The Impact of the Inflation Reduction Act on Global Manufacturing

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Abstract. In August 2022, the Biden administration of the United States (U.S.) passed the Inflation Reduction Act (IRA), which took effect in January 2023. The plan involves approximately $430 billion in investments, focusing on areas such as climate, healthcare, and tax reform. This marks the largest climate investment bill in U.S. history, with far-reaching impacts on global trade, diplomacy, and supply chain layouts. This paper examines the impact of the bill on global manufacturing. Based on theories such as trade protectionism, government intervention in the economy, comparative advantage, and international division of labor, it employs case analysis to select key industries like electric vehicles and batteries, analyzing the responses and adjustments made by the United States, China, and related enterprises. The study reveals that the Inflation Reduction Act has a dual impact on global manufacturing: On the positive side, it accelerates green transformation, drives down technology costs, and promotes industrialization in emerging markets; On the negative side, it intensifies protectionism, triggers subsidy competitions and resource conflicts, or delays global emission reduction efforts. Future countries need to seek balance across multiple dimensions.

Keywords: Trade protectionism, global manufacturing, government intervention.

1. Introduction

In August 2022, the Biden administration formally enacted the Inflation Reduction Act (IRA) a landmark climate investment bill with $430 billion in funding that became the most extensive and ambitious climate-focused legislation in United States (U.S.) history. Effective January 2023, the act prioritizes three key areas: climate action, healthcare reform, and tax policy optimization. Notably, nearly 80% of incentives target clean energy and low-carbon technologies, including direct subsidies for solar power, wind energy, electric vehicles, and energy storage systems, along with tax credits and localization mandates. For instance, it requires tax-eligible electric vehicles to be fully assembled in North America and mandates that the domestic supply ratio of critical battery minerals and components must reach 100% by 2030 [1]. Beyond its domestic scope, the IRA serves as both a cornerstone for achieving America's 2050 net-zero emissions goal and a strategic blueprint to reshape global manufacturing competitiveness through industrial policies. Its impact now extends beyond national borders, profoundly influencing international trade frameworks, supply chain dynamics, and diplomatic relations worldwide.

The "localization-first" provisions of the Inflation Reduction Act have sparked widespread international controversy, particularly facing strong opposition from traditional U.S. allies. In its March 2023 report titled "Impact Assessment of the U.S. Inflation Reduction Act on EU Industries," the European Commission explicitly stated that the legislation's use of tax credits and subsidies to forcibly link industrial support with "North American origin" constitutes a classic form of trade protectionism, directly undermining European Union (EU) competitiveness in sectors like electric vehicles and photovoltaic modules. According to data from the European Commission's Directorate-General for Industry, EU electric vehicle exports to the U.S. declined by 22% in the second half of 2023 compared to the same period last year, while investment willingness among photovoltaic companies toward the U.S. plummeted by 41% before the act took effect.

In this context, this paper takes the impact of the Inflation Reduction Act on the global manufacturing industry as its core research topic. It not only focuses on the immediate impacts of the legislation on global energy transition and trade patterns, but also conducts an in-depth analysis of

the response strategies adopted by governments and enterprises worldwide —— such as China balancing domestic and international markets through its "dual circulation" strategy, the EU maintaining industrial competitiveness via subsidy reforms, and U.S. companies gaining policy dividends through localization strategies. The study aims to provide theoretical and practical references for understanding new trends in global manufacturing development and addressing policy uncertainties [2].

2. Theoretical Basis

The Inflation Reduction Act stipulates that vehicles eligible for tax credits must undergo final assembly in North America, with a specified proportion of battery minerals and components sourced from North America. This essentially excludes electric vehicles assembled in the United States or outside North America from the tax credit policy. Such practices constitute typical trade protectionism, which restricts foreign product access while favoring domestic industries to shield them from foreign competition. This approach aims to enhance domestic industrial competitiveness in global markets, yet it violates the non-discrimination principle enshrined in the World Trade Organization [3].

This legislation demonstrates the U.S. government's robust economic intervention through massive fiscal subsidies and tax credits, directing resources toward industries like clean energy and electric vehicles. Contrary to the traditional skepticism about direct government economic intervention held by mainstream American political parties, it marks a shift in U.S. policy direction. The administration now employs policy tools to regulate markets, achieving multiple objectives including climate goals, revitalizing manufacturing, and enhancing economic competitiveness. This approach aligns with the principles of economic policy regulation outlined in government intervention theories.

According to the theory of comparative advantage and international division of labor, industries can reduce global production costs and low-carbon transition costs by leveraging cost advantages through global resource allocation, enabling countries and regions with cost advantages to participate in manufacturing. However, the Inflation Reduction Act prioritizes domestic industries, disrupting this comparative advantage-based international division of labor system. As a result, industrial distribution is no longer solely determined by cost and efficiency but becomes heavily influenced by U.S. domestic policies, ultimately compromising the optimal allocation of global resources.

3. The United States Adjusted Its Layout under the Inflation Reduction Act

To boost domestic production through subsidies and tax incentives, the government has implemented localization requirements for key industries such as batteries and semiconductors. The clean energy tax incentive program allocates $369 billion in investments, offering tax credits for photovoltaic, wind power, and electric vehicle projects while streamlining application processes through the IRS ECO online platform. To support small and medium-sized enterprises, the government has released the Climate Finance Guide and expanded the 504 loan program to finance green initiatives [1, 4].

3.1. Tesla's Global Layout Adjustment

Ecological layout adjustment. Tesla has suspended the construction of a 50GWh battery factory in Germany and relocated production to the United States, while expanding its Nevada facility. The automaker announced plans to halt construction of a 50GWh battery plant in Germany and bring battery manufacturing back to the U.S. Meanwhile, Tesla is expanding its Nevada battery factory, increasing production capacity to 39GWh by 2022 and planning an additional 100GWh of 4680 battery capacity. Supply chain restructuring. Battery supply has deepened dependence on South Korea's LG New Energy. In late July 2025, Tesla signed a $4.3 billion long-term battery supply

agreement with LG New Energy, with production to be handled by its Michigan plant. The agreement specifies that LG will supply lithium iron phosphate batteries and high-energy-density cylindrical batteries (including 4680 cells) for Tesla. According to Benchmark Mineral Intelligence data, LG's battery share for Tesla approached 20% in 2024, nearly doubling from 2022 [5, 6]. Chip manufacturing. Tesla expanded chip foundry partnerships. The automaker reached a $16.5 billion AI chip manufacturing deal with Samsung Electronics, leveraging Samsung's new wafer fab in Taylor, Texas, to produce next-generation AI6 chips for core business areas like autonomous driving and robotics. Previously, Tesla's chips were mainly manufactured by Taiwan Semiconductor Manufacturing Company (TSMC). The cooperation means that Tesla has expanded from the previous pattern of relying on TSMC in chip manufacturing to a new camp, including Samsung Electronics.

3.2. Solar Formation of a Manufacturing Enterprise Sun Spark's Response to the Inflation Reduction Act

Capacity expansion and workforce growth. Sun Spark secured substantial funding through tax credits and subsidies under the Inflation Reduction Act for solar energy development. The company invested in building a new solar panel production line, creating over 50 local jobs, including assembly workers, technicians, and management staff during construction and operations. Research and Development (R&D) investment and technological innovation. To meet the act's requirements for higher efficiency and lower costs in solar products, Sun Spark allocated part of its subsidy funds to R&D. The team developed an innovative solar cell packaging technology that boosted module conversion efficiency by 5%, making it more competitive in the market. This achievement also earned them additional R&D incentives under the act's advanced technology program.

4. China's Strategic Adjustment under the Inflation Reduction Act

In the short term, China mitigates shocks through diplomatic negotiations, industrial policy adjustments, and market diversification; in the long term, it builds sustainable competitiveness through technological innovation, rule restructuring, and international cooperation. Although the Inflation Reduction Act poses challenges to China's new energy industry, the strategic adjustments it has stimulated have instead accelerated China's transformation from a "manufacturing giant" to an "innovation powerhouse," providing a new path for global green economic governance.

4.1. BYD Adjusted Its Regional Strategy

BYD initially planned to build a factory in Mexico with an annual production capacity of 150,000 electric vehicles, aiming to export products to the United States through the U.S.-Mexico-Canada Agreement (USMCA). However, the project was terminated in July 2025 due to U.S. pressure. Instead, BYD adopted a "multi-polar layout" strategy: First, nearshore production capacity reserves. A factory was constructed in Bahia State, Brazil, which met South American market demand through localized manufacturing despite facing subcontractor lawsuits. Second, technological roadmap transformation. Increased investment in energy storage technology leveraged America's reliance on lithium iron phosphate batteries to supply energy storage batteries to Tesla and other companies, circumventing tariff barriers imposed by the Investment and Commerce Act on electric vehicles (52% of battery cells in U.S. energy storage projects still require imports). Third, European localization. An electric vehicle factory was built in Hungary to serve the European market, benefiting from EU subsidies for domestic production while overcoming carbon footprint certification barriers through collaboration with Germany's Solarwatt.

4.2. Global layout of Ningbo Rongbai New Energy Material Technology Co., Ltd.

Establishing a new manufacturing facility overseas. On July 24,2023, Rongbai Technology received approval from South Korea's Ministry of Land, Infrastructure and Transport (MNIT) to expand its production capacity. Building upon its existing 20,000-ton annual output of cathode

materials at its South Korean plant, the company has been authorized to construct an additional 80,000-ton annual production base for ternary precursors and supporting sulfate production facilities in the Sinwangjin National Industrial Complex.

From the perspective of rules of origin, the cathode materials produced by South Korean factories are classified as "Made in Korea," which can enjoy zero tariffs or low tax rates under the US-South Korea Free Trade Agreement when exported to the United States, thereby avoiding the high tariffs imposed by the US on Chinese products. Meanwhile, the Inflation Reduction Act requires that critical battery materials be manufactured in free trade agreement partner countries or North America itself. As a US free trade partner, Rongbai Technology's South Korean factory products meet the requirements of the Inflation Reduction Act, consolidating its market access qualification in the US. Additionally, with the first-phase 20,000 tons/year ternary cathode material production capacity at the Chungju plant reaching full capacity in the fourth quarter of 2024 and primarily supplying the North American electric vehicle market, along with the construction of the second-phase 40,000 tons/year production capacity, Rongbai Technology has achieved capacity expansion, further enhancing its competitiveness in the US market [6].

5. EU Restructuring under the Inflation Reduction Act

Europe launched the Green New Deal Industrial Plan, relaxing restrictions on state subsidies. Meanwhile, Europe has adjusted its supply chain to reduce dependence on China's batteries and photovoltaic products, promoting localized production (such as Northvolt building a battery factory in Sweden) [2, 5].

5.1. Total Energies

First, joint venture capacity expansion. Through establishing the ACC joint venture with Stellantis and Mercedes-Benz to build a 24GWh battery factory in northern France, Total has adopted a "European R&D + North American manufacturing" model. This approach not only circumvents tariff barriers imposed by the Inflation Reduction Act on "non-free trade partner countries" but also secures €852 million in EU Innovation Fund support, directly matching the $35/kWh tax credit under the Incentive Refund Act (IRA). Second, technological differentiation. By developing submerged cooling battery technology in collaboration with Renault, charging speeds have been increased by 50% and range extended by 6%, enabling Total to enter the U.S. high-end EV market with technological advantages. This technology has been applied to the Volkswagen Megan E-TECH model and is being licensed to help American automakers like Ford meet the IRA's localization requirements for battery components.

5.2. A French Electric Battery Manufacturer

First, financing and government support. In 2023, it secured €2 billion in financing (including €650 million in subsidies from the French government and €500 million in loans from the European Investment Bank) to build a Gigafactory in Dunkirk for producing low-carbon batteries. Second, supply chain localization. Focusing on local production, it claims its battery carbon footprint is 4-5 times lower than that of <term_0> products, reducing reliance on imports, and signed a long-term supply agreement with Renault Group (supplying 120GWh batteries annually). Third, policy coordination. Leveraging frameworks such as the EU's "European Battery Alliance", it collaborated with institutions like EIT InnoEnergy and Schneider Electric to integrate technical resources and enhance competitiveness.

6. Conclusion

The U.S. Inflation Reduction Act combines climate governance with industrial competitiveness attributes, and its impact on global manufacturing has transcended the scope of a single national

policy, becoming a key variable in reshaping the global industrial landscape, trade rules, and technological competition dynamics. Domestically, through a combination of "fiscal subsidies + tax credits + localization requirements," the U.S. has effectively stimulated private capital investment in clean energy and high-end manufacturing sectors. This has enabled companies like Tesla and Sun Spark to achieve domestic capacity expansion and supply chain restructuring, achieving dual goals of "revitalizing manufacturing" and "accelerating green transformation" in the short term, highlighting the role of government intervention in guiding industrial upgrading. However, the "local-first" logic of the Inflation Reduction Act has triggered global ripple effects. On the trade front, its strict origin restrictions are essentially protectionism, leading to declining EU electric vehicle exports to the U.S., discouraging investment intentions in the photovoltaic industry, and sparking a global "subsidy race." The EU introduced the Green New Deal Industrial Plan to relax subsidy restrictions, while China adjusted production capacity layouts under the "dual circulation" strategy, exacerbating risks of fragmentation in the global trade system. On the supply chain front, the Inflation Reduction Act disrupted international division of labor based on comparative advantages, forcing companies like BYD and Rongbai Technology to circumvent barriers through near-shoring strategies and technological transformations. Although this provided temporary relief, it ultimately increased overall operational costs for global manufacturing. Long-term, the IRA demonstrates dual impacts: It accelerates technological iteration and cost reduction in photovoltaic and energy storage sectors by incentivizing clean tech R&D, providing lessons for emerging markets' industrialization. However, protectionism-driven resource competition and regulatory conflicts may delay global coordinated emission reductions, posing challenges to vulnerable developing nations. Moving forward, the global manufacturing sector must balance "competition and cooperation" —enhancing competitiveness through innovation while establishing multilateral frameworks for green transition. By avoiding zero-sum games and transforming policy shocks into industrial upgrading momentum, it can build a more resilient global industrial ecosystem.

The future development of global manufacturing requires balancing competition and cooperation. Nations must enhance core industrial competitiveness through technological innovation while establishing multilateral frameworks that align with green transition goals, steering clear of zero-sum game scenarios. Only by adopting this approach can the policy impacts of the Inflation Reduction Act be transformed into momentum for green and intelligent manufacturing upgrades. This strategic shift will foster a more resilient and sustainable global industrial ecosystem.

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