U.S.-China Economic and Security Review Commission

Staff Research Report

November 14, 2025

Made in China 2025: Evaluating China's Performance

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Executive Summary

Made in China 2025 (MIC2025) exemplifies how China's industrial strategy is a comprehensive mobilization of state resources, private enterprise, and national priorities that has reshaped global technology competition. Across ten key technologies in MIC2025, China has met or exceeded many of the very ambitious global market share, local sourcing, and technology development targets it set for itself in 2015. While it has fallen short on others, in most cases it still made significant gains in each sector. The bottom line is that after a decade of state support, China is more innovative, has moved up the global value chain, and has solidified its status as a global manufacturing powerhouse. In evaluating China's progress, several lessons can be drawn:

- The technologies in which China met most of its targets benefited from consistent, long-term government support, vertically integrated supply chains, and/or economies of scale. These include electric vehicles (EVs), electrical equipment, biopharma and high-performance medical devices, ships, and space equipment. China was already on track to dominate ships and electrical equipment from state support before MIC2025.
- China used multiple interlocking policy tools to support targeted industries and help companies integrate their supply chains and scale up production. These policies included market entry barriers; subsidies, tax breaks, and financial incentives; forced technology transfer policies; equity investments and government guidance funds; and government and state-owned enterprise (SOE) procurement.
- China missed its goals in markets dominated by a small number of strong global incumbents and when Chinese firms struggled to overcome barriers to entry, including extensive upfront investment and specialized intellectual property (IP) tightly controlled by incumbents, leading to mixed results in aviation, new materials, and integrated circuits.
- China was often highly successful in moving up the value chain. China-based firms accounted for nearly one-quarter of the global growth in exports related to the ten MIC2025 sectors between 2015 and 2023, the latest year for which global trade data are available. The growth in Chinese brands' share of EV exports has been particularly rapid, with their share of the EU market alone increasing by over eight times from 2019 to 2023.
- Even when China failed to reach its ambitious MIC2025 goals, China can still point to areas of significant progress for its manufacturing sector. As examples: China did not hit its export goals in advanced rail transport equipment, yet it is now a global leader in the industry. In foundational semiconductors, China fell short of its policy targets but still significantly expanded its manufacturing capabilities and its domestic and global market share, with Chinese production capacity growing more than four times faster than global demand between 2015 and 2023.

Introduction

Ten years ago, China launched its MIC2025 program with the goal of becoming a "manufacturing powerhouse." MIC2025 established a series of often highly ambitious targets within ten technology sectors, seeking to move China up the value chain, reduce reliance on foreign technologies, and expand China's ability to compete in global markets. Now, as the targets reach their deadline, was MIC2025 a success?

Overall, and in many specific instances, China undoubtedly views the answer as yes. While China broadly met its MIC2025 goals in only about half of its focus sectors, these sectoral goals were often highly ambitious. Despite shortfalls in some areas, China has nevertheless been successful in achieving many of its overarching goals and has rapidly built domestically and, in many cases, globally competitive capabilities across the ten MIC2025 technologies. MIC2025 contributed to further strengthening its position as the world's industrial hub. China's sustained investment to expand and upgrade its manufacturing base is creating spillover benefits to innovation and manufacturing efficiency. MIC2025 helped turn China into a formidable peer competitor with the United States and other global manufacturing leaders in many areas of leading-edge technology, enhancing China's ability to innovate in new technologies and further dominate global manufacturing output in the future.

This report evaluates China's progress in meeting the MIC2025 targets and the implications of its progress to date. The following section of the paper reviews MIC2025's report card, summarizing where China met the targets across the ten technologies and the factors that contributed to that success or failure. The subsequent section details China's achievements—or lack thereof—within each technology sector.

Scorecard on Made in China 2025

MIC2025 is a multi-stage industrial master plan by the Chinese Communist Party with the goal of turning China into a "manufacturing powerhouse" and establishing China as the global leader in targeted sectors.[1] While China was already the world's largest manufacturer in 2015, Beijing assessed that its production base was "large but not strong."[2] The policy set 2025 as a key milestone in a multi-stage vision of climbing the technology value chain, culminating with China building "a world-leading technology system and industrial system" by the 100th anniversary of the People's Republic of China in 2049.[3]

MIC2025 aimed to move China up the global value chain and establish manufacturing dominance by targeting state support in ten sectors that Beijing considered strategically important yet underdeveloped. These sectors were:

1) Next-generation information technology (IT) industry, including integrated circuits, information communication equipment, and software;
2) High-end computer numerically controlled (CNC) machines and robotics;
3) Aviation and space equipment, including drone technologies;
4) Offshore engineering equipment and high-tech ships;
5) Advanced rail transportation equipment;
6) Energy-saving and new energy vehicles (NEVs), including electric vehicles (EVs);
7) Electrical equipment, including solar and wind power;
8) Agricultural machinery and equipment;
9) New materials;* and
10) Biopharma and high-performance medical devices.

Under the MIC2025 strategy, China set specific technology development goals within each targeted sector. In 2015, an advisory body created to support MIC2025 published the "Roadmap of Major Technical Domains for Made in China 2025" (more commonly called the Green Book), which contained over 250 specific targets across the ten MIC2025 priority areas.† [4] Although China's government has said the Green Book is non-binding, it is broadly assessed to be semi-official due to the specificity of the targets as well as public endorsement from then–Vice Premier Ma Kai and other officials.[5]

Across the ten sectors, the targets were ambitious, though some were more achievable than others. The targets were set based on technical input from 48 academics and over 400 industry experts and high-level representatives, and they generally grounded these targets in forecasts of market and technological trends.[6] In areas of existing strength—such as shipbuilding and high-speed rail—targets largely aligned with the existing direction of growth. At the same time, some targets were likely adjusted upward to conform with overarching political goals, such as an economy-wide requirement within MIC2025 to reach 70 percent self-sufficiency in "core basic components and key basic materials."[7] Similarly, targets for the semiconductor industry were based on overly optimistic projections.[8]

* This sector included efforts to advance material science capabilities and develop cutting-edge materials for manufacturing, such as graphene.

† Updated technical roadmaps were published in 2017, 2019, and 2023. In addition to revising the targets for the ten MIC2025 sectors, these updates set technical goals for additional sectors, such as construction machinery and new-type display technologies. To keep the research manageable and focus on the outcomes of China's long-term industrial planning, this report focuses on the roadmap detailed in the first Green Book published in 2015. State Strategic Advisory Committee for Building China into a Manufacturing Superpower, 中国制造业重点领域技术创新绿皮书——技术路线图 (2023) [Green Book on Technological Innovation in Major Domains of China's Manufacturing Industry—Technology Roadmap (2023)], December 1, 2023.

To evaluate China's success, this report focuses on three categories of metrics across key sectors:

- China's global market share or number of top global companies by market share.
- Localization ratios, or the share of final products and components sourced domestically.
- Technology development targets focused on establishing domestic production capabilities for specific advanced technologies or products (e.g., narrowbody jets).

Looking at each MIC2025 technology sector as its own category, China broadly succeeded in reaching its ambitious targets in half of the technology sectors. Based on an evaluation of performance targets across these three dimensions, China met or exceeded most of the key goals for energy-saving and new energy vehicles; electrical equipment; biopharma and high-performance medical devices; offshore engineering equipment and high-tech ships; and space equipment, as discussed in detail below. In the remaining MIC2025 priority areas, China's goals were so ambitious that the significant industrial development it achieved lagged behind its timelines and goals. The ways in which China made significant gains even when it fell short of its ambitious targets are noted in the sector discussions. This report also considers the extent to which MIC2025 contributed to significant technological and geopolitical advances that are not encapsulated in the specific metrics (for how the Commission's approach differs to other evaluations, see Appendix I).

Next-Generation Information Technology: Semiconductors

Type of Goal	Target	Met?	Details*
Localization of Production	50 Percent Domestic Market Share in Semiconductors by 2020†[9]	No[10]	16.6 percent self-sufficiency in 2020[11]
Localization of Production	50 Percent Domestic Market Share in Chipmaking Equipment by 2020[12]	No[13]	16 percent self-sufficiency as of Q3 2024[14]
Global Market Share	Over 14 Percent Global Market Share by 2020[15]	No[16]	11 percent of global value added in 2022[17]

Semiconductors, also called integrated circuits or computer chips, process and store digital information and have become ubiquitous in electronics, from smartphones to fighter jets. China's drive to master leading-edge semiconductors has only grown in urgency since MIC2025 was released, as "compute"—the raw amount of digital information a firm or country can process—has become a key ingredient to powering artificial intelligence. In addition to targeting these advanced chips, MIC2025 also aimed at achieving global competitiveness in foundational chips, defined as semiconductors fabricated on 28-nanometer (nm) process nodes or larger, which serve as critical building blocks in most modern electronic devices.‡

China had mixed progress toward its domestic market share goals in semiconductors and the highly specialized equipment required to fabricate them, but it is rapidly increasing its share of global production capacity for foundational chips. It missed the goal of sourcing half of chips used by domestic industry from local suppliers by

* This column explains the actual outcomes achieved by China when data or close proxies are publicly available or provides other context to better understand the evaluation of China's success in hitting its targets.

† Unlike other MIC2025 sectors, the Green Book did not set explicit localization and market share targets for semiconductors and instead provided a baseline scenario that projected China's industry scale and market size. Nevertheless, we will refer to these as goals. It also specified few 2025 deadlines for the semiconductor sector, instead setting most for completion by 2030, with 2020 as an interim milestone. Camille Boullenois, Malcolm Black, and Daniel H. Rosen, "Was Made in China 2025 Successful?" *Rhodium Group (prepared for the U.S. Chamber of Commerce)*, May 5, 2025, 53–54. *https://rhg.com/research/was-made-in-china-2025-successful*; Dan Kim and John VerWey, "The Potential Impacts of the Made in China 2025 Roadmap on the Integrated Circuit Industries in the U.S., EU and Japan," *U.S. International Trade Commission*, August 2019, 17, 18. *https://www.ssrn.com/abstract=3433844*.

‡ Foundational semiconductors are found in nearly all electronic equipment—including consumer electronics, automobiles, industrial equipment, and many weapons systems—which often require multiple foundational semiconductors to operate. For instance, the average vehicle contains over 1,700 semiconductor chips. Advanced logic chips—those produced using <28-nm processes—are used for most advanced computing applications, including high-end smartphones and artificial intelligence.

2020 and is behind on developing an advanced chip-making industry by 2030.[18] However, according to semiconductor analysts Dan Kim and John VerWey, the targets set forth in the Green Book require "highly questionable assumptions and highly optimistic growth projections" and assume "a current level of competitiveness for China's integrated circuit industry that is not necessarily a reflection of reality."[19] Consequently, China's lackluster progress toward hitting these highly ambitious MIC2025 targets is a poor indicator of the gains in China's chipmaking capability, which have been dramatic in some segments of the semiconductor industry. Chinese companies are now significant competitors in foundational semiconductors—China's market share in this segment rose from 19 percent in 2015 to 33 percent in 2023.[20]

- **Overall:** Chinese chipmakers hold only a fraction of the global market across most stages of the value chain, accounting for just 11 percent of total value added as of 2022.[21] Nonetheless, because China's progress is concentrated in segments that have lower value added, like assembly, testing, and packaging (ATP), its role in global supply chains is understated by value-added metrics. Further, while China will likely source just 30 percent of its chips from local manufacturers by the end of 2025, some analysts project that China's rapidly growing fabrication capacity will allow it to reach self-sufficiency in foundational chips by 2030.[22]
- **Advanced semiconductors:** China is behind on localizing production of 20–14-nm chipmaking equipment, as China-based equipment manufacturers met only 9.6 percent of domestic demand in 2023.[23] Many industry analysts assess that China remains at least two years behind the cutting edge. Chinese firms have so far been unable to overcome a large incumbency advantage in the chipmaking business where new entrants struggle to match the rapid pace of innovation by industry leaders.[24] U.S. and partner countries' export controls on chipmaking technology[*] likely further delayed China's efforts to foster an advanced chipmaking industry.[†]
- **Foundational semiconductors:** China's foundational chipmaking industry has expanded at breathtaking speed, though it fell short of its targets. In 2023, China-based firms made up 33 percent of the global wafer production capacity for foundational node logic chips, increasing from 19 percent in 2015.[25] This growth is continuing even as MIC2025 ends. China's mature-node semiconductor capacity grew more than four times faster than global demand from 2015 to 2023, and China-based chipmakers are projected to account for nearly half of new mature-node capacity over the next three to five years.[26] These trends have raised concerns that China will monopolize these lower-value-added segments, which are nonetheless crucial for nearly all applications ranging from automobiles to grid technology.[27]

China's partial success has come at great monetary cost but may have greater strategic value. By 2024, China's state-led investment exceeded $150 billion—roughly three times the funding earmarked for encouraging semiconductor production in the United States under the CHIPS and Science Act.[‡] [28] Extensive state investment has contributed to Chinese state-owned Semiconductor Manufacturing International Corporation (SMIC) overtaking U.S.-headquartered GlobalFoundries in the first quarter of 2024 to become the third-largest foundry,

[*] Beginning in October 2022, the United States introduced country-wide export controls on China for advanced node semiconductors and semiconductor manufacturing equipment and further coordinated with Japan, the Netherlands, and South Korea to limit their exports of equipment to China.

[†] China's SMIC has made important progress on developing advanced semiconductors by acquiring older semiconductor manufacturing equipment technology that was not subject to export controls. It produced the Kirin 9000S chip for Huawei based on a 7-nm process using deep ultraviolet (DUV) lithography machines—which are relatively less advanced than leading-edge extreme ultraviolet (EUV) lithography machines—by pushing DUV to its limits, though at a significant cost to efficiency. While the speed and relative success of these efforts have surprised many industry experts, China nonetheless continues to lag in advanced semiconductor manufacturing capabilities, and the "yield" of these efforts is such that China is likely to have difficulty in using this process as a practical substitute to meet all of its domestic market demand.

[‡] The $150 billion figure refers to total state-led investments made since 2014, including central and provincial government support, while CHIPS Act funding only started in 2023. In May 2024, the Chinese government-supported Integrated Circuit Industry Investment Fund (often called "the Big Fund") closed its third funding round, raising another $47.5 billion in capital. If fully invested in the chip industry, this new funding would bring total investment since 2014 to nearly $200 billion. Ryan McMorrow and Cheng Leng, "China Raises $47bn for Chip Industry in Drive for Self-Sufficiency," *Financial Times*, May 27, 2024. *https://www.ft.com/content/175a36b0-c928-4285-bbc1-41b6026e4f92*; "China Boosts State-Led Chip Investment," *Economist Intelligence Unit*, March 13, 2024. *https://www.eiu.com/n/china-boosts-state-led-chip-investment/*.

with 6 percent of global revenue, according to tech research firm Counterpoint.* [29] SMIC is now behind only South Korea's Samsung and world leader Taiwan Semiconductor Manufacturing Corporation (TSMC). Rapid gains in fabrication capacity for foundational semiconductors could enable China to pursue its familiar playbook: after establishing production capacity that far outstrips global demand and drives down domestic prices, China exports excess supply to undercut competitors and establish global dominance. This is already occurring in segments of the market, with Taiwan's Powerchip announcing that it is pivoting into new, AI-related product lines due to competition from Chinese chipmakers.[30] Even if Chinese chipmakers face pushback or challenges expanding into global markets, capturing China's domestic market itself could hamper the competitiveness of foreign producers, given that China's immense electronics manufacturing sector is one of the largest demand sources for foundational chips; in 2022, China accounted for over 30 percent of global semiconductor purchases, and U.S. firms held over half of market share in China.[31]

High-End Computer Numerically Controlled Machines

Type of Goal	Target	Met?	Details
Localization of Production	80 Percent Domestic Market Share by 2025[32]	No[33]	Roughly 33 percent domestic market share[34]
Localization of Production	80 Percent Indigenous Ball Screws, Guide Rails, and Spindles by 2025[35]	No[36]	Foreign firms still "dominate" hardware and software—for example, controlling 90 percent of China's high-end ball screw market[37]

Important for upgrading manufacturing capabilities, CNC machines are automated, high-speed, precision machine tools that are programmed by machinists to more accurately and consistently shape parts, components, and materials.[38] CNC machines come in many forms, including plasma cutters, lathes, and drills, and are used to make any manufactured product from high-tech parts for aerospace, automobiles, and shipbuilding to lower-tech baseball bats and furniture.[39] The programmability of CNC machines allows the same machine to be used in a variety of contexts; for example, Taiwanese Foxconn and Japanese Fanuc adapted machine tools used in the aerospace sector to mass produce metal iPhone frames.[40]

China missed both key MIC2025 targets for CNC machines. While China held significant domestic market share in low- and mid-tier CNC machines in 2018 (85 and 63 percent, respectively), it only controlled 8 percent of the high-tier market that makes up the bulk of sales, making the indigenization goals very ambitious.† [41] China initially supported the industry through subsidies, but those began to disappear as local governments prioritized robotics, leading to CNC firm bankruptcies and industry consolidation.[42] Thus today, Japanese firms Fanuc and Mitsubishi and German firm Siemens control 69 percent of the Chinese CNC market, leaving Chinese firms with just under a third, far below China's 2025 goal of 80 percent.[43] It is worth noting, though, that China likely at least doubled its

* Though publicly listed in 2021, GlobalFoundries is majority owned by Mubadala Investment Company, a sovereign wealth fund of the Abu Dhabi government. "Mubadala Unit to Raise $950 Mln from GlobalFoundries Stake Sale," *ZAWYA*, May 23, 2024. *https://www.zawya.com/en/wealth/wealth-management/mubadala-unit-to-raise-950mln-from-globalfoundries-stake-sale-uqrlpz2g*.

† CNC machines can be divided into three tiers—high-tier, mid-tier, and low-tier—largely based on a machine's number of axes (i.e., the number of directions in which the machine can move relative to the material it is manipulating). High-tier CNC machines have at least four axes, mid-tier have three, and low-tier are the simplest machines and often have lower reliability. "Difference between 3-Axis, 4-Axis, and 5-Axis Milling," *DATRON*, accessed August 22, 2025. *https://www.datron.com/resources/blog/difference-between-3-axis-4-axis-and-5-axis-milling*; "中国高端机床行业发展趋势分析与投资前景研究报告（2024-2031 年）" [Analysis of Development Trends and Investment Outlook in China's High-End CNC Industry Research Report (2024–2031)], *Insight and Info*, accessed August 22, 2025. *https://web.archive.org/web/20250822185112/https://www.chinabaogao.com/baogao/202402/693857.html*.

total domestic market share of high-tier machines in just a few years.* Chinese firms also remain heavily reliant on components, operating hardware, and software from Fanuc and Siemens.[44]

Chinese firms have made further inroads in low- to mid-tier CNC machines, though market share gains have come with price cuts that have eaten into profitability. Despite Chinese companies' relatively low share of the domestic CNC machine market as a whole, analysts say they "dominate" in low- to mid-tier machines, having achieved over 99 percent domestic market share in low-end machines.[45] Chinese companies largely compete on cost; for example, in 2024, Chinese CNC machine manufacturers experienced 5.2 percent declines in revenue and 76.6 percent declines in profit.[46] In addition to domestic market share gains, China has been a net exporter of CNC machines since 2021.[47] Many of those exports are the result of sales by foreign firms that moved production to China, indicating that while China has successfully increased global dependency on its manufacturing base, it has struggled with indigenous innovation in this sector.[48]

Chinese CNC Machines and Semiconductors Vital to Russia's Defense Industrial Base†

China's increasing share of global exports is boosted by CNC machine sales to Russia after many European companies stopped supplying Russia in 2022. China replaced the EU as Russia's primary machine tool supplier in 2022 and more than doubled its machine tool exports to Russia between 2022 and 2023.[49] The Economic Security Council of Ukraine found that from January 2023 through July 2024, 62 percent of Russian CNC machine imports and over half of CNC component imports came from China—both Chinese manufacturers and the subsidiaries of European manufacturers.[50] Despite February 2024 sanctions imposed by the United States on companies selling CNC machines to Russia, CNC resellers have continued targeting Chinese firms when advertising their ability to access the Russian market, suggesting that Chinese CNC machines continue to find a market in Russia.[51]

Chinese manufacturers are also meeting Russia's demand for other high-tech products, including semiconductors.[52] Extensive evidence demonstrates Chinese sales to Russia of semiconductors used in weapons. According to the *Financial Times*, U.S. officials found that China supplied 90 percent of the Russian defense industrial base's chip imports in 2023.[53] While some of those chips are transshipped U.S. products, customs documents have shown Chinese companies shipping semiconductors to Russian defense suppliers, and Chinese semiconductors have been found in Russian weapons used to attack Ukraine.[54]

Robotics

Type of Goal	Target	Met?	Details
Localization of Production	70 Percent Domestic Market Share by 2025[55]	No	52 percent domestic market share[56]
Localization of Production	Key Components 70 Percent Indigenous by 2025[57]	Mixed	30 percent indigenous overall, 80–90 percent in mid-tier[58]
Global Market Share	1–2 Top Five Global Companies by 2025[59]	Yes	1 company[60]

China's progress toward its MIC2025 goals for market share of robotics is mixed, though it was boosted in 2016 when a Chinese company acquired leading German robotics firm Kuka. China missed its market share target but still almost tripled its domestic firms' share from 2015 to 2024 at the same time the number of annual industrial robot installations also tripled.[61] Missing its market share target also disguises that China now accounts for 41 percent of the world's installed industrial robots.[62] Indigenous Chinese firms have also integrated supply chains for

* Due to lack of consistently comparable annual data, it is difficult to confirm the exact growth. Specific breakdowns by tier are not available for 2015. Between 2018 and 2022, Chinese firms about doubled domestic market share in high-tier machines—from 8 percent to 16 percent. Data to disaggregate the 2024 numbers to identify China's more recent high-tier market share are not available. "中国高端数控机床迎来国产替代" [China High-End CNC Machines Invites Domestically Produced Replacements], *Frost and Sullivan*, July 24, 2023. *https://www.frostchina.com/content/insight/detail/65d56e17a2aa84f5d8547dd7*.

† For more on China's support for Russia's defense industrial base, see U.S.-China Economic and Security Review Commission, Chapter 3, "Axis of Autocracies: China's Relations with Russia, Iran, and North Korea," in *2025 Annual Report to Congress*, November 2025.

low- and mid-tier robots, but despite government subsidies, tax incentives, and multiple equity investments in and acquisitions of foreign firms, Chinese firms have struggled to acquire the IP or scale up components for high-tech robots, leading to firms that compete well in terms of unit sales but not in terms of unit value.[63] Government support is now shifting to humanoid robots, potentially allowing China to reduce foreign dependencies by leapfrogging into more advanced robotics technology.

- **Domestic market share:** While Chinese firms have made gains from 2015 when they controlled 18 percent of the domestic market, they are not on track to meet 70 percent this year.* [64] Chinese firms' failure to meet this ambitious target hides their success in almost tripling their market share in nine years, with Chinese firms claiming over half the domestic market by the third quarter of 2024.[65]
- **Components:** Ambitious targets also hide China's progress in robot components. China's total localization rate for robot components is only 30 percent, but China has become 80 to 90 percent self-sufficient in mid-tier components.[66] China's low total rate is due to dependence on imports for advanced components (e.g., 50 percent of advanced sensors, 70 percent of actuators, and 90 percent of ball screws are imported).[67] To expand market share in advanced components, Chinese firms have taken stakes in or acquired U.S. and European software and hardware companies, but the dominance of advanced Japanese and European firms could make it difficult for Chinese companies to acquire the cutting-edge IP necessary to imitate and iterate on their competitors' designs.[68]
- **Top global companies:** China met its goal of having one or two of the top five global robotics companies, though it did so through the Chinese acquisition of a large German robotics company. China has one firm in the global top five—Kuka—accounting for 11.5 percent of the global market.[69] Kuka is a German robotics firm that was acquired by Chinese conglomerate Midea in 2016, so while it does not fully represent indigenous innovation, it does represent significant Chinese control of the robotics industry.[70] Kuka's robotic arms are also being used to automate Chinese military production lines.[71] Major indigenous robotics firms Estun, Siasun, and EFORT have each captured less than 2 percent of the global market by value, highlighting that their success comes from competition on price in lower-tier models.[72] By comparison, the smallest of the "Big Four" robotics companies, ABB, controls 8.7 percent of the global market by value.[73] Midea's acquisition of Kuka—the second-largest robotics firm by value and one of the "Big Four" robotics companies—means that China has met its "top global companies target," regardless of which metric is used, and is positioned to succeed at both the low and high end of the market.[74]

Agricultural Machinery and Equipment

Type of Goal	Target	Met?	Details
Localization of Production	Output of Agri-Machinery Sector Reaches 800 Billion Renminbi (RMB) ($112 Billion) by 2025 [75]	No[76]	Combined main business revenue of 260 billion RMB in 2024[77]
Localization of Production	95 Percent Domestic Market Share by 2025[78]	Mixed[79]	90 percent market share as of 2023, with some segments exceeding 95 percent, like small tractors[80]
Localization of Production	60 Percent Domestic Market Share in High-End Products by 2025[81]	No[82]	Foreign brands hold 80 percent of domestic high-end market[83]

China fell short of most of its agri-machinery targets, despite growing food security concerns.[84] China's market share targets did not seem particularly ambitious because domestically produced equipment already held 90 percent

* Chinese firms' market share was 51.6 percent in Q1–Q3 2024. It would require an 18.4 percentage point gain between 2024 and 2025 to meet China's target, which would be inconsistent with historical trends, given that China's most impressive gain was 9 percentage points from 2022 to 2023. "2024 年前三季度工业机器人销量同比增长 5%, 国产品牌市场份额再创新高" [In the First Three Quarters of 2024, Industrial Robot Sales Grew 5 Percent, Domestic Brands' Market Share Hit a New High], *MIR*, November 15, 2024. *https://web.archive.org/web/20250310183709/https://mp.weixin.qq.com/s/x8_yxeXJj41H528Mp0xm6g*.

market share in 2016, according to the China Agricultural Machinery Industry Association.[85] This share remains unchanged as of 2023, and China appears on track to miss the 2025 target of 95 percent market share. While domestic firms are gaining momentum in most market segments, China was notably less competitive in high-end products.* [86] The domestic tractor industry remains primarily geared toward models with 200 horsepower or below, while higher-powered machines needed for large-scale farming operations were and continue to be predominantly sourced from abroad.[87] China similarly relied on foreign producers for specialized agricultural machines, like cotton-harvesting technology and combine harvesters.[88] MIC2025 aimed to reduce this dependency and advance agricultural mechanization by promoting domestic alternatives, but so far local manufacturers have failed to match the reliability, sophistication, and market share of leading foreign firms in the high-end segment.[89]

In 2020, the entire revenue of China's domestic agri-machinery industry was roughly equal to that of John Deere's global agri-machinery segment revenue—roughly $26 billion (170 billion RMB).[90] One expert estimated that foreign brands continue to account for over 80 percent of high-end sales in China in spite of a high premium, suggesting that foreign-owned brands are viewed as being more reliable and higher quality.[91] China has also struggled to localize upstream component manufacturing, leaving domestic firms heavily reliant on imported parts for high-end agricultural machinery.[92] Nonetheless, foreign production inside China appeared to contribute to China's share of global exports of agri-machinery, which rose from 9.3 percent in 2015 to 11.6 percent in 2023.[93]

Where they have made inroads, Chinese manufacturers' increasing share of higher-end market segments owes largely to lack of access to foreign brands. For instance, Chinese cotton pickers now dominate the domestic market, following U.S. restrictions on transactions with entities that exploit Uyghur forced labor in Xinjiang, China's main cotton-producing region.[94]

New Materials

Type of Goal	Target	Met?	Details
Localization of Production	Advanced Foundational Materials 90 Percent Domestic Market Share[95]	Unclear	Broad range of materials covered, difficult to evaluate[96]
Localization of Production	Critical Strategic Materials 85 Percent Domestic Market Share[97]	Unclear	Broad range of materials covered, difficult to evaluate[98]

It is difficult to measure China's progress in "new materials" because of the category's sheer breadth. The MIC2025 definition includes "advanced foundational materials" like petrochemicals, "critical strategic materials" such as special alloys, and "frontier new materials" like lab-developed nanomaterials.[99] Additionally, new materials are mostly inputs to other products, making it hard to gauge market share.

Measuring the ambition of China's goals is also difficult for similar reasons. Depending on the sector, application of new materials requires highly advanced equipment, like the autoclaves used to fashion airplane wings from carbon fiber and other composite materials. In other words, commercial success in new materials can owe to advances not only in materials science but also in machine tooling and production techniques. Well before the start of MIC2025, China had achieved commercial advances in composites through foreign joint ventures (JVs) and acquisitions, including an aerospace composite materials JV with Boeing and Hexcel and the acquisition of German machining and tooling firm Krauss-Maffei.[100] China also supported the growth of the new materials industry through seven manufacturing innovation centers and preferential support for almost 2,000 new materials "Little Giants."[101] However, China remained dependent on the United States for new material applications with the most market value.

* The exact scope of high-end machinery targeted by China is not clear, though the Green Book provided two examples of high-horsepower (hp) (>200 hp) tractors and harvesters, and the category also includes machines with features that increase yield, like intelligent seeding and harvesting technology, precision seeders, and satellite navigation guidance systems. Exact data in the segment in public sources are challenging to identify. It is clear, however, that while Chinese producers dominate at the low end, which is a large part of its total market, foreign brands continue to be responsible for between 80 and 90 percent of high-end agri-machinery with >200 hp.

The general consensus in Chinese sources is that progress toward the MIC2025 targets is lackluster. Former Chinese Academy of Engineering vice president Yong Gan described China as a second-tier new materials country behind the United States, Japan, and the EU, while an April 2024 analysis by the *South China Morning Post* determined that new materials had the lowest completion rate of MIC2025 goals across the ten sectors.[102] Measuring research rather than market indicators, China underperforms in novel and breakthrough discoveries and lags in investment intensity in research and development (R&D) and science and technology (S&T) applications of new materials.[103] Job prospects are also less attractive than other science, technology, engineering, and mathematics (STEM) fields, and China's talent pool for materials science has grown slower as a result. Enrollment in related programs increased 14 percent from 2016 to 2023 versus 62 percent for computer science over the same period.[104]

Nonetheless, China made demonstrable strides in certain materials, especially composites essential for manufacturing in other targeted sectors, and overall industry growth indicators are strong. According to China's Ministry of Industry and Information Technology, China was on track to meet 14 years of consecutive double-digit growth in its new materials industry by November 2024.[105] At 43 percent of global production, China is the world's largest producer of mid-range carbon fiber, in part as a result of demand for wind turbine blades that drove Chinese annual production capacity from over 20,000 tons in 2019 (17.3 percent of global capacity) to roughly 120,000 tons in 2023 (47.7 percent of global capacity).[106] The domestic share of Chinese-made carbon fiber also grew explosively from 12.5 percent in 2015 to over 60 percent in 2023.[107] While China may fall short of its 85 percent target for critical strategic materials, it continues to invest heavily in carbon fiber production, including a facility in Xinjiang that is projected to produce 50,000 tons of carbon fiber annually by 2028.[108] By contrast, China met its 2025 goal of producing over 10,000 tons of high-quality graphene powder annually by 2021, due in part to policy efforts focused on graphene and a "graphene craze" that increased demand as inventors searched for novel applications.[*] [109]

Aviation

Type of Goal	Target	Met	Details
Technology Development	Deliver 150-Seat Narrowbodies by 2020[110]	No	First narrowbody delivered in 2023[111]
Technology Development	Deliver 280-Seat Widebodies by 2025[112]	No	China's widebody jet model is in the detailed design phase[113]
Localization of Production	Mainline Aircraft 10 Percent Domestic Market Share by 2025[114]	No	7 percent domestic market share[115]
Global Market Share	Turboprops 10–20 Percent Global Market Share by 2025[116]	No`	Negligible sales outside China[117]
Global Market Share	General Aviation 40 Percent Global Market Share by 2025[118]	No	China's two largest aviation companies (AVIC and AVIC-owned Cirrus)[†] account for 2 percent of the top 100 aerospace firms' revenue[119]
Global Market Share	Helicopters 15 Percent Global Market Share by 2025[120]	No	U.S. and European companies account for at least 90 percent of the global market[121]
Technology Development	Commercialize CJ-1000A Engine by 2025[122]	No	The CJ-1000A is in a trial phase and has yet to be tested on a C919[123]

In 2015, the state-owned Commercial Aircraft Corporation of China (COMAC) unveiled the C919, promising its first flight in 2016 and its first of over 500 orders to be fulfilled in 2019.[124] Yet China fell short of its seemingly

[*] Graphene is a nanomaterial with emerging applications in solar, lithium-ion batteries, electronics, automobiles, and other fields.
[†] In 2011, AVIC, through one of its subsidiaries, acquired the U.S.-based light aircraft manufacturer Cirrus. Brooke Sutherland, "Ties to China Weren't a Problem. Now They Are," *Bloomberg*, July 19, 2023. *https://www.bloomberg.com/opinion/articles/2023-07-19/ties-to-china-weren-t-a-problem-for-cirrus-aircraft-now-they-are*.

achievable goals in aircraft manufacturing, with the C919's maiden flight delayed to 2017 and its first order unfulfilled until 2023.[125] Despite setting up multiple JVs with foreign aviation firms to access foreign IP, China struggled to overcome technical barriers in a sector where vital IP and knowhow is tightly held by a few incumbents.* [126] COMAC only delivered 13 of its narrowbody C919 jets in 2024, meeting 7 percent of domestic demand versus a 10 percent target, and China's decade-long project to commercialize the CJ-1000A jet engine for use in the C919 also has yet to yield results.[127] Moreover, there is no indication domestic sales will lead to export success. The C919 has a shorter range and higher fuel consumption than peer models, and only Chinese-owned airlines have confirmed orders of the C919.† [128] The C919 also faces barriers to entering U.S., European, and many global markets because it has not pursued an internationally recognized airworthiness certification from the U.S. Federal Aviation Administration, and the EU Aviation Safety Agency, which began the C919's safety evaluation in 2021, has said it will not be able to certify the jet model until 2028 at the earliest.[129] Nonetheless, China persists in its attempts to develop domestic jets and build domestic capabilities, supply chains, and talent that could later contribute to a breakthrough or advances in adjacent industries. Its large, insulated domestic market dominated by state-owned airlines provides guaranteed revenue as COMAC continues to develop the jet; in September 2023, COMAC reported 1,061 orders had been placed for the C919, according to Chinese state media.[130]

COMAC has had more success with its smaller regional jet, the C909 (previously known as the ARJ21). China produces 20 to 30 annually and has not purchased foreign-branded regional jets since C909 deliveries began in 2015, causing Brazilian competitor Embraer to close its plant in Harbin.[131] Despite the C909 having inferior range and fuel consumption to comparable jet models, a Chinese-owned airline in Indonesia deployed the first C909 jets overseas in April 2023, and in 2025 Lao Airlines and VietJet Air became the first non-Chinese-owned airlines to operate them.‡ [132] The C909 successfully completed its first international flight in July 2025 from Hohhot, China, to Ulaanbaatar, Mongolia.[133] According to *Travel and Tour World*, 149 C909s are now in service and 380 are on order.[134]

China's investments in aviation also have dual-use applications for China's fighter jet and military transport programs.[135] One notable example is its CJ-1000A engine program, which is run by a company jointly founded by COMAC and China's military aircraft manufacturer.[136] However, it is unclear to what extent commercial developments aid military programs and vice versa.[137] For example, while many countries—including China—have successfully developed quality military jet engines, only three global companies produce commercial jet engines.[138]

Chinese Drone Dominance Creates U.S. Dependency

China dominates the global commercial drone market in spite of setting vague and qualitative goals, unlike other MIC2025 aviation technologies.§ Chinese firm DJI commands almost 70 percent of the global drone market,

* Notably, the C919's avionics—the electronics on an aircraft encompassing navigation and complex flight control systems—were provided by AVIAGE Systems, a JV formed in 2011 between U.S. firm General Electric and Chinese state-owned aerospace giant Aviation Industry Corporation of China. Jennifer Villareal, "GE Aviation Provides Advanced Systems on the C919 First Flight," *GE Aerospace*, May 5, 2017. *https://www.geaerospace.com/news/press-releases/systems/ge-aviation-provides-advanced-systems-c919-first-flight*.

† While Brunei-based and partially Chinese-owned GallopAir announced C919 orders in 2023, a May 2025 report by the *South China Morning Post* shows that those orders are not confirmed. Ralph Jennings and Xiaofei Xu, "China's C919 Stuck on Tarmac in Europe as Certification Timeline Extended," *South China Morning Post*, May 1, 2025. *https://www.scmp.com/economy/china-economy/article/3308546/chinas-c919-stuck-tarmac-europe-certification-timeline-extended*.

‡ In September 2025, Air Cambodia agreed to purchase C909 jets, although it has yet to start operating them. Zou Xiaotong and Denise Jia, "China's Homegrown C909 Jet Finds New Lift in Southeast Asia with Cambodian Deal," *Caixin Global*, September 11, 2025. *https://www.caixinglobal.com/2025-09-11/chinas-homegrown-c909-jet-finds-new-lift-in-southeast-asia-with-cambodian-deal-102361213.html*.

§ The Green Book does not explain why China set vague goals for drone development. In 2015, DJI was already the leading drone firm, holding 50 percent of the North American market. Just after MIC2025 was published, Chinese state-owned media also highlighted DJI's internationally recognized position. Experience had not yet shown the full extent to which consumer drones can have broad military benefits, even for a well-resourced military. It is possible Beijing did not see an urgency to setting more specific goals for its drone industry. Sally French, "Drone Sales in the U.S. More than Doubled in the Past Year," *MarketWatch*, May 28, 2016. *https://www.marketwatch.com/story/drone-sales-in-the-us-more-than-doubled-in-the-past-year-2016-05-27*; Yang Yangteng, "把"飞翔梦"做到完美——记大疆创新科技有限公司董事长汪滔" [Perfecting a "Flying Dream"—Story on DJI's President Wang Tao], *Economic Daily*, May 26, 2015. *https://web.archive.org/web/20250516131325/https://www.most.gov.cn/ztzl/zmkjry/rwzf/wt/201506/t20150601_119771.html*.

including over 90 percent of the global consumer drone market.[139] DJI has achieved this dominance through subsidies and investments from central and local government entities; its vertically integrated supply chain from raw metals through avionics, sensors, and assembly; the automation of crucial parts of the production process; and the use of aggressive pricing models.[140] Drones and related technology are also being widely adopted as part of China's "low-altitude economy" initiative in food and e-commerce delivery and flying cars for tourism.[141] In the United States, DJI accounts for over 90 percent of the commercial drone market, and U.S. companies, consumers, and even government agencies rely on Chinese drones.[142] U.S. drone users—including firefighters, law enforcement officers, and federal drone operators—complain that alternatives to DJI have low reliability and capabilities and relatively high costs.[143] In 2022, the U.S. Department of Defense added DJI to the Section 1260H list of Chinese military companies, and in 2025, the Office of Information and Communications Technology and Services (OICTS) at the U.S. Department of Commerce's Bureau of Industry and Security opened a proceeding to examine national security implications of drones designed, developed, manufactured, or supplied by China.[144]

Space-Related Targets

Type of Goal	Target	Met?	Details
Technology Development	Develop New Launch Rocket Models[145]	Yes[146]	New launch rocket models include the Long March 5 heavy-lift rocket and the Zhuque-2 Y-3 methane-liquid oxygen rocket[147]
Technology Development	Global Satellite Observation, Communication, and Positioning Coverage[148]	Yes[149]	Attained global coverage in 2020[150]
Technology Development	Land Exploratory Equipment on Mars by 2021[151]	Yes[152]	Deployed a rover to Mars in 2021[153]
Technology Development	Complete a Space Station by 2020[154]	No[155]	Completed in 2022[156]
Technology Development	Collect Lunar Samples by 2020[157]	Yes[158]	Collected in 2020[159]

Long-term government investment helped China meet its civil space goals across the board.[160] As space was only opened up to the private sector in 2014, the year before MIC2025 was announced, China's success in hitting its space-related targets has largely been driven by SOEs.[161] Ambitious but achievable, China's varied objectives for improving launch capabilities, completing its GPS rival BeiDou, and reaching a number of space exploration milestones demonstrate China's state-led system working as planned. The successes enhanced China's geopolitical stature and contributed to its advances in a range of dual-use applications of commercial space assets.

- **New launch rocket models:** China met its goal of developing new launch rocket models, including heavy-lift rockets that enabled space station construction.[162] In the five years before 2015, China averaged 16 launches a year, and launches more than quadrupled to 68 in 2024, though they remain far fewer than in the United States.[163] Chinese rockets remain more expensive to launch than U.S. SpaceX's, and although Chinese commercial launch companies are behind in many ways (e.g., lacking a reusable launch capability), they have occasionally out-innovated U.S. companies.[164] For example, Chinese LandSpace beat Blue Origin and United Launch Alliance in the race to launch a rocket with methane-liquid oxygen, a fuel seen as cheaper and less carbon emission intense.[165]
- **Satellite coverage:** China met its goal for global observation, communication, and positioning satellite coverage by completing the BeiDou satellite constellation in June 2020.[166] Today, BeiDou is almost twice the size of the U.S. GPS constellation and has over ten times as many Earth-based monitoring stations, which could make BeiDou more accurate than GPS in many parts of the world, especially in the Asia Pacific region.[167]
- **Mars:** China landed exploratory equipment on Mars in 2021.[168]

- **Space station:** While China missed its 2020 target, it launched the core of its Tiangong space station in 2021, completing the station in 2022.[169] It also launched a crewed space lab, Tiangong-2, in 2016, building on its first crewed space lab, Tiangong-1, just five years before.[170]
- **Lunar samples:** China met its goals to collect lunar samples by 2020 and also collected the first-ever far-side lunar samples in its 2024 Chang'e-6 mission.[171]

As noted, most of the above was driven within the government or by SOEs. In just ten years of commercial space investments, programs under MIC2025—including subsidies, use of state-backed investment funds, state-supported manufacturing facilities, the transfer of military technology to private firms, and the recruitment of private firms for defense research and procurement—have also yielded significant growth. In 2023, around 25 percent of China's rocket launches were commercial, and a commercial launch site began operating in November 2024.[172] The number of private space companies set up in this short time span, with roughly 50 seen as competing with rival SpaceX, has set the stage for rapid acceleration in space manufacturing and technological innovation.[173]

Maritime Engineering Equipment and High-Tech Maritime Vessel Manufacturing

Type of Goal	Target	Met?	Details
Global Market Share	50 Percent for High-Tech Vessels by 2025[174]	Mixed[175]	Chinese shipyards secured 48 percent of new orders for liquified petroleum ships but only 38 percent for liquified natural gas vessels[176]
Global Market Share	More than Five Internationally Renowned Shipbuilders[177]	Yes[178]	Five of top ten shipbuilders in 2024 were Chinese[179]
Technology Development	50 Percent of Key Systems and 80 Percent of Key Equipment Produced Domestically[180]	Mixed[181]	Localization rate estimates range between 40 and 60 percent[182]

Following a playbook of subsidies,* predatory practices, and undercutting competitors, China was already on track to dominate global shipbuilding in 2015, and the ambition of its MIC2025 goals reflected trends that were already underway.[183] China delivered 36 percent of the world's ships by tonnage in 2015, up from 5 percent in 1999.[184] China built on this progress over the course of MIC2025, delivering 53 percent in 2024.[185] By comparison, U.S. shipbuilders built just five ships in 2022, equivalent to 0.2 percent of global tonnage.[186] In addition to placing China at the center of global maritime trade, China's shipbuilding capabilities are inherently dual use and support the expansion of its naval power.

- **Conventional ships:** China has virtual dominance in bulk carriers that underpin global commerce; Chinese-built ships make up 41 percent of the active global bulk carrier fleet, a share that is likely to grow.[187] In 2024, Chinese shipyards captured 75 percent of new global orders for oil tankers and bulk carriers and over 80 percent of orders for containerships.[188] Between 2019 and 2024, more than 70 percent of Chinese-built vessels (by tonnage) were delivered to non-Chinese owners.[189]
- **Specialized ships:** China is also gaining market share in some higher-value ships, with Chinese shipyards overtaking South Korea in securing orders for liquefied petroleum gas tankers in 2024.[190] In 2023, China's first domestically built mega cruise ship entered commercial service, meeting a goal to develop a 100,000-ton vessel by 2025 ahead of schedule.[191] It is a major producer of ultra-large container vessels, with its shipyards having built seven of the ten largest containerships, each capable of carrying 24,000 twenty-foot equivalent units (TEUs) of containerized cargo.[192] In April 2025, China delivered the world's largest dual-fuel ultra-large containership, which reduces emissions by running on both conventional fuel and liquified natural gas (LNG).[193] Although China continues to lag behind South Korea in building LNG tankers, which are among the most technologically complicated ships,† its shipbuilding capacity has grown rapidly.[194] Chinese shipyards accounted for roughly 20 percent of global LNG vessel deliveries in 2024 and secured 38 percent of new global orders for LNG ships in 2024.[195] However, some analysts project that lingering concerns over the quality of Chinese LNG ships may slow growth.[196]

China's buildout of its shipping industry has also advanced its military modernization, as many of its shipyards are dual use and build both commercial vessels and ships for China's navy, coast guard, and maritime militias.[197] Around 40 percent of China's annual ship production comes from shipyards with strong links to the military.[198] Military naval production has picked up since MIC2025 began, with China's navy adding 78 warships between 2015 and 2023 while the United States added 20.[199] Steady foreign demand for Chinese ships also keeps dual-use production lines active, sustaining a robust shipbuilding capacity that could be used to ramp up military production.[200]

* China has invested heavily to build its shipping industry for over two decades, with shipyards receiving subsidies worth an estimated $91 billion between 2006 and 2013 alone. Panle Barwick, Myrto Kalouptsidi, and Nahim Bin Zahur, "Industrial Policy: Lessons from Shipbuilding," *Centre for Economic Policy Research*, November 5, 2024. *https://cepr.org/voxeu/columns/industrial-policy-lessons-shipbuilding*.

† LNG tankers are among the most technically demanding and complex vessels to build, requiring advanced engineering to safely transport LNG at temperatures below minus 160 degrees Celsius.

Section 301 Investigation Finds China Undercut U.S. Producers

China's massive drive to control the shipbuilding sector poses economic and national security threats to the United States. The Office of the U.S. Trade Representative (USTR) completed a Section 301 investigation in January 2025 that found Chinese government support has unfairly advantaged Chinese shipbuilders and undercut U.S. producers.[201] The report found that China's objective "is not to foster more competitive markets and fair competition" but to "give it market power over global supply, pricing, and access" and "ultimately displace foreign competitors throughout the maritime value chain."[202] Some of its so-called "advantages" include unenforced labor rights, forced labor, low input costs due to excess capacity in steel and other upstream industries, and contracts that force customers to source engines and subcomponents from China even when Korean and Japanese parts are preferred.[203] As of November 9, 2025, the United States has currently suspended trade actions taken under the Section 301 investigation for one year.* [204] In addition, the United States is pursuing efforts to bolster its domestic shipbuilding industry, including the April 2025 executive order on "Restoring America's Maritime Dominance" and ongoing legislative discussions on the SHIPS for America Act.[205]

Advanced Rail Equipment

Type of Goal	Target	Met?	Detail
Global Market Share	Global Sales Account for 40 Percent of Industry Sales[206]	No[207]	CRRC's global sales reached 16 percent of total rolling stock revenue[208]
Technology Development	Develop High-Speed Trains That Can Reach 350 km/h[209]	Yes[210]	17 rail lines operating at 350 km/h, and CRRC is in the process of deploying a train capable of 400 km/h operating speeds[211]

China's domestic high-speed rail industry expanded at breakneck speed, which meant it could not grow internationally. Moving forward, it is likely that Chinese competitors will attempt to dominate international markets. And China did hit its key technology development milestone. In 2015, the year MIC2025 was released, China's high-speed rail network had already grown to over 12,000 miles from just 417 miles in 2008, eclipsing the network length in all other countries combined.[212] This momentum continued during the MIC2025 period, with China's network more than doubling in size to 27,984 miles between 2015 and 2023 and accounting for almost all global high-speed rail expansion over the period—explaining challenges boosting the proportion of international sales.[213]

- **Technology development and self-sufficiency:** Technology transfer from global railway leaders fast-tracked China's high-speed rail industry and enabled China to surpass its targets for self-sufficiency in rolling stock technologies. As a precondition to participate in China's massive buildout of its rail network, foreign companies were required to form JVs and comprehensively transfer key technology, in effect engaging in a quid pro quo of market access for helping cultivate a global competitor.[214] Today, the Chinese state-owned rolling stock manufacturer CRRC now competes with those same foreign companies, and it launched an indigenously developed high-speed rail capable of speeds over 450 km per hour (280 miles per

* To respond to China's massive nonmarket distortions in the sector, in April 2025 the United States announced fees on Chinese-built ships and Chinese shipowners, which came into effect on October 10, 2025, before being suspended the following month. The measures included a service fee levied on Chinese-owned or operated ships that make U.S. port calls, set at $50 per net ton (NT) with planned increases to $140/NT by 2028. Certain other Chinese-built vessels were subject to a $18/NT port fee or a per-container fee of $120, both of which were set to increase incrementally through 2028. The USTR also announced tariffs on imports of Chinese ship-to-shore cranes and other port equipment, effective November 9, 2025. Office of the United States Trade Representative, "Notice of Modification and Proposed Modification of Section 301 Action: China's Targeting of the Maritime, Logistics, and Shipbuilding Sectors for Dominance," 90 Fed. Reg. 48320 (October 16, 2025); Office of the U.S. Trade Representative, "Notice of Action and Proposed Action in Section 301 Investigation of China's Targeting the Maritime, Logistics, and Shipbuilding Sectors for Dominance, Request for Comments" 90 Fed. Reg. 17114 (April 23, 2025).

hour). Moreover, China has rapidly localized much of its commercial rail industry, causing imports of railway equipment and components to fall 62 percent between 2015 and 2023.[215]

- **Exports:** Chinese companies have struggled to break into overseas markets, and revenues in the rail industry are falling as domestic construction slows amid a saturated rail network.[216] In the Green Book, export goals were 30 percent and 40 percent of the total sales by 2020 and 2025, respectively.[217] However, between 2020 and 2023, overseas sales amounted to just 16 percent of China's total rolling stock sales.[218] Total rail product exports declined from $5.4 billion in 2015 to $3.8 billion in 2023.[219]

Despite encountering challenges breaking into global markets, China was still able to leverage its rail industry to pursue geopolitical goals. Rail infrastructure projects have been marquee successes of China's Belt and Road Initiative.[220] Chinese rail companies have secured contracts throughout Africa and Southeast Asia, furthering Beijing's efforts to generate geopolitical influence and economic interdependence with developing countries.[221]

Energy-Saving and New Energy Vehicles

Type of Goal	Target	Met?	Details
Global Market Share	Sell 3,000,000 Indigenous NEVs[222]	Yes[223]	Sold 3.5 million in 2021[224]
Localization of Production	80 Percent Domestic Market Share[225]	Yes*[226]	Roughly 91 percent domestic market share in 2024[227]
Localization of Production	Indigenously Control Whole NEV Supply Chain[228]	Yes[229]	Indigenous control concentrated in raw material processing, components, finished batteries, and NEVs†[230]

China hit all key targets ahead of schedule for "energy-saving and new energy vehicles," a category that includes EVs, hybrids, and fuel-efficient internal combustion engine (ICE) vehicles and has increasingly prioritized EVs over the course of MIC2025.[231] The breakout success of Chinese EVs has roots in industrial policy as early as 2007, when China's government began promoting the sector in hopes of leapfrogging U.S., German, and Japanese automakers dominant in ICE vehicles and reducing energy and environmental pressures.[232] The sheer volume and acceleration of China's production is nonetheless staggering: the global market for EVs totaled three million sales in 2020, with 1.1 million of those Chinese sales; China met its goal of producing three million EVs domestically just one year later.[233] BYD is perhaps the most notable example of MIC2025's success in EVs—in 2015, BYD sold a total of 69,222 NEVs, including commercial vehicles; in 2024, it sold 4,272,145 units.[234]

Across-the-board success in EVs owes to two key factors:

- **Calibrating supply- and demand-side support:** On the supply side, companies benefited from subsidies and grants, cheap and ample funding, discounted land and electricity, and lax regulation.[235] On the demand side, buyers received fast-tracked registration, tax exemptions, rebates, and trade-in subsidies that encouraged EV adoption.[236] Local governments also bought electric buses and taxis and subsidized charging infrastructure.[237]

- **Coordinating vertical integration:** From 2015 to 2019, the central government required EVs to use Chinese-made batteries to qualify for subsidies.[238] Local governments took stakes in EV companies'

* The market share of Chinese brands was 62 percent globally, including China's domestic market. Seventeen million EVs were sold globally in 2024, 11 million of which were sold in China. Of those sold outside China, over 562,000 were Chinese branded. Therefore, Chinese-branded EVs must have achieved roughly 91 percent market share within China to achieve 62 percent globally.

† China also controls more raw material production than is initially apparent through mine ownership and offtake agreements. Jack Nicas, "The Mine Is American. The Minerals Are China's," *New York Times*, April 16, 2025. *https://www.nytimes.com/2025/04/16/world/americas/brazil-mine-rare-earths-china.html*; Farrell Gregory and Paul J. Milas, "China in the Democratic Republic of the Congo: A New Dynamic in Critical Mineral Procurement," *U.S. Army War College Strategic Studies Institute*, October 17, 2024. *https://ssi.armywarcollege.edu/SSI-Media/Recent-Publications/Article/3938204/china-in-the-democratic-republic-of-the-congo-a-new-dynamic-in-critical-mineral*.

suppliers and worked with EV leader Tesla to localize the supply chain and strengthen local talent.[239] Battery manufacturers also vertically integrated supply chains for critical battery minerals like lithium and graphite.[240]

Rising Chinese exports of EVs are a notable example of the second "China Shock." In 2024, Chinese brands accounted for 62 percent of global EV market share.[241] Even in markets with established EV brands, Chinese EVs have gained market share. For example, in the EU the market share of Chinese brands increased from less than 1 percent to 8 percent in four years, and in April 2025, BYD outsold Tesla in Europe for the first time, growing full EV sales almost ten times more quickly than overall growth in European EV sales.[242] One challenge in the Chinese EV sector is that the massive buildout in capacity from distortive state policy has led to intense competition and downward price pressures, making most EV and battery companies in China unprofitable.[243] Overcapacity seems likely to persist, especially since past government support during contractions and downturns has kept struggling firms afloat.[244]

Electrical Equipment

Type of Goal	Target	Met?	Details
Localization of Production and Technology Development	New Energy Electricity Generation over 80 Percent Domestic Market Share with Indigenous IP by 2025[245]	Yes	China completed its first indigenous nuclear reactor in 2020, controlled over 80 percent of the global solar market by 2023, and controlled over 95 percent of the domestic wind market by 2015 [246]
Localization of Production and Global Market Share	Transmission and Smart Grid Technology over 90 Percent Domestic Market Share, 25 Percent Global Market Share by 2025[247]	Mixed	China has over 90 percent domestic and global market share in ultra-high-voltage (UHV) transmission lines but only has 30 to 40 percent domestic market share in high-end transformers[248]

China broadly succeeded in its targets for electrical equipment, hitting goals for renewable energy technologies ahead of schedule but meeting varied degrees of success in transmission equipment. China's success in renewables precedes MIC2025. In wind turbines, for instance, Chinese manufacturers had attained over 95 percent domestic market share by 2015 through JVs, foreign acquisition, and licensing agreements.[249] MIC2025 most clearly assisted the solar industry, where domestic market share almost doubled from 47 percent in 2015 to over 80 percent today.[250]

- **Nuclear:** China is bringing nuclear power online faster than any other country, supported by power plant designs both voluntarily transferred and stolen from U.S. Westinghouse, although nuclear technology transfers were later restricted.[251] Over the last ten years, China went from 18 to 55 nuclear reactors and has at least 22 under construction, 45 percent of the global total.[252] China's state-owned nuclear firms built their first reactor with over 85 percent Chinese components and indigenous IP in 2020.[253] In December 2023, China brought the world's first fourth-generation nuclear reactor online.[254]
- **Solar:** In solar, China used government policy to attain economies of scale and vertically integrate the solar supply chain. Chinese companies took advantage of central and local government loans and demand-side policies that boosted their efforts to scale up and reduce costs.[255] Local governments also encouraged solar supply integration through industrial parks and clusters; notably, the Guangzhou provincial government even forced out existing firms to make space for solar companies and their suppliers.[256] China now commands at least 80 percent market share in each sector of the solar supply chain, up from 47 percent of global solar manufacturing in 2015.[257]

- **Wind:** By 2023, six of the ten dominant turbine makers were Chinese, commanding over 60 percent of the global market.[258] China met its domestic solar and wind installation target of 1,200 gigawatts six years early in July 2024.[259]
- **Transmission and smart grid:** Chinese firms are well positioned in industrial batteries and transmission lines but lagging in transformers. Building on success in EV batteries, Contemporary Amperex Technology Co., Limited's (CATL) energy storage systems have over 40 percent of the global market.[260] Chinese firms also have a 99 percent market share for UHV power line components, and Chinese companies have built about 90 percent of global UHV lines.[261] Chinese firms claimed 30 to 40 percent of China's domestic high-end transformer market in 2022 but remain behind top multinational companies.[262]

Biopharma and High-Performance Medical Devices

Type	Target	Met?	Detail
Pharmaceuticals and Biopharma			
Technology Development	Obtain Overseas Regulatory Approval for and Manufacture 5–10 New Biotechnology or Small-Molecule Drugs by 2025[263]	Yes[264]	7 approved by U.S. FDA since 2019 and 6 remain in the U.S. market for sale)[265]
Technology Development	Bring 20–30 Innovative Drugs into Commercial Production by 2025[266]	Yes[267]	Chinese regulators approved 26 Class 1 innovative drugs in 2022 alone[268]
High-Performance Medical Devices			
Localization of Production	Hospitals Procure 70 Percent of High-Value Medical Devices Domestically[269]	No[270]	Localizations rate of 52 percent for life support equipment, 46 percent for in vitro diagnostic equipment, 26 percent for medical imaging in 2024[271]
Localization of Production	80 Percent of Core Components Sourced Domestically[272]	No[273]	Foreign companies are sole suppliers of many high-end components, such as x-ray detectors, x-ray tubes, and high-voltage generators[274]
Global Market Share	5–10 Internationally Recognized Brands[275]	Yes[276]	Chinese brands with significant international sales include Microport, Mindray, Weigao, United Imaging, Lepu Medical, and Contec[277]

China had mixed results in medical sector targets, exceeding goals for pharmaceuticals but falling short in medical devices despite pressuring foreign firms to shift production to China.[*] China's pharmaceutical goals seemed reasonably ambitious; China approved three Class 1 innovative drugs in 2015 and four in 2016 (on track to beat its

[*] For more on China's role in biopharmaceutical supply chains, including the risks stemming from a reliance on China-based contract service providers like WuXi AppTec for innovative pharmaceutical and biotechnology development, see U.S.-China Economic and Security Review Commission, "U.S.-China Competition in Emerging Technologies," in *2024 Annual Report to Congress*, November 2024, 215–225.

goal), but the first U.S. regulatory approval for a drug discovered in China did not happen until 2019.[278] China's medical device goals were much more ambitious, considering Chinese firms had less than 20 percent market share in several high-tech medical devices (i.e., CT, MRI, and DSA machines).[279] Subsidies, research grants, and other financial support to innovative biotech firms strengthened China's drug discovery efforts. MIC2025 policies helped build an ecosystem for biotech research that includes an extensive network of state research labs and clusters for biomedical research.[280]

- **Pharmaceuticals and Biopharma:** China exceeded goals for both domestic and overseas drug approvals, and Chinese companies have produced a handful of first-in-class drugs.[281] In 2023, China had five first-in-class domestic approvals, compared to two total before 2013.[282] In June 2025, investment bank Stifel projected that China will be responsible for 37 percent of molecules licensed by large pharmaceutical companies in 2025—typically a sign of innovative potential.[283] Oncology drug development is a particular area of success, reflecting strong demand in a country that accounted for roughly one-quarter of new global cancer patients in 2022 but 18 percent of the population.[284] Chinese manufacturers benefited from low-cost access to advanced pharmaceutical ingredients—key drug-making materials—which are increasingly produced within China.[285] In addition to direct support, China implemented reforms starting in 2015 that streamlined the drug approval process, sparking a surge in the number of new drugs entering the development pipeline.[286]
- **Medical devices:** Chinese hospitals still import a large proportion of high-value medical devices despite extensive fiscal support for local firms and various forms of protectionism.[287] For instance, by mid-2024, just 25.6 percent of medical imaging equipment was sourced locally.[288] While China may not have met its ambitious targets, local brands are gaining market share at the expense of top foreign firms—CT scanners purchased from GE, Phillips, and Siemens fell from 87 percent in 2015 to 63 percent in 2022.[289] Chinese firms' market share gains owe in part to strict market access conditions and local procurement requirements in China's state-run healthcare system.[290]

MIC2025 targeted healthcare and medical applications of biotechnology.[291] However, investments in China's biopharmaceutical industry since 2015 are providing knowledge spillovers and research and manufacturing infrastructure to other biotech sectors, including non-therapeutic areas of synthetic biology, such as industrial and agricultural bioengineering. Sustained and significant government support for China's National GeneBank, an extensive library of genetic code, has propelled BGI Group and other Chinese genomics companies to become market leaders.[292] China's capacity to collect and analyze vast quantities of genomic data could accelerate drug discovery and biotech breakthroughs.[293] The 13th Five-Year Plan in 2016 called for "development of bulk fermentation products such as amino acids and vitamins," and China now holds a controlling market position in these and other crucial building blocks for other products in the bio economy.[294] China's fermentation capacity itself has scaled rapidly over the past decade, and it now accounts for 70 percent of global capacity.[295] Fermentation, particularly to produce amino acids as a building block for most bio-based products, is critical to the iterative nature of innovation in synthetic biology, and China is likely to emerge as a global leader in a field with the potential to reshape the modern economy.[296]

The extensive biotech infrastructure built out by China's industrial policy has provided important competitive benefits. The growing biotech sector and state-of-the-art infrastructure in China has attracted internationally trained talent to return to China to build major biopharma companies such as BGI, BeiGene, and Wuxi AppTec.[297] Many Western biopharma companies have leveraged China's biomanufacturing infrastructure by outsourcing contract manufacturing organizations (CMOs) to China.[298] These investments further contribute to the country's significant buildout of its biomanufacturing and biotech research infrastructure and help keep Chinese companies central to global biotech supply chains with access to key information at the cutting edge of production and innovation.[299]

Drivers of MIC2025 Outcomes

Given the wide range of industries and technologies targeted by MIC2025, there is no single explanation for why China's industrial policy met its goals in some areas and lagged in others. Outcomes varied across sectors, reflecting

differing market conditions, the complexity of technological innovation, and the specific forms of government support deployed, among other factors (for an overview of Chinese industrial policy tools, see Appendix II). Nonetheless, four recurring fault lines shaped outcomes across the sectors:

- **Barriers to entry:** China struggled to catch up in industries where production processes require extensive upfront investment and depend on accumulated IP, including trade secrets and technical knowhow.[*] It has generally succeeded in industries where barriers to entry are low and China's investment and support for vertical integration of the supply chain built economies of scale. This approach enabled Chinese firms to quickly match the technological level of their foreign competitors while offering cheaper products.
    - **Success in shipbuilding:** Massive, continuous state support to build out China's shipbuilding industry since 2000—with shipyards receiving subsidies worth RMB 624 billion ($91 billion) between 2006 and 2013 alone—meant that China was already the largest shipbuilding country by 2015.[300] In the decade since, support under MIC2025 enabled Chinese shipyards to underprice and outcompete foreign shipyards and attain dominance in nearly every segment of the global shipbuilding market.[301]
    - **Challenges in aviation:** China fell short of its ambitious goals related to commercial aviation and has not yet succeeded in developing the state-of-the-art sub-systems required for commercially competitive jet engines. This is not to say that China has not made progress; in testimony before the Commission, one witness noted that no company has succeeded in joining the "big jet club" in 80 years except for COMAC.[302] China has mastered many other advanced technical processes in aircraft production and continues to invest significant resources in aviation R&D as well as international safety certifications needed to expand into overseas markets.[303]
- **Technology transfer:** China struggled to catch up in industries where the most advanced IP was tightly held by a small number of international firms; China quickly closed the gap in sectors where foreign firms shared technology with local partners.
    - **Success in High-Speed Rail:** China bought its way into the high-speed rail industry by requiring industry leaders to form JVs with Chinese train makers. Seeing a once-in-a-century chance to profit from China's rail expansion, foreign firms transferred technology and knowhow in a quid pro quo for market access—helping cultivate their top global competitor in the process.[304]
    - **Challenges in semiconductors:** China's progress in advanced and leading-edge semiconductor production was hindered by an inability to compel leading firms to establish high-value manufacturing operations within its borders and, more recently, U.S.-led restrictions on its acquisition of advanced semiconductor manufacturing equipment.[305] Because foreign-sourced chips were critical to China's export manufacturing-led growth, Chinese policymakers were unwilling to impose market barriers to force non-Chinese companies to transfer advanced technologies for market access.[306] However, many firms agreed to set up less-advanced facilities, which may contribute to China's apparent effort to dominate the market in foundational semiconductors.[307]
- **Strong Foreign Incumbents:** China struggled to catch up in industries where incentives to buy local could not overcome the strong brand incumbency and market position of foreign firms. Chinese firms made inroads when policy coupled extensive supply-side support, such as subsidies, with demand-side inducements to buy Chinese—including explicit local content requirements and other incentives that drove end-user demand for targeted Chinese-made products. They also made more progress in technologies where foreign firms had limited presence, including industries where China maintained market access barriers against foreign competition or in emerging fields where fewer foreign firms had a strong incumbent advantage.

[*] China has overcome these challenges in some sectors via cyberespionage. Benjamin Jensin, written testimony for U.S. House of Representatives Committee on the Judiciary, *Hearing on Intellectual Property and Strategic Competition with China: Part 3—IP Theft, Cybersecurity, and AI*, October 19, 2023. *https://www.congress.gov/118/meeting/house/116383/witnesses/HHRG-118-JU03-Wstate-JensenB-20231019.pdf.*

- **Success in NEVs:** China's success in meeting NEV targets was driven by demand-side policy support for EVs and their batteries. Local governments stimulated demand by procuring electric buses and taxis; the central government required EV makers to use Chinese-made batteries to qualify for subsidies; and consumers were encouraged to switch to EVs through tax incentives, fast-tracked vehicle registrations, and trade-in subsidies.[308] During most of this time, China restricted market presence of foreign-manufactured EVs through tariffs and subsidy exclusions.[309]
- **Challenges in Agri-Machinery:** Even despite direct subsidies for purchasing alternatives from Chinese companies, high-end foreign-branded farm machinery, such as John Deere, has retained a strong presence in China's domestic market.[310] Indigenously developed agriculture machinery has failed to match the quality and reliability of established foreign brands and their extensive networks of after-sales services and component parts and suppliers.

- **Basic Research versus Iterative Innovation:** China struggled to catch up in industries where innovation gains are highly dependent on basic research; it succeeded in industries where technological progress is concentrated in applied, pre-commercial stages and particularly where innovation occurs on the factory floor. China recognized this as a problem before MIC2025 was launched and has invested in overcoming its weak basic research environment, with growth in basic research expenditures outpacing growth in overall R&D expenditures every year but one since 2014.[311]
  - **Success in Electrical Equipment:** China's success in meeting its targets for nuclear, solar, and wind generation equipment was driven not only by subsidies but also by returns to process-level innovation. In nuclear energy, China has improved on U.S. power plant designs to become the leading builder of nuclear power plants.[312] Likewise, while underlying technology for photovoltaic cells and wind turbines was developed abroad, government subsidies coupled with production process innovations by Chinese firms helped China to become the dominant global solar and wind manufacturer.[313]
  - **Challenges in New Materials:** China's failure to clearly meet its new materials targets is due in part to a lack of basic research. This sector relies on novel and breakthrough discoveries of *new* materials. China's R&D investment intensity—the ratio of R&D spending to gross domestic product—in new materials lags behind that in the United States, Japan, and major European countries.[314] Its investment in new materials talent also lags behind other high-tech industries.[315]

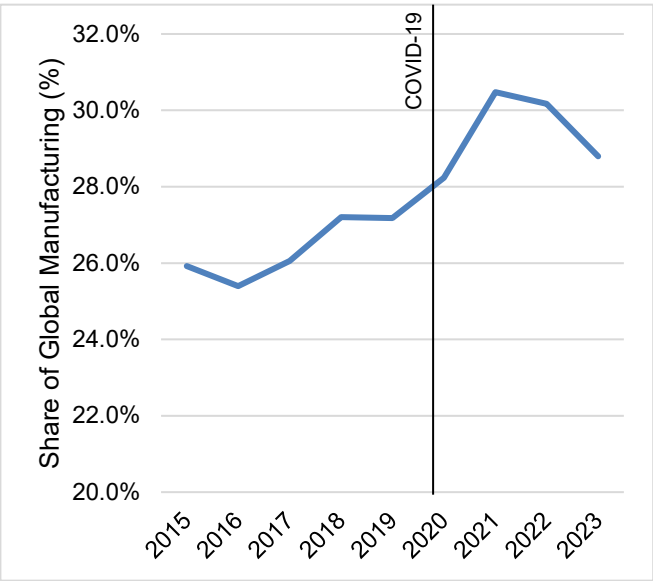
Implications for the United States: China's Innovation Ecosystem after MIC2025

MIC2025 is more than the sum of its parts, and its strategic value extends far beyond its sectoral scorecards. MIC2025 policies helped China achieve its higher-order goals—including improving innovative capacity of domestic firms and capturing a larger share of global manufacturing value added. Further, the policy served as a foundational building block for China's broader pursuit of technological self-reliance, creating industrial capabilities that reduce strategic vulnerabilities while enhancing geopolitical leverage. General Secretary of the Chinese Communist Party Xi Jinping laid out the objectives of this approach explicitly in an April 2020 speech, stating: "We must tighten international production chains' dependence on China, forming powerful countermeasures and deterrent capabilities based on artificially cutting off supply to foreigners."[316] Thus, even where China fell short of its specific targets, China's sustained investment and related industrial policies established manufacturing ecosystems that continue advancing Beijing's long-term strategic competition with the United States.

Importantly, MIC2025 helped boost China's overall manufacturing capacity and global exports. As shown in Figure 1, China's share of global manufacturing—already disproportionately high—rose more from 25.9 percent in 2015 to 28.8 percent in 2023.[317] At the same time, China's manufacturing exports have captured a larger share of global markets. China-based firms accounted for nearly one-quarter of the global growth in exports related to the ten MIC2025 sectors between 2015 and 2023, the latest year for which global trade data are available. In 2023, China

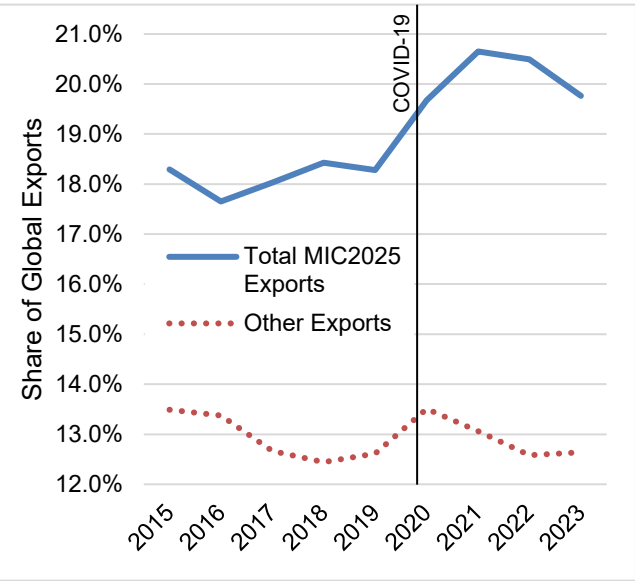
exported $1.5 trillion of MIC2025 products, equal to just under 20 percent of global exports of such products (see Figure 2).

Figure 1: China's Share of Global Manufacturing Value Added,* 2015–2023



Source: Various.[318]

Figure 2: Chinese Exports Gain Global Market Share for MIC2025 Products, 2015–2023



Source: Various.[319]

MIC2025 differed from past industrial policies—including those of both China and its East Asian neighbors—in its sheer breadth. However, it was also distinct in its strategic vision and implementation. Many of the subsidiary policies supporting MIC2025 were guided by China's Innovation-Driven Development Strategy (IDDS), a framework released in 2016 that advocated pursuing advances in a cluster of related technologies. Where prior industrial policies sought to attain discreet goals in specific sectors, the IDDS sought to foster broader economy-wide gains, particularly through mastering general-purpose technologies that provide spillover benefits in other sectors. Notably, the IDDS incorporated a geostrategic element to its vision, aiming to reduce reliance on imported technology and gain "unique advantages" in "strategically contested fields."[320]

For the United States, the challenge posed by China's industrial policies is progress not just in targeted technologies but also in the overall competitiveness of China's manufacturing and innovation ecosystem. Improvements in sophistication of components, supply chain integration, and production processes enable China to iterate and innovate faster. China's manufacturing capacity is particularly notable in sectors where technical advances are often driven by "process innovation" on the factory floor or where China's policies have helped it develop large sectors of overlapping clusters of end-product manufacturers, component suppliers, and R&D capabilities. The latter may prove to be MIC2025's most enduring legacy. As discussed in the Commission's 2025 *Annual Report to Congress*, Chinese industrial policy fostered the world's most advanced industrial commons—a collective resource base that Chinese firms can exploit to advance technological capabilities—with interlocking innovation flywheels that span a dense network of interrelated technologies.† Consequently, technical advances in one sector can rapidly catalyze breakthroughs in adjacent industries. Increasingly, the spillover benefits from today's industrial policies provide important advantages to Chinese firms in commercializing many technologies of the future. For instance, innovation in batteries and other key technologies in EVs is proving essential to developing humanoid robots and autonomous

* China's shares of global manufacturing value added and exports peaked in 2021 due to the economy's rapid opening from the initial impact of the COVID-19 pandemic but have edged down since 2022 as manufacturing activity recovered in other countries. "World Manufacturing Production: Quarter II 2022 Report—Positive Trend in Manufacturing Continues, Although at a Moderating Pace," *United Nations Industrial Development Organization*, 2022, 3. *https://www.unido.org/news/positive-trend-manufacturing-continues-although-moderating-pace*.

† For more, see U.S.-China Economic and Security Review Commission, Chapter 6, "Interlocking Innovation Flywheels: China's Manufacturing and Innovation Engine," in *2025 Annual Report to Congress*, November 2025, 313–369.

vehicles. In the next phase of Chinese industrial policy, firms outside China may face not just shrinking market share in established industries but also immense challenges gaining a foothold in emerging fields.

Appendix I: Recent Evaluations of MIC2025

A number of recent studies have assessed China's progress toward its MIC2025 objectives. Differences in the definition and measurement of success led to variations in the findings, summarized below.

Office of Former Senator Marco Rubio, *The World China Made: "Made in China 2025" Nine Years Later* (2024): This study used the global competitiveness of Chinese industry to evaluate the success of MIC2025, finding that China became a world leader or made substantial progress in all but one sector: agricultural machinery. This study's focus on China's large industrial base leads to an emphasis on the quantity of production in sectors like high-speed rail and shipbuilding, while the Commission's analysis emphasizes global market share and technological leadership.

Bloomberg Intelligence and Bloomberg Economics, "Made in China 2025: Industrial Master Plan Advances at Home, Faces Obstacles Abroad" (2024): Using China's progress toward its stated targets to benchmark its success, the report found that China has become globally competitive in seven of 13 specific technologies related to the MIC2025 sectors, leads the world in five, and fell short of its targets in commercial aircraft. Bloomberg rates China as "competitive" in some technologies like semiconductors due to their technological progress and low-end market share gains, even if they remain behind the leading edge. The Commission's analysis looks at the current state of China's technological development and reliance on foreign imports, leading to slightly different conclusions on agricultural technology.

Wire China, "Grading Day" (2025): *Wire China*'s analysis places MIC2025 within its historical context, explaining foreign governments' responses and China's increasing focus on self-sufficiency. It assesses that China succeeded in six sectors, including robotics and high-tech ships. The Commission's analysis differs in those two sectors. In robotics, *Wire China* emphasizes China's industrial robot installations and increasing rate of automation, while the Commission emphasizes its failure to meet domestic market share and local sourcing targets. In high-tech ships, *Wire China* emphasizes China's overall shipbuilding capacity, while the Commission emphasizes its mixed progress in producing higher-value, specialized ships like LNG tankers.

European Union Chamber of Commerce in China, "Made in China 2025: The Cost of Technological Leadership" (2025): This study evaluated China's progress toward technological self-sufficiency across the ten MIC2025 sectors, finding that China had become a technological leader in three—shipbuilding, NEVs, and electrical equipment—and improved its level of self-sufficiency but remained significantly reliant on foreign suppliers in seven. In semiconductors and high-speed rail, the study's findings differ from the Commission and focus on China's trade with the EU rather than the world.

Rhodium Group and U.S. Chamber of Commerce, "Was Made in China 2025 Successful?" (2025): This study assessed China's progress toward four stated objectives: decreasing import dependency, decreasing dependency on foreign companies, achieving global competitiveness, and becoming a technological leader. China achieved strong performance on all four goals in high-speed rail and electrical power equipment, but the results were mixed in other sectors. In agricultural technology and medical devices, their focus on China's gains in low-end market share versus the focus in this report on high-end machinery leads to different evaluations of China's success. They also include different technologies in their analysis of the next-generation IT (focus on 5G technology) and energy-saving and new energy vehicles sectors (including ICE vehicles).

South China Morning Post,[*] "As Beijing's 'Made in China 2025' Plan Nears Finish Line, How Well Has It Done?" (2024): This article evaluated progress toward over 260 targets laid out in MIC2025 planning documents by

[*] The *South China Morning Post* is a Hong Kong-based newspaper owned by the Alibaba Group.

reporting the percentage of targets met in each sector. This study found that China achieved 86 percent of its goals, far exceeding its benchmarks in NEVs and electrical equipment, but only met 75 percent of its new materials targets, the lowest out of the ten sectors. These broad metrics make it difficult to compare their findings to the Commission's, as the *South China Morning Post* only highlights select successes and failures.

Appendix II: China's Multi-Pronged Approach to Accelerating Industrial Development

The launch of MIC2025 ushered in a major expansion in the scope and scale of China's industrial policy.[321] In quantitative terms, China's industrial policy spending is massive, amounting to 1.7 percent of gross domestic product in 2019, which exceeded the country's defense spending that year.[322] China relied on a wide array of policy instruments to funnel these resources to targeted sectors, ranging from direct financial support through subsidies and tax credits to measures aimed at orchestrating technology transfer from abroad.[323] Table 1 provides an overview of the major forms of industrial policy support along with examples of their use in promoting MIC2025 technologies.

Table 1: Select Policy Tools Used to Implement MIC2025

Policy Tool	Example
Market Entry Barriers are formal market access restrictions and informal barriers that create an uneven playing field that favors domestic firms over foreign firms operating in China.	China maintained regulatory barriers in its medical device sector that impose onerous inspection and permitting requirements on foreign firms, adding costs and creating delays in introducing products to market.[324] These measures give Chinese competitors time and space to build market share.
Subsidies, Tax Breaks, and Financial Incentives include direct government subsidies, below-market loans made through government-controlled banks, tax credits, and below-market land sales.	China began subsidizing the EV industry through supply-side subsidies, grants, low-cost land, electricity, and loans and later shifted toward subsidizing demand, with EV buyers receiving fast-tracked registration, tax exemptions, rebates, and trade-in subsidies.[325] China also combined subsidies with market entry barriers, requiring EVs to use Chinese-made batteries to qualify for subsidies.[326]
Forced Technology Transfer Policies include compelling foreign firms to form JVs with state-connected Chinese partners, requiring technical information disclosures to license technology, and cyber and corporate espionage.	China required foreign high-speed rail companies to transfer technology to Chinese JV partners as a condition for market entry.[327]
Government Guidance Funds (GGF) are state-backed financial instruments that have become one of Beijing's primary means for directing financial resources to high-tech firms.	China's largest GGF, the National Integrated Circuit Industry Investment Fund (also known as the Big Fund), has raised over RMB 683 billion ($94 billion) in funding for investments into the semiconductor industry since 2014.[328]
Procurement is used as a lever in markets where Chinese SOEs dominate, often through discriminatory policies that prevent foreign firms from competing for public contracts.	China's airline industry is dominated by state-owned firms, and China has used airline procurement to support its internationally uncompetitive jet models.[329] For example, despite its regional jet model—the C909—having inferior range and fuel consumption to comparable models, Chinese airlines have not purchased foreign-branded regional jets since C909 deliveries began in 2015, causing Brazilian competitor Embraer to close its Chinese plant.[330]

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