technology will never be globally competitive) is one of the classic pitfalls of industrial policy, though it can be addressed with institutions, such as regular review and objective criteria for continued support. That inability can be driven by lobbying from the vested interests that support creates or by the reluctance of policy-makers to admit failure and their perception of past support as sunk costs.

Another negative impact could result if the support granted for a particular sector is not needed to spur low-carbon innovation—which would have occurred anyway—but rather is taken as pure rent by firms in return for locating in the granting jurisdiction instead of a competing jurisdiction (Thomas, 2011). Such support is a clear example of "smokestack chasing" and lacks a defining characteristic of "good" green industrial policy support (i.e., a policy that corrects market distortions by inducing beneficial investment that otherwise would not have taken place). Instead, such investment incentives distort investment flows to the detriment of other jurisdictions, and they represent a global welfare loss because they could have been devoted to supporting real innovation.

Environmental Impacts

To the extent that green industrial policy is successful, it should result in lowering costs and prices for critically needed technologies, as supported firms become globally competitive. This could be the result of lower production costs through learning by doing, economies of scale, or innovation by the supported firm(s). The ultimate result is a beneficial increase in the dissemination of goods and technologies that address environmental problems, such as climate change. It is important to note that the environmental benefits that accrue from this result are unlike the economic benefits, which are concentrated primarily in the producing country; if the environmental problem in question is international, then the benefits are also international. For example, China has created massive spillover climate benefits for the rest of the world through its generous support for sectors such as solar photovoltaic, wind turbines, and EVs and their batteries by helping lower the cost of those technologies globally.

Additionally, the fact that green industrial policy helps enable ambitious environmental action is an environmental benefit. Without the promise of jobs and prosperity that typically accompany green industrial policy, the constituency for often costly environmental policies would be consistently lower (Allan et al., 2021).

Where green industrial policy is unsuccessful, the implications are much different. At the domestic level, it means less environmental bang for the buck; that is, in retrospect, it may have been better to simply import the technology or goods than to try to locally produce them. A case study of wind power development in Ukraine found that not only did a competitive domestic sector fail to develop, but deployment of wind power was half or less what it could have been for the same budget, given high domestic production costs (Point Carbon, 2007).

The unsuccessful policy scenario also implies a diversion of investment away from other producers that may diminish global innovative capacity in the supported sector, reducing the sector's beneficial environmental impacts.

Such negative environmental impacts cannot always be seen as unintended consequences. Green industrial policy may have multiple objectives, and there are cases in past and current policy of deliberate trade-offs being made between environmental improvements and achieving such goals as domestic employment, geopolitical advantage, or security of supply chains. However, such a trade-off will often imply policies (e.g., protective tariff walls) that condemn the supported sector to an increasingly uncompetitive existence, which, in the long run, is economically unsustainable.

Implications

Previous sections have made it clear: Current trends lean toward the use of more state-level green industrial policies in pursuit of goals such as national economic development, geopolitical advantage, economic security, and addressing global challenges such as climate change. The general direction of that trend holds true even if the speed and intensity are modulated by the kinds of political headwinds now facing climate ambition in the United States and the EU; politics notwithstanding, the climate crisis is intensifying, and its costs are being more widely felt. This section has shown, however, that green industrial policies are

plagued by inherent tensions, often between the interests of the implementing country and those of other countries.

The raison d'être of trade law and the associated institutions of international economic governance is to mediate such tensions, defining multilaterally what is appropriate behaviour in the context of a globally connected community of nations. Yet our current multilateral accord in the area of green industrial policy, as embodied in the World Trade Organization body of law, may be struggling to play that role effectively. It bears asking what sort of shared understanding might actually address the tensions highlighted here, and whether the trade regime—which is challenged by a historic erosion of multilateralism—is the appropriate place for aspects of any such beneficial agreement.

It bears noting that while there are tensions even in the exercise of successful green industrial policy, they are diminished relative to the tensions that exist in the context of unsuccessful policies. It may be that agreement on the elements of successful policy could be a starting point in elaborating the sort of shared understanding that could guide national policy-makers toward better practice. There is, fortunately, a wealth of expertise on that subject, drawn from decades of experience—both positive and negative—of industrial policy.

6.0 Going Forward: Key considerations and questions

The OECD has warned that uncoordinated support measures can lead to market distortions, retaliatory tariffs, and reduced policy effectiveness. In this context, green industrial policy can help drive decarbonization and technological innovation, but its long-term success depends on transparent policy design, rigorous targeting based on globally agreed benchmarks, and international dialogue to avoid subsidy races, a regulatory race to the bottom, or protectionist backlash. As climate and trade policy become increasingly intertwined, ensuring that industrial policy remains anchored in principles of fairness, sustainability, and global cooperation will be critical.

Good green industrial policies must adequately address the tensions between economic and environmental benefits at the national level, as well as the tensions with trading rules and partners at the international level. Equally importantly, they must offer equitable opportunities to developing and least developed countries to achieve their sustainable development objectives within their limited financial and technical capacities. Balancing these multiple—and sometimes conflicting—demands will require finding answers to some key questions.

National Level: Design and tools for specific contexts and capacities

Economies differ substantially in terms of their sizes, structures, resources, and capacities. These differences will have implications for the design and tools available for green industrial policy. For example, developing countries and least developed countries generally will not have the financial resources to provide large subsidies (even if allowed under the multilateral trade rules). They are also hampered by limited access to green technologies. On the other hand, they may have resource endowments (e.g., critical minerals, green hydrogen, cheap labour) that can be leveraged through well-designed green industrial policies.

In the quest for good green industrial policies, the following questions will have to be addressed at the national level:

- How can green industrial policy be designed to maximize positive impacts and mitigate negative impacts at the purely national level?
- How can policy design take specific country contexts into account, particularly for developing and least developed countries?
- What safeguards need to be built in (e.g., independent monitoring and evaluation, sunset clauses, etc.) to mitigate or avoid rent-seeking and capture by powerful interest groups?

International Level: Trading rules and equity

Green industrial policies by individual countries will impact other countries, particularly through creating incentives or disincentives for trade and investment flows. They can provide powerful positive spillovers, where low-cost technology is provided at scale on the global market. But the use of powerful industrial policy in wealthy countries can also disadvantage poorer countries and contravene international trade rules. Instead of a just global green transition, such policies can lead to a fragmented and more unequal world. Finding the right balance among these objectives would require addressing the following questions:

- When does industrial policy create positive spillovers for trading partners and the global economy? When does it create negative spillovers?
- How can governments tackle those difficult cases where there might be positive impacts of a policy domestically but negative impacts abroad?
- Do the current international trade rules require adjustments to accommodate the pursuit of good green industrial policies by countries or to rein in unhelpful policies not currently covered by the rules?
- What policy structures would help ensure that developing countries have access to clean technologies but are not marginalized in the global green markets of the future?

Cooperation and Collaboration

Governments designing green industrial policies can greatly benefit from research and dialogues, based on evidence and open exchanges, that aim to respond to the above questions. A process of research and debate can also identify how to balance economic and environmental interests at the national level with the need for equity- and rules-based approaches at the international level. Ideally, research and dialogue could aim to produce a set of practical, evidence-based guidance to help countries craft good green industrial policies. Beyond that, however, a process should also identify where international cooperation on trade policy is needed to maximize the potential positive international spillovers of industrial policy choices, or to minimize negative impacts, and how that cooperation might be forged.

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References

Abnett, K. (2024, December 20). *EU's largest political group pushes to weaken combustion engine ban.* Reuters. https://www.reuters.com/world/europe/eus-largest-political-group-pushes-weaken-combustion-engine-ban-2024-12-10/

Allan, B., Lewis, J. I., & Oatley, T. (2021). Green industrial policy and the global transformation of climate politics. *Global Environmental Politics, 21*(4), 1–19. https://doi.org/10.1162/glep_a_00640

Altenburg, T., Andreoni, A., & Chang, H. J. (in press). *Industrial policy at a crossroads: Techno-nationalism, greening and the new hybrids* (Centre for Sustainable Structural Transformation Working Paper Series). SOAS University of London

Altenburg, T., & Rodrik, D. (2017). Green industrial policy: Accelerating structural change towards wealthy green economies. In T. Altenburg & C. Assmann (Eds.), *Green industrial policy: Concepts, policies, country experiences* (pp. 1–20). UN Environment. https://drodrik.scholars.harvard.edu/sites/g/files/omnuum7106/files/dani-rodrik/files/altenburg_rodrik_green_industrial_policy_webversion.pdf

Altenburg, T., Rosendahl, C., Stamm, A., & von Drachenfels, C. (2008). Industrial policy – A key element of the social and ecological market economy. In C. Küsel, U. Maenner, & R. Meissner (Eds.), *The social and ecological market economy – A model for Asian development?* (pp. 134–153). Deutsche Gesellschaft für Technische Zusammenarbe. https://www.idos-research.de/uploads/media/Altenburg_et_al._2008_Industrial_Policy_01.pdf

Altenburg, T. & Strohmaier, R. (2025). Low-emission hydrogen: Global value chain opportunities for latecomers and industrial policy challenges. *Journal of International Business Policy, 8,* 319–340. https://doi.org/10.1057/s42214-025-00217-7

Amsden, A. (1989). *Asia's next giant: South Korea and late industrialization.* Oxford University Press.

Anmar, N., Laurin, M., Bagnoli, P., & Scholz, T. (2024, October 10). *A distributional analysis of the federal fuel charge – Update.* Officer of the Parliamentary Budget Officer. https://www.pbo-dpb.ca/en/publications/RP-2425-017-S--distributional-analysis-federal-fuel-charge-update--analyse-distributive-redevance-federale-combustibles-mise-jour

Archibong, B., Coulibaly, B., & Okonjo-Iweala, N. (2021). *Washington Consensus reforms and economic performance in sub-Saharan Africa: Lessons from the past four decades* (AGI Working Paper 27). Africa Growth Initiative at Brookings. https://www.brookings.edu/wp-content/uploads/2021/02/Washington-Consensus-Reforms.pdf

Asian Development Bank. (2021). *The 14th Five-Year Plan of the People's Republic of China: Fostering high-quality development* (Observations and Suggestions No. 2021-01). https://www.adb.org/sites/default/files/publication/705886/14th-five-year-plan-high-quality-development-prc.pdf

Bermel, L., Cummings, R., Deese, B., Delgado, M., English, L., Garcia, Y., Hess, H., Houser, T., Pasnau, A., & Tavarz, H. (2024). *Clean Investment Monitor: Tallying the two-year impact of the Inflation Reduction Act.* Rhodium Group LLC & MIT Center for Energy & Environmental Policy Research. https://cdn.prod.website-files.com/64e31ae6c5fd44b10ff405a7/66b2bf45bd0dd034beefb5bd_Clean%20Investment%20Monitor_Tallying%20the%20Two-Year%20Impact%20of%20the%20Inflation%20Reduction%20Act.pdf

Bian, L, Dikau, S., Miller, H., Pierfederici, R., Stern, N., & Ward, B. (2024). *China's role in accelerating the global energy transition through green supply chains and trade.* Grantham Research Institute on Climate Change and the Environment, London Public School of Economics and Political Science. https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2024/02/Chinas-role-in-accelerating-the-global-energy-transition-through-green-supply-chains-and-trade.pdf

Bickenbach, F., Dohse, D., Langhammer, R. J., & Liu, W.-H. (2024). *Foul play? On the scale and scope of industrial subsidies in China* (Kiel policy brief). Kiel Institute for the World Economy.

Birdsall, N., de la Torre, A., & Valencia Caicedo, F. (2010, June 4). *The Washington Consensus: Assessing a damaged brand* (Center for Global Development Working Paper No. 213). http://dx.doi.org/10.2139/ssrn.1693969

Bivens, J. (2023, August 14). *The Inflation Reduction Act finally gave the U.S. a real climate change policy.* Economic Policy Institute. https://www.epi.org/blog/the-inflation-reduction-act-finally-gave-the-u-s-a-real-climate-change-policy/

Black, S., Liu, A. A., Parry, I. W. H., & Vernon, N. (2023). *IMF fossil fuel subsidies data: 2023 update* (IMF Working papers 169). https://doi.org/10.5089/9798400249006.001

Boullenois, C., Black, M., & Rosen, D. H. (2025). *Was Made In China 2025 successful?* Rhodium Group LLC. https://rhg.com/wp-content/uploads/2025/05/Was-MIC25-Successful.pdf

Busby, J., Goldman J., & Villalobos, F. (2024). *Can the U.S. and China ease tensions with a clean tech détente?* The Carnegie Endowment for International Peace. https://carnegie-production-assets.s3.amazonaws.com/static/files/Villalobos_Clean%20Tech.pdf

Cavanaugh, J. A., Corbeau, A.-S., Morenhout, T., Bowen, M., & Kaufman, N. (2025, July 14). *Assessing the energy impacts of the One Big Beautiful Bill Act.* Center on Global Energy Policy, Columbia SIPA. https://www.energypolicy.columbia.edu/assessing-the-energy-impacts-of-the-one-big-beautiful-bill-act/

Chang, H.-J. (2002). *Kicking away the ladder: The "real" history of free trade.* Anthem Press.

Chang, H.-J., & Andreoni, A. (2020). Industrial policy in the 21st century. *Development and Change, 51*(2), 324–351. https://doi.org/10.1111/dech.12570

Chen, H., & Gençsü, I. (2019). *South Korea: G20 coal subsidies.* ODI Global.

Christopher, T. (2025, March 6). CNBC host busts out laughing as Trump Sec. Lutnick gets peppered by the co-host. *MediaITE.* https://www.mediaite.com/media/news/cnbc-host-busts-out-laughing-as-trump-sec-lutnick-gets-peppered-by-co-host/

Colman, Z. & Mathiesen, K. (2025, May 19). China's head start on clean energy is shaping the debate on the Republicans' megabill. *Politico.* https://www.politico.com/news/2025/05/19/china-clean-energy-gop-megabill-debate-00355229

Cowan, J. (2025, April 21). *Here's the status of major EV battery plants and projects in Canada.* NTD. https://ntdca.com/heres-the-status-of-major-ev-battery-plants-and-projects-in-canada/

Dahl, J., Leali, G., & Noyan, O. (2024, March 11). The EU ban on combustion car engines is in trouble. *Politico.* https://www.politico.eu/article/why-eu-combustion-car-ban-is-in-trouble-greenhouse-gas-climate-change/

Demirkol, S. (2025, February 15). *Nova Indústria Brasil (NIB) marks one year with R$ 3.4 trillion in investments and industrial growth.* Brazilian NR. https://braziliannr.com/2025/02/15/nova-industria-brasil-nib-marks-one-year-with-r-3-4-trillion-in-investments-and-industrial-growth/

Department of Finance. (2024). *Budget 2024: Chapter 4: Economic growth for every generation.* Government of Canada. https://www.budget.canada.ca/2024/report-rapport/chap4-en.html#s4-2

The Economist. (2022, March 5). *Why industrial decline has been so stark in Brazil.* https://www.economist.com/the-americas/2022/03/05/why-industrial-decline-has-been-so-stark-in-brazil

European Commission. (2020, January 15). *The European Green Deal: Striving to be the first climate-neutral continent.* https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en.

European Commission. (2023, March 16). *Net-Zero Industry Act.* https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/green-deal-industrial-plan/net-zero-industry-act_en

European Commission. (2025a, March 29). *Carbon Border Adjustment Mechanism.* https://taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism_en

European Commission. (2025b, February 26). *Clean Industrial Deal: A plan for EU competitiveness and decarbonisation.* https://commission.europa.eu/topics/eu-competitiveness/clean-industrial-deal_en

Evenett, S., Jakubik, A., Martín, F., & Ruta, M. (2024). *The return of industrial policy in data* (IMF Working Papers 2024, 001). International Monetary Fund. https://doi.org/10.5089/9798400260964.001

Federative Republic of Brazil. (2024). *First biennial transparency report of Brazil to the United Nations Framework Convention on Climate Change.* Ministry of Science, Technology and Innovation. https://unfccc.int/sites/default/files/resource/BRA_BTR1_2024_ENG.pdf

Gabbatiss, J., & Song, W. (2024, October 24). *Q&A: Can 'carbon border adjustment mechanisms' help tackle climate change?* https://www.carbonbrief.org/qa-can-carbon-border-adjustment-mechanisms-help-tackle-climate-change/

Giswold, J. (2024, June 14). *Tallying government support for EV investment in Canada.* Office of the Parliamentary Budget Officer. https://www.pbo-dpb.ca/en/additional-analyses--analyses-complementaires/BLOG-2425-004--tallying-government-support-ev-investment-in-canada--bilan-aide-gouvernementale-investissement-dans-ve-canada

Godoy, J., Freifeld, K., & Shepardson, D. (2025, May 24). *'Little, little screws' one of many hurdles to US-made iPhones.* Reuters. https://www.reuters.com/world/us/little-little-screws-one-many-hurdles-us-made-iphones-2025-05-23/

Government of Canada. (2025, May 27). *Speech from the Throne: Building Canada Strong: A bold, ambitious plan for our future.* https://www.canada.ca/en/privy-council/campaigns/speech-throne/2025/building-canada-strong.html

Greer, J. (2025, August 5). *Why we remade the global order.* Office of the United States Trade Representative. https://ustr.gov/about/policy-offices/press-office/press-releases/2025/august/op-ed-ambassador-jamieson-greer-why-we-remade-global-order

Guerra, A. M., Sahay, T., De Gaspi, R. H., & Allan, B. (2025). *New industrial policy for a new world: Brazil's path to becoming a global green powerhouse.* Net Zero Industrial Policy Lab, Johns Hopkins University. https://www.netzeropolicylab.com/brazil-new-world

Heejin, K. (2024, May 8). Korea pledges $7 billion aid package for EV battery supply chain. *Financial Post.* https://financialpost.com/pmn/business-pmn/korea-pledges-7-billion-aid-package-for-ev-battery-supply-chain

Hidalgo, C.E. & R. Hausmann (2009). The building blocks of economic complexity. *Proceedings of the National Academy of Sciences, 106*(26), 10570–10575. https://doi.org/10.1073/pnas.0900943106

Hughes, A. (2024, May 13). *Honda to postpone plans for EV plant in Canada for at least 2 years*. CBC News. https://www.cbc.ca/news/business/honda-canada-ev-announcement-1.7533402

Ilyina, A., Pazarbasioglu, C., & Ruta, M. (2024, April 12). Industrial policy is back but the bar to get it right is high. *IMF Blog*. https://www.imf.org/en/Blogs/Articles/2024/04/12/industrial-policy-is-back-but-the-bar-to-get-it-right-is-high.

Innovation, Science and Economic Development Canada. (2023, November). *Strategic Innovation Fund: Impact report.* Government of Canada. https://ised-isde.canada.ca/site/strategic-innovation-fund/sites/default/files/documents/impact-report.pdf

International Energy Agency. (2021, July 16). *Korean New Deal: Digital New Deal, Green New Deal, and stronger safety net.* https://www.iea.org/policies/11514-korean-new-deal-digital-new-deal-green-new-deal-and-stronger-safety-net

Irwin, D.A. (2021, March). The rise and fall of import substitution. *World Development, 139,* Article 105306. https://doi.org/10.1016/j.worlddev.2020.105306

Heejin Krugman, P. (2008). Inequality and redistribution. In N. Serra & S. J. E. Tiglitz (Eds.), *The Washington Consensus reconsidered: Towards a new global governance* (pp. 31–40). Oxford University Press.

Joo, J., Paavola, J., & Van Alstine, J. (2023). The divergence of South Korea's Emissions Trading Scheme (ETS) from the EU ETS: An institutional complementarity view. *Politics & Policy Journal, 51*(6), 1155–1173. https://doi.org/10.1111/polp.12566

Juhász, R., Lane, N., Oehlsen, E., & Pérez, V. (2023). *Global industrial policy: Measurement and results* (UNIDO Policy Brief Series: Insights on Industrial Development, Issue 1). https://www.unido.org/sites/default/files/unido-publications/2023-04/IID%20Policy%20Brief%201%20-%20Global%20Industrial%20Policy%20-%20Measurment%20and%20Results%20-%20FINAL%2029-03.pdf

Kiel Institute. (2024). *China's massive subsidies for green technologies*. https://www.kielinstitut.de/publications/news/chinas-massive-subsidies-for-green-technologies/

Krueger, A. O. (1974). The political economy of the rent-seeking society. *American Economic Review, 64*(3), 291–303. http://www.jstor.org/stable/1808883

Lamb, D. M. (2025, May 13). *Canada's multibillion-dollar bets on the EV industry aren't all working out.* CBC News. https://www.cbc.ca/news/canada/ev-investments-canada-facts-1.7533719

Liberal Party of Canada. (2025). *Canada Strong: Mark Carney's plan*. https://liberal.ca/wp-content/uploads/sites/292/2025/04/Canada-Strong.pdf

Lin, J. Y., & Monga, C. (2011). *Growth identification and facilitation: The role of the state in the dynamics of structural change* (World Bank Policy Research Working Paper No. 5313). https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1611526#

List, F. (1841). *Das Nationale System der politischen Ökonomie*.

Lütkenhorst, W., Altenburg, T., Pegels, A., & Auktor, G. V. (2014). *Green industrial policy: Managing transformation under uncertainty* (DIE Discussion Paper 28/2014). https://doi.org/10.13140/2.1.1706.7529

Mathiesen, K., Weise, Z., & Guillot, L. (2024, June 10). A triumphant right's first post-election target: Overturning Green Deal car ban. *Politico.* https://www.politico.eu/article/european-election-green-deal-rollback-europes-far-right-greenhouse-gas-pollution-global-warming/

Mazzucato, M., & Penna, C. C. (2016). Beyond market failures: The market creating and shaping roles of state investment banks. *Journal of Economic Policy Reform 19*(4), 305–326. https://doi.org/10.1080/17487870.2016.1216416

McBride, J., & Chatzky, A. (2019, May 13). *Is 'Made in China 2025' a threat to global trade?* Council on Foreign Relations. https://www.cfr.org/backgrounder/made-china-2025-threat-global-trade

McKinsey & Company. (2022, October 24). *The Inflation Reduction Act: Here's what's in it.* https://www.mckinsey.com/industries/public-sector/our-insights/the-inflation-reduction-act-heres-whats-in-it.

Muresianu, A. (2025, July 25). *How the One Big Beautiful Bill changes green energy tax credits.* Tax Foundation. https://taxfoundation.org/blog/big-beautiful-bill-green-energy-tax-credit-changes/

Myllyvirta, L., Qin, Q., & Qiu, C. (2025, February 19). *Analysis: Clean energy contributed a record 10% of China's GDP in 2024.* Carbon Brief. https://www.carbonbrief.org/analysis-clean-energy-contributed-a-record-10-of-chinas-gdp-in-2024/

Newfarmer, R., Page, J., & Tarp, F. (Eds.). (2018). *Industries without smokestacks: Industrialization in Africa reconsidered.* Oxford University Press. https://doi.org/10.1093/oso/9780198821885.001.0001

Nguyen, P. -V., & Le Cacheux, J. (2025, March 26). Omnibus Directive: A setback for the European Green Deal? *Polytechnique Insights: A review by Institut Polytechnique de Paris.* https://www.polytechnique-insights.com/en/columns/economy/omnibus-directive-a-setback-for-the-european-green-pact/

Pack, H. & Saggi, K. (2006). Is there a case for industrial policy? A critical survey. *World Bank Research Observer 21*(2), 267–297. https://doi.org/10.1093/wbro/lkl001

Phillips, T. (2025, May 12). Brazil's president seeks 'indestructible' links with China amid Trump trade war. *The Guardian.* https://www.theguardian.com/world/2025/may/12/brazil-china-trade-lula-da-silva-trump

Point Carbon. (2008). *Clean energy investment in the former Soviet Union (Ukraine and Kazakhstan): The domestic context* (IISD Clean Energy Investment Project Country Case Study). https://www.iisd.org/system/files/publications/cei_ukraine_kazakhstan.pdf

Prebisch, R. (1950). *The economic development of Latin America and its principal problems.* UN Econommic Commission for Latin America. https://repositorio.cepal.org/server/api/core/bitstreams/08ac817a-864c-4df6-961c-7745a3b2fae9/content

Presidência da Repùblica. (2024, January 26). *Brazil launches new industrial policy with development goals and measures up to 2033.* https://www.gov.br/planalto/en/latest-news/2024/01/brazil-launches-new-industrial-policy-with-development-goals-and-measures-up-to-2033

Organisation for Economic Co-operation and Development. (n.d.). *Agricultural policy monitoring* [Database]. https://www.oecd.org/en/topics/policy-issues/agricultural-policy-monitoring.html

Organisation for Economic Co-operation and Development. (2025). *Government support in the solar and wind value chains* (OECD Trade Policy Papers, No. 288). OECD Publishing. https://doi.org/10.1787/d82881fd-en

Reshoring Initiative. (2023, March 24). *Reshoring and FDI up 53%, a new record.* https://reshorenow.org/march-24-2023/

Rockström, J., Steffen, W., Noone, K., Persson, A., Chapin III, F. S., Lambin, E. F., Lenton, T. M., Scheffer, M., Folke, C., Schellnhuber, H. J., Nykvist, B., de Wit, C. A., Hughes, T., van der Leeuw, S., Rodhe, H., Sörlin, S., Snyder, P. K., Cotanza, R., Svedin, U., … & Foley, J. A. (2009). A safe operating space for humanity. *Nature, 461,* 472–475. https://doi.org/10.1038/461472a

Rodrik, D. (2004). *Industrial policy for the twenty-first century* (CEPR Discussion Papers 4767). https://web.archive.org/web/20130512202801/http:/www.scribd.com/doc/4930237/Industrial-Policy-for-the-21st-Century

Rodrik, D. (2008). *Normalizing industrial policy* (Commission on Growth and Development Working Paper No. 3). World Bank. https://documents.worldbank.org/en/publication/documents-reports/documentdetail/524281468326684286/normalizing-industrial-policy

Ryan, M., & Burman, S. (2024). The United States–China 'tech war': Decoupling and the case of Huawei. *Global Policy, (15),* 355–367. https://doi.org/10.1111/1758-5899.13352

Schweickert, R., & Thiele, R. (2004). *From Washington to post-Washington? Consensus policies and divergent developments in Latin America and Asia* (Kiel Discussion Papers 408). Kiel Institute for the World Economy. https://www.files.ethz.ch/isn/124502/kd408.pdf

Semiconductor Industry Association. (2021). *SIA Whitepaper: Taking stock of China's semiconductor industry*. https://www.semiconductors.org/wp-content/uploads/2021/07/Taking-Stock-of-China%E2%80%99s-Semiconductor-Industry_final.pdf

Senate Committee on Energy & Natural Resources. (2025, May 13). *Chairman Lee introduces bill to end Biden's trillion-dollar "Green New Deal" subsidies* (News release). https://www.energy.senate.gov/2025/5/chairman-lee-introduces-bill-to-end-biden-s-trillion-dollar-green-new-deal-subsidies.

Smart City Korea. (2024, September 20). *Ulsan City, MOLIT-hosted 'Hydrogen City Development Project' competition selection.* Ministry of Land, Infrastructure, and Transport. https://smartcity.go.kr/en/2024/09/20/.

Steelwatch. (2025). *Why green iron trade trade will catalyse steel industry decarbonisation* (Steelwatch Explainer Series). https://steelwatch.org/wp-content/uploads/2025/04/2504_GreenIron-3.pdf

Stiglitz, J. E. (2004). *The post Washington Consensus consensus.* The Initiative for Policy Dialogue. https://www.truevaluemetrics.org/DBpdfs/Development-Economics/Stiglitz-Post-Washington-Consensus-Paper-22536.pdf

Sylla, R. (2024). Alexander Hamilton's report on manufactures and industrial policy. *Journal of Economic Perspectives 38*(4), 111–130. https://theahasociety.org/wp-content/uploads/2025/05/sylla-2024-alexander-hamilton-s-report-on-manufactures-and-industrial-policy-1.pdf

The White House. (2025, July 7). *Ending market distorting subsidies for unreliable, foreign controlled energy sources.* https://www.whitehouse.gov/presidential-actions/2025/07/ending-market-distorting-subsidies-for-unreliable-foreign%E2%80%91controlled-energy-sources/

Thomas, K. P. (2011). *Investment incentives and the global competition for capital.* Palgrave MacMillan.

United Nations Trade and Development Investment Policy Hub. (2022, August 16). *United States of America: $369 billion in investment incentives to address energy security and climate change.* https://investmentpolicy.unctad.org/investment-policy-monitor/measures/4004/-369-billion-in-investment-incentives-to-address-energy-security-and-climate-change-

United States Environmental Protection Agency. (2025, January 28). *Summary of Inflation Reduction Act provisions related to renewable energy.* https://www.epa.gov/green-power-markets/summary-inflation-reduction-act-provisions-related-renewable-energy

Urquhart, T. (2025, April 25). *CATL and BYD battery tech could disrupt the global BEV market.* S&P Global. https://www.spglobal.com/automotive-insights/en/blogs/2025/04/catl-byd-battery-tech-news

Wade, R. (1990). *Governing the market: Economic theory and the role of government in East Asian industrialization.* Princeton University Press. https://doi.org/10.2307/j.ctv346sp7

Wade. R. H. (2014). The paradox of US industrial policy: The developmental state in disguise. In J. M. Salazar-Xirinachs, I. Nübler, & R. Kozul-Wright (Eds.), *Transforming economies: Making industrial policy work for growth, jobs and development* (pp. 379–400). International Labour Organization.

Williamson, J. (2008). A short history of the Washington Consensus. In N. Serra & J. E. Stiglitz (Eds.), *The Washington Consensus reconsidered: Towards a new global governance* (pp. 14–30). Oxford University Press.

Yakub, M. (2024, December 2). *It's up, it's down and everyone is wondering: What is the future of Canada's EV supply chain?* Electric Autonomy Canada. https://electricautonomy.ca/ev-supply-chain/2024-12-02/canada-ev-battery-supply-chain-challenges/

Yeon-woo, L. (2024, March 19). Gov't to allocate $313 bil. for low carbon transition in finance. *The Korea Times.* https://www.koreatimes.co.kr/economy/20240319/govt-to-allocate-313-bil-for-low-carbon-transition-in-finance

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