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Navigating the Inflation Reduction Act:

Impacts on the Battery Industry, Transatlantic Trade and Green Transitions.

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1. Introduction:

The Inflation Reduction Act (IRA) passed in August 2022 is a significant milestone for climate and clean energy in the United States. It is undoubtedly the largest initiative in US history, representing a serious step towards green transitions and the goals of the Paris Agreement. However, concerns exist about its potential impact on global environmental initiatives, trade, and competition, suggesting that the IRA, although aligned with climate goals domestically in the US, could put obstacles in the way of the EU's transitions due to its protectionist approaches.

Following the pandemic and the war in Ukraine, the energy crisis has heightened awareness of energy security and accessibility in the European Union (EU). The cut-off from Russian gas has made it necessary to explore and invest in alternative energy options in addition to a considerable focus on storage capacity. As a critical aspect of electrification and green transitions, national and transnational strategies claim batteries as building blocks of reliable, resilient, and efficient clean energy storage and delivery. Moreover, as critical for the transition to a greener economy. Outside of China, the EU has since 2017 led the way in advancing renewable energy through technology initiatives and heavy investment in research and development (R&D) to create a stable and independent battery industry. However, these initiatives now face significant challenges due to the Inflation Reduction Act's provisions targeting China's dominance in the supply chain.

Geopolitical tensions between the United States (US) and China have generated apprehension over the latter's growing dominance in global battery supply chains, leading to fears that it could exploit its power to gain leverage in strategic sectors, such as the battery industry, where more than 80% of battery mineral extraction, refining, and battery cells are owned, produced, and marketed by Chinese companies. In response, one of the primary objectives of the IRA is to reduce dependence on countries of concern and enhance domestic production capacity in the United States by offering almost \$400 billion in subsidies and tax credits for domestic production and processing capacity in the battery supply chain, attracting battery companies worldwide and potentially disrupting the European market. European battery and mineral companies now face the challenge of retaining their competitive advantage in green industries and innovations by relocating manufacturing to the US, finding ways to work within the IRA framework, or waiting for the EU to respond with similar, if not more favourable subsidy arrangements to boost and keep EU battery initiatives and secure access to renewables.

Against this backdrop, this thesis aims to analyse the IRA's potential as both a solution and a problem for transatlantic cooperation in global climate governance and the green energy transition. Moreover, the thesis explores how the IRA and the European Green Deal are aligned or conflict in their goals of incentivising a green energy transition. Additionally, it will examine the IRA's protectionist approaches to mitigating risks and securing a sustainable supply chain for the growing demand for renewable energy and storage systems by 2030. Consequently, this thesis will analyse the following research question:

How does the IRA act both as a potential solution and a challenge to transatlantic cooperation in global climate governance and the transition to green energy?

The research problem addressed in this thesis is the potential impact of the Inflation Reduction Act on transatlantic cooperation in global climate governance and green energy transition. Since adopting the IRA, the EU Commission and member states have been in an uproar due to its constraints on transatlantic trade. While the IRA seeks to reduce dependence on countries like Russia and China, restrictions on subsidies and credits, specifically in the battery industry, may have unintended consequences that harm the EU's interests. This could lead to trade disruptions, tariffs, and barriers to trade that could harm businesses and consumers in both regions.

Given the importance of the EU-US relationship and the significant investments made in developing a European-based battery chain, it is critical to investigate the response of the EU and the potential interactions between the two regions and see the stream EU battery companies lean towards. This research aims to contribute to mapping out the current development of the global battery market, given the historical relevance of the IRA as a climate and green technology law in the US and the increasing demand for lithium-ion batteries globally. As batteries enable better, safer, and more flexible access to energy and development, this research is essential in understanding whether the IRA will hurt or aid in competition towards green transitions.

Outline of the thesis:

This M.Sc thesis will focus on the potential impact of the IRA on the battery industry in the US and its domestic transformation. The aim is to assess the EU's response and how the IRA's protectionist approaches will affect the EU market and identify opportunities the EU can take to counter these effects. To answer this, the thesis will be structured in the following way:

Firstly, the background section overviews the battery industry's growth and initiatives, highlighting its significance for green transitions and the geopolitical implications involving

Russia, China, and the West. It then focuses on the IRA, discussing its goals, reactions within the EU, and its potential impact on global trade agreements and competition in the renewable energy sector. The chapter also examines the current state of the European market for green industries, considering its competitive advantages. Furthermore, it explores the relevance of batteries within the IRA context, addressing factors like the energy crisis, green transitions, the rise of EVs, challenges associated with the Chinese battery value chain, and the influence of US environmental policies leading to the development of the IRA and supportive market instruments.

Secondly, chapter 3 will examine the theoretical framework and discuss globalisation and how this links to dependency theory and Wallerstein's World-Systems Theory. Then I will bring aspects of International Political Economy that can be linked to trade and environmental policy, such as the mercantilist model by Gilpin and ideas like complex interdependence by Keohane and Nye. Next, I explore the ideas of green trade protectionism and different environmental economy instruments that have commonly been used to shape the environmental policy trends in the US.

The methodology chapter describes the methods for data collection that laid the base for my thematic analysis. This study employs explanatory research methods. For my data collection method, I utilised both primary data through a non-probability sampling of interviews and secondary data through a literature review of policy analysis in published journals, articles, seminars, and news articles.

Lastly, my analysis uses the four themes in the results to discuss the impact on transatlantic trade and green transitions. I will first look at the challenges and then present the opportunities.

2. Background:

2.1 EUs Sustainable Development and Battery Initiatives:

The topic of green transitions to support sustainable development has been a priority in the European Union (EU) for decades. Despite ongoing debates about growth and technological advancement, sustainability and circularity have remained a key focus. As emission goals and standards get stricter and renewable energy (RE), goals become more ambitious, environmental ideas and concerns have become integrated into everything from the energy sector to finance and clothing. The development of policies to reduce emissions through promoting RE sources has been developing steadily since the 1990s, and the EU has been apparent in its targets to achieve an RE energy share of 32% by 2030 (IRENA, no date), with reductions in heavy

transport and industry remaining the most significant challenges. The EU has clarified that technological advancements and access to cheaper and more reliable technology are imperative to achieve a fast and steady transition to reach these climate goals. And due to their versatility, batteries have and will continue to play a crucial role in flexible, stable, and clean energy sources. They are also essential for making the transport sector greener – one of the most significant contributors to CO₂ emissions.

For their flexibility and transferability, batteries have thus emerged as the primary energy storage method for numerous RE sources by addressing the intermittent flow of wind and solar power by storing surplus energy produced during high wind or solar activity periods. The stored energy can then be released when demand is at its peak, ensuring a balanced and consistent flow of renewable energy (P01). With a steady base of reliable and efficient batteries, these technologies can help provide a consistent and dependable power source (Loonela et al., 2020). Seeing the potential batteries hold in a smooth transition towards climate goals, The EU Commission and the World Bank started investing in a European-based battery industry in 2017.

The Global Battery Alliance (GBA), a public-private collaboration platform, was launched in 2017 at the World Economic Forum to establish a sustainable and responsible global battery value chain by 2030. With the increasing global demand and strict environmental regulations globally, improving the entire global battery value chain, including sourcing, raw material extraction, battery production, use, and end-of-life recycling, is essential. The Green Battery Alliance (GBA, no date) has raised concerns about the challenges faced in the battery supply chain. The primary challenge is extracting and processing five minerals widely used in EV battery manufacturing. It is vital to address these challenges to ensure the ethical and sustainable production of EV batteries. In response to the GBA, the European Union launched the European Battery Alliance (EBA, 2019) in the same year. This initiative addresses the challenges of building a sustainable and reliable renewable industry foundation in the EU, focusing on batteries as a crucial component for supporting Europe's transition to a carbon-neutral economy. The automotive industry, a significant contributor to the EU's economy and trade, has been shifting towards producing more electric and hybrid vehicles due to the growing demand for battery-powered cars driven by public environmental consciousness. This has pressured automakers to make more batteries to meet the rising demand (Fleischmann, J. *et al.*, 2023).

The launch of these initiatives set a shift in the sphere of environmental governance regarding batteries which until then had been thought of in relation to tech countries like Japan, South

Korea, and China. The EU's Green Deal (2020) which came in 2020 also included provisions to develop a sustainable battery chain within the European continent based on the goals that The EU must establish a sustainable and competitive economy, as part of the European Green Deal, by achieving no net emissions of greenhouse gases by 2050, ensuring economic growth decoupled from resource use, and leaving no person or place behind. Batteries are crucial to supporting this transition, and the EU must strive to develop sustainable and safe batteries while promoting a transparent value chain, recycling, repurposing, and creating new jobs. In the journey towards achieving energy independence and sustainable technology, it's becoming increasingly vital to prioritise the development of high-performing, safe, and long-lasting batteries. The IPCEI Batteries initiative (IPCEI, no date) is an excellent example. It unites various European countries to collaborate on the production, knowledge sharing, and innovation of new battery technologies. As famously quoted by Elon Musk, "Lithium batteries are the new oil" (Root,2022), emphasising the crucial need for us to work together to ensure that these batteries are efficient, effective, and repurposed, remanufactured, and recycled, supporting a strong and sustainable battery value chain.

With the rise in renewable energy development, the importance of batteries for power capacity, flexibility, stability, and energy storage is becoming more crucial. The EU has been leading the way in advancing the use of renewable energy sources, with initiatives focused on transnational cooperation, technology development, R&D, and knowledge sharing. These initiatives, such as the EU Green Deal and the Important Project for Common European Interest on Batteries, have promoted innovation and ensured a sustainable and circular European battery source for mining, production, and recycling (IPCEI, no date). Consequently, this has led to the development of national battery strategies in many European countries as they seek to prepare for future demand for battery electrification while addressing the environmental impact of current supply chains. Taking responsibility for one's consumption is a recurring theme in European discussions as the need for electrification and sustainable living continues to grow.

2.2 Demand for EVs

As the world shifts towards renewable energy sources, the demand for batteries as a fuel and energy storage solution is quickly increasing. The transportation sector is one of the world's most significant contributors to CO₂ emissions, accounting for 37% of global emissions, as reported by the International Renewable Energy Agency (IRENA, 2022). Consequently, the EU is encouraging the use of electric vehicles (EVs) over petrol or diesel alternatives, resulting in a significant increase in interest from private individuals who prefer EVs as their mode of

transportation. As a result, there has been an unprecedented surge in demand for EVs. Market analysts predict that the grid-scale battery storage market share will grow into a \$15 billion industry by 2027, driven by the need for reliable, stable, and secure batteries for the transportation sector. In addition, efforts are underway to establish a European battery chain to meet this demand, with global sales doubling from 2020 to 2021, reaching 6.6 million. With increased incentives and national battery strategies, this number is expected to overtake fossil-fuelled cars in the 2030s (IEA, 2023).

According to the IEA's Global EV Outlook 2022 and 2023 reports (IEA, 2022), there has been and will be a significant increase in the number of electric vehicles in all road transport modes. The number is expected to go up from almost 18 million in 2021 to 200 million by 2030, an average annual growth rate of over 30%. If this growth rate is achieved, EVs will represent about 10% of the road vehicle fleet by 2030. The report also predicts that total EV sales will reach 18 million in 2025 and over 30 million in 2030, accounting for 13% and over 20% of all road vehicle sales, respectively. This trend is becoming more common globally, but different regions embrace this shift at varying rates with little progress outside the three biggest markets: China, the EU, and the US (IEA, 2023).

Although countries like Norway have achieved 90% EV sales of new cars, China is the first significant market where EVs have reached a market share of 25%. The Chinese market also accounts for about 60% of the global market, surpassing its 2025 target for new energy vehicle sales (IEA, 2023). They are also the current leader in the electrification of buses and two/three-wheelers, with the world's highest stock share of electric buses, at over 10%, due in part to the large number of EV bus models available. This success is attributable to the availability of a significant number of EV bus models in China and the government's unwavering commitment to the electrification of public transportation. By prioritising sustainability and clean energy solutions, the global increase in EV sales in 2021 was primarily thanks to China which accounted for half of the growth. In 2020, over 3 million EVs were sold in China, more than the world combined. This points to China's role in upscaling EV production and battery demand. Still, their monopoly and dominance in the supply chain are becoming an issue to the West (EVO, 2022). This will be elaborated on in section 2.3.

Furthermore, the EU has also been prompted to implement CO₂ emission standards for light-duty vehicles (LDVs) and heavy commercial vehicles and has become the second largest market, with an increase of 15% in 2022 (Vitra, 2023). By 2030, electric LDVs will account for over 35% of sales and potentially over 50% of all European sales. This aligns with the European

Union's goal to reduce emissions from cars and vans by 55% and 50%, respectively (EU Commission, 2019). The European Union Clean Vehicles Directive has also established minimum requirements for purchasing zero-emissions public buses and trucks (EU Commission, no date). Notably, battery electric vehicles (BEVs) have already seen a significant increase, accounting for 12.1% of the total market share in 2022, as opposed to a mere 1.9% in 2019 (Bello, 2023). The European Commission has announced a ban on the sale of all combustion engine cars by 2035, a bold step towards achieving climate neutrality. In conclusion, the growth of Europe's EV fleet plays a critical role in reducing emissions and making progress towards achieving climate neutrality (European Parliament, 2022).

The US, the third largest market, also saw an immense increase of 55% in the first quarter of 2022, reaching a market share of 8% globally (IEA, 2022). At the current rate, expectations are that by 2040, the US will hold 17% of all global EV sales. Bloomberg predicts an estimated 3.2 million EVs will be sold by 2028, and meeting this demand will require 320 gigawatt-hours of domestic lithium-ion battery production capacity (Colthorpe, 2022c). However, the US is expected to have only 148 GWh by 2028, posing a significant risk to US companies' long-term financial viability (FCAB, 2021). Without immediate action, this could result in vulnerable supply chains for the transportation, utility, and aviation sectors and dependence on foreign sources of batteries and critical materials. The Li-bridge alliance, led by Argonne National Laboratory, is an initiative in the US to address the issue of insufficient domestic lithium-ion battery production capacity (Li-bridge, 2023). The US has established a national blueprint for lithium batteries 2021-2030, which supports R&D and other promotions of domestic battery ecosystems, reducing dependence on insecure sources and creating a more resilient supply chain. However, only ten states have implemented any plan and goals for battery energy storage (Tsafos and Carey, 2022). Given that the auto industry has historically contributed 5.5% of the total US gross domestic product, it's crucial for the US to capitalise on the growth in the domestic and global markets to capture this market (IEA, 2022).

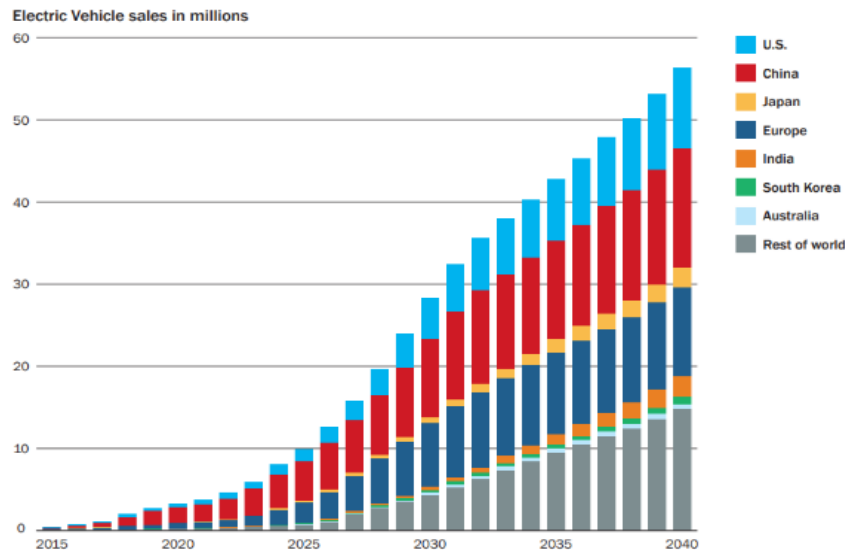


Figure 1: Bloomberg EVO Report 2022

As shown in the graph above, the outlook of EV demand and grid-scale lithium batteries will rapidly increase towards 2040 (EVO, 2022). Bloomberg estimates that the lithium-ion battery demand will grow by 33% annually until 2030, mainly in the transport and energy storage sector (Fleischmann *et al.*, 2023).

China's influence in the electric vehicle and transportation domains surpasses mere utilisation and implementation. Their control over the supply chain provides a considerable geopolitical edge in a rapidly expanding and exigent industry. Nevertheless, this control has also given rise to apprehensions about neglecting human rights, workers abuse, and lack of environmental regulations on the toxic chemicals from rare-earth mining for the necessary battery components causing countries to turn ever more towards regionalising production and industry capacity to ensure and support just and sustainable green transitions.

2.3 Chinese Dominance and unsustainable supply chain:

According to the International Energy Association (IEA, 2022), China remains the leading electric vehicle market, accounting for 50% of global demand and growth in the EV market in 2021. Lithium-ion batteries, the only type in big-scale production, are the type of batteries in our phones, computers, power tools, cars, and storage systems. However, China has emerged as the dominator in the supply chain, dominating over 80% of the market from mineral extraction, processing, and cell production. Currently, China is the only country with the infrastructure capacity to process the number of minerals in the desired time; therefore, as demand grows and governments change over to EVs, countries with a monopoly in the supply chain will gain an unfair geopolitical advantage.

ELECTRIC VEHICLE BATTERY SUPPLY CHAIN

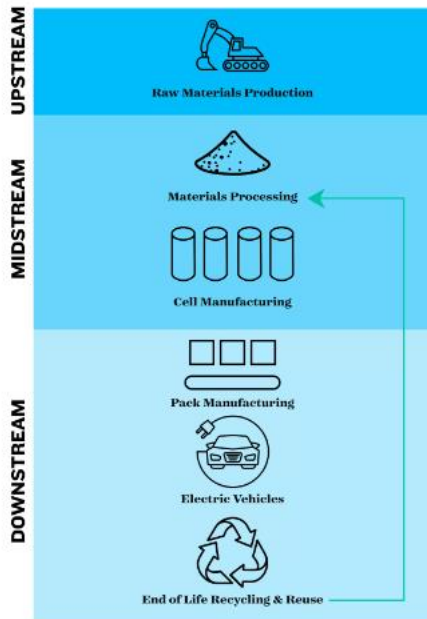


Figure 2: Source from NCDC, *Battery basics*

Lithium-ion battery technology, arguably the fuel to modern technological life, is becoming increasingly demanded due to being easy to recharge, cheap to produce, chemically stable and lightweight. Due to the influx in demand and production over the past few years, lithium-ion batteries have seen a tenfold decrease in price since the 2010s (Garside, 2022). Since then, China has dominated the production of anodes and cathodes, the positive and negative charge in the battery, with 70- and 85%, respectively. Each of these electrodes includes a mix of rare high-grade minerals. And with China housing more than half of the world's lithium, cobalt, and graphite processing plants, and six of the ten largest battery companies, it puts them at a clear advantage and control. As of 2022, China produced more batteries than the rest of the world combined, and if it continues

at this rate, it is projected to have a lithium cell production capacity of 1,811 GWh by 2025 (EVO, 2022).

Infamous for its pollution, China's capacity for battery production has led the country to look towards reducing its reliance on fossil fuels and imports, strengthening its economic power, and addressing its environmental issues. As EVs are becoming increasingly popular, the EU is even banning the sale of new petrol and diesel cars by 2025. However, even with all these incentives, China is well ahead with a 55% global market share of electric vehicle (EV) sales in 2022. China has been increasingly investing more in mines and infrastructure outside its borders to meet this demand, solidifying its position in the EV supply chain (Bhutada, 2023). For the past few decades, through their Belt and Road projects, China has expanded into Africa's mineral-rich land due to lenient regulations and cheaper labour in countries like The Republic of Congo, where the vast majority of cobalt, a vital component of the cathode, is mined (Green Car Congress, 2022). The democratic republic of Congo controls more than 70% of the world's cobalt. However, the harvesting and dependence on this rare mineral are also rumoured with human rights abuses, brutal working conditions, and violence against workers in predominately Chinese-owned mines. Here, Chinese control over the supply of China is twofold. First, the Chinese companies send the minerals back into China to ensure control

over processing and output. What is illegally mined by the Congolese also tends to get sold on the black market back to China, where three-quarters of this are processed and refined. Secondly, due to the size of the African market and their limited fiscal bases, they are forced to resort to international financing sources. China has thus been Africa's single largest creditor since the 2000s and is crucial in bilateral negotiations and strategy (Nambiar, 2022).

In the lithium triangle, one of the world’s largest lithium reserves between Chile, Bolivia, and Argentina, China has taken a similar approach to the political instability in the region by waving its chequebook and investing billions of dollars into Bolivian lithium mining projects

(Ramos, 2019) and the principal funder and contractor for President Evo Morales’s state-led development projects (Gomez, 2017). Other vital battery components, like manganese, are also 95% refined in China, and graphite by mining 64% (Khalid, 2023).

In conclusion, China’s ownership and control over the lithium-ion batteries production and supply chain, the EU and US’ concern over future energy security is rising. Aiming to have sustainably sound practices and

energy sources, the mining, waste, ethical and environmental issues surrounding batteries is a clear goal to internalise and improve. Outside of this vision, China, its controversial practices abroad, accusations of human rights abuses, and lack of environmental regulations pose more than a political risk to energy security and ethics.

2.4 Environmental issues and unsustainable practices:

Lithium-ion batteries have become increasingly popular due to their convenience and versatility. And as we are getting closer to the decarbonisation goals, “batteries [will be crucial] to provide reliable and cheaper electricity in isolated grids and to off-grid communities, which otherwise rely on expensive imported diesel fuel for electricity generation.” (IRENA, 2020). However, their production relies heavily on finely processed and refined minerals from different regions worldwide and is far less convenient when we want to recycle them for further use. While lithium is critical in achieving our decarbonisation goals and creating a sustainable future, concerns have arisen over the sustainability of battery production. The high resource intensity required, toxic waste, and adverse effects on human health and the environment pose

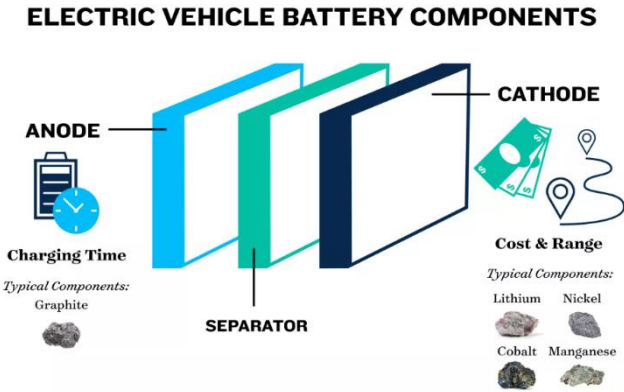


Figure 3: Battery Basics, (Brinn, 2022).

Projection of worldwide lithium demand from 2019 to 2030

(in 1,000 metric tons of lithium carbonate equivalent)

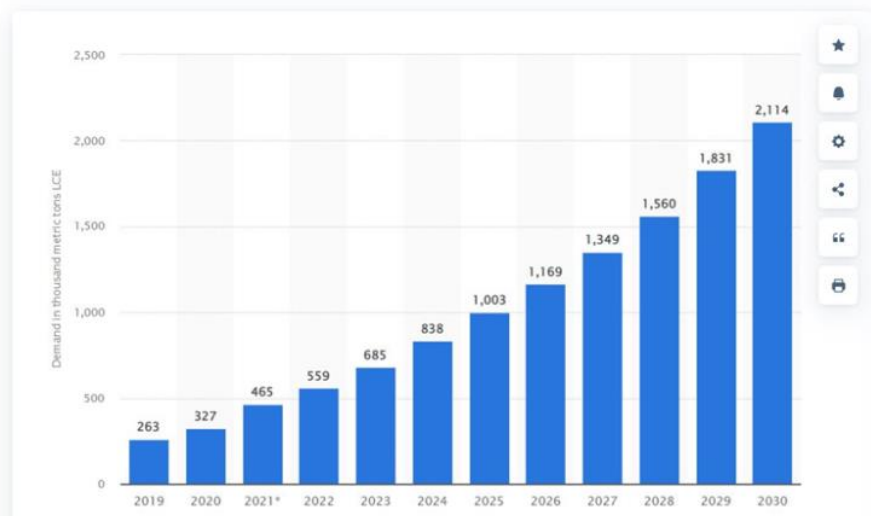


Figure 4: Statista, Garside, M. (2022)

Due to expected demand, lithium sources are projected to increase from around 500,000 tons in 2022 to over 2 million tons in 2030 Figure 3. Concerns regarding this environmental stress are unavoidable in the energy debates, especially with initiatives wanting to regionalise production chains (Brinn, 2022).

Lithium extraction entails consuming vast amounts of energy and water, which is a growing concern for many, especially the developing countries most minerals are sourced, like the lithium triangle, which is plagued by political and economic instability. The most prevalent method of extracting lithium involves lithium brines, which are saline groundwater deposits with high concentrations of dissolved lithium. To acquire a single ton of lithium, about 500,000 litres of water is required, making lithium an energy- and water-intensive mineral (Tedesco, 2023). Using chemicals and heavy metals during mining can also cause pollution in our air and water, harming wildlife and humans. Furthermore, the practice can contribute to soil erosion, which can have far-reaching ecological effects (Earnshaw-Osler, 2023).

As previously mentioned, lithium-ion batteries are widely used due to their rechargeability. Compared to other chemistry mixes, it typically has the best-charging life (McElwee, 2020). However, eventually, the battery will die and be unusable. Therefore, another environmental issue is how to get rid of them. While the battery is no longer helpful, the rare minerals are still there, and there is nothing in the way of reusing them if adequately recycled and reused for other purposes. Extracting rare minerals can be expensive and challenging, but recycling batteries offer an alternative solution to controversial minerals by extending their life and use.

significant challenges. This creates a complex dilemma where the drive for clean energy and reducing our carbon footprint conflicts with the dirty practices that creates them.

As shown in Figure 3 above, modern lithium-ion batteries depend on the right mix of minerals like graphite, lithium, cobalt, and manganese. And although all these minerals pose environmental risks, lithium and cobalt that are debated for their environmentally harmful extraction

Batteries in landfills also pose environmental risks, as the chemicals can seep into the soil and contaminate surrounding groundwater and surface water (McElwee, 2020).

Recycling electric vehicle batteries presents a twofold challenge: reducing waste generated by end-of-life batteries and promoting the reuse of as many components and resources from the manufacturing process as possible. To facilitate the recycling process, the various elements of the battery must first be separated and treated for reuse as raw materials present (Renault Group, 2019). The specific technical processes employed in recycling vary depending on the company and the materials involved. Some companies may begin by grinding the materials before subjecting them to mechanical separation or pyrometallurgy treatment at extremely high temperatures. The final stages of separation and refining are completed through hydrometallurgy, where the materials are smelted into a black substance before metal separation. Despite ongoing efforts, recycling electric vehicle batteries remains a challenging and unprofitable enterprise (Renault Group, 2019). Despite several battery initiatives mentioning recycling as an integral part of their plan, the scale currently needs to be closer to where it must be to be profitable. Due to the price and energy-intensive recycling process, there are dilemmas on every corner for super high temperatures to smelt the batteries (Ruiz, 2022).

Various challenges must be addressed in pursuing regionalising battery production, including environmental concerns and potential pollution from mines. These issues are not limited to countries where production is being relocated, as they may also arise in Europe and the US, where higher-quality production has become the norm. The Not-In-My-Backyard (NIMBY) phenomenon may also cause tension in local communities as production moves closer to home (Cohen, 2016). To achieve the net-zero emissions and Fitfor55 goals, it is imperative to focus on recycling, repurposing, and alternative chemical combinations of batteries. The global initiatives for batteries have evolved naturally from international cooperation and voluntary efforts. However, with the increasing demand for batteries, environmental and ethical concerns have come to the forefront, necessitating a reevaluation of current production methods. The geopolitical implications of battery production have also garnered the attention of the US after years of climate complacency.

The inflation reduction act represents a shift towards green transitions and energy security/self-reliance, signalling the need for countries to think differently about batteries. However, it has only sometimes been that way as the EU and the US have had very different approaches to tackling climate issues. For the next section, I will briefly look into the EU's environmentalist

culture compared to the habit of the US' climate complacency and lack of actions before going into details about the IRA, its main provisions, and its reactions.

2.5 EU and the US difference in approach to climate policy:

Environmental policy is an area where the US and the EU pledged to contribute to international environmental governance but ended up on quite different paths. After the UNFCCC conference in 1992, 197 countries joined the treaty to strengthen their response to global climate change jointly until the failed ratification of the Kyoto Protocol US pioneered global environmental policy as the largest investor in the United Nations Environmental Programme (UNEP) since its creation in the 1970s. However, since then, the US leadership in this area has fallen behind most European nations. For example, the Netherlands, a country with an economy twenty times smaller than the U.S., contributed 30% more in 2021 (UNEP, 2017). Similarly, the European Union, in collaboration with its member states, is currently the most significant contributor to climate financing globally, aimed at assisting developing nations in their quest to transition to green energy and combat the negative impacts of climate change. Due to the EU system, integrating environmental policy with its single-market principles has been a balancing act: The EU comprises separate and independent states with separate legal and governance systems. So, although having the legislative power to enact laws member states must follow, it still poses potential problems to implementation, expansion, and the prevention of non-tariff barriers (European Council, 2023).

The EU's commitment to sustainable development and climate change-reducing goals has aligned with the Paris Agreement from 2015. All member states to support has pledged themselves to the international agreement and encourage global partners, internationally and bilaterally, to do the same (European Council, 2023). This commitment to environmental protection has led to the development of the current regulatory system, which encourages economic growth through environmental protection (European Union, no date). To achieve this, there is a mix of different policy approaches in place in the EU, both market- and non-market-based instruments.

After implementing laws and regulations in the EU body, different market-based instruments like emission trading and environmental taxes have helped progress towards the 2030 goals (European Commission, 2020). Here the application of the EU taxonomy and different reporting standards have been very influential in tracking progress and fostering a sense of responsibility (Climate Policy Infor Hub, no date). The open method for coordination initiated by the EU Council in 2000 has been essential for Member States to learn from each other and

improve their domestic policies. While the process may seem soft, a sense of peer pressure and naming and shaming often drives the improvement process forward. The evaluations and command-and-control-based instruments through emissions targets are essential to the governance process and are crucial in promoting transparency, accountability, and progress (European Parliament, 2014).

The EU boasts a range of institutions and bodies that effectively support the implementation of climate law, such as the European Environment Agency and the European Investment Bank. These entities work closely with national parliaments to ensure the proper application of laws, maintaining credibility and legitimacy. While the EU acknowledges the difficulties of implementing laws at the national level, it prioritises compliance-based mechanisms, strategic legal sanctions, supportive bodies, and financial aid to overcome such challenges (EU law, 2021). Notably, the European Climate Law was recently adopted by the EU, providing a legally binding framework for achieving the EU's climate targets by setting specific targets and annual reporting requirements. In 2021, a questionnaire was administered to member states to find out about each member's approach to climate change in relation to their major industries. This revealed that their approaches to decarbonisation and achieving EU climate goals vary greatly and are affected differently by the single market (EU law, 2021).

The single market is a crucial factor to consider when enacting climate policies, including subsidies and tax credits, as the line between EU members and national states holds different powers of enactment. However, while industries within the EU must comply with environmental regulations and share common environmental goals, the free market can pose challenges to environmental policies, as enterprises may resist regulations that could reduce their competitiveness (Bjonnes, 2020). Balancing industry interests, the free market, and environmental policies represents a significant challenge for the EU (European Union, no date).

The European Single Market is one of the EU's greatest achievements, driving economic prosperity and serving as a cornerstone of the Union's success. With the reinforcement of the Single Market, there is a renewed focus on leveraging its power to accelerate the green transition, which is a vital part of the European Green Deal (European Policy Centre, 2023). Building on the strength of the Single Market is critical for making the European industry more competitive in the face of growing global competition. However, some argue that integrating solid and sustainable practices into the open market is challenging across national borders (de Soysa, 2022). It is crucial to balance the free movement of goods and environmental protection when incorporating environmental concerns into the EU's internal market policy. The EU

recognises that different environmental standards can lead to nontariff trade barriers, impacting trade and the economy. To overcome these barriers, the EU has employed trade provisions that eliminate product standards or restrictions based on environmental concerns (European Commission, no date).

On the contrary, the US has had a pretty different relationship with climate and environmental policies. Before the 1970s, states and local governments were responsible for reducing harmful chemicals and pollution (EPA, 2015). However, the public consensus started to shift in the 1960s to see environmental issues as a national concern, as states or local borders did not restrict pollution. This change in perception was partly brought about by influential books such as *Silent Spring* (1962), *The Population Bomb* (1968), and *Limits to Growth* (1972), which helped to establish government intervention for environmental protection as a legitimate approach (Benson and Jordan, 2018). As a result, the United States became the first country to adopt federal legislation and create agencies to protect natural resources, achieved through establishing the National Environmental Policy Act in 1969 and the Environmental Protection Agency (EPA) in 1970 (Wisman, 2013).

This solidified the national government as holding the responsibility of environment, health and conservation (Shapiro, 2021), and the EPAs' creation of the Clean Air Act in 1970 and the Federal Water Pollution Control Act in 1972 represented a legal shift in the involvement of environmental protection on a federal level (Metcalf, 2009). However, with a higher focus and regulatory control over these issues, other issues like CO₂ emissions lost traction with increasing emission rates and less regulatory control (Shapiro, 2021). With a highly polarised political environment, the direct intervention of the national government to create similar regulations and caps on the industry was not popular. Therefore, using market-based instruments became the most popular choice for environmental policy to achieve desired goals with minimal economic cost. Pleasing both environmentalists and popular with conservatives and market liberals (Bohr, 2016). But despite these trending approaches persisting, the limitations have been a point of contention and gradually gained more attention due to consistent failure to deliver and take part in climate goals – vital to reach decarbonisation goals.

Internationally, the United Nations framework convention on climate change (UNFCCC) in 1992 (ratified in 1994) arguably set off the talks on global action to address climate change (UNFCCC, no date). All agreed to cut emissions to prevent lasting damage to the global climate and environment. Nearly a universal meeting, the US also recognised the common but differentiated responsibility. There were no country-specific requirements that the Kyoto

Protocol tried to address later. The US was adamant about putting in points for cap and trade but ended up not ratifying. This first attempt was regarded as a failed attempt at tackling international climate issues (Maizland, 2020). Since then, the US has been careful with pledging themselves to anything international and commitments where they must do something that might not be on their terms or with the freedom to opt out (Clean Air Task Force, 2020). The international community has therefore criticised the US for being inconsistent and unreliable in its efforts to address climate change. Despite making promises to do more, the US has gotten a reputation for failing to deliver. However, the situation has changed significantly with the introduction of the Inflation Reduction Act, which as a landmark legislation, has shifted the US policy approach towards green technologies and sparked a new sustainability momentum (Hill, 2022). As a result, the US is now seen as a leading player in the global effort to combat climate change.

2.6 The Inflation Reduction Act:

2.6.1. INTRODUCTION

The inflation reduction act got signed into law in 2022 as the first and single biggest climate bill nationally in US history (NHO, 2023). The law aims to accelerate the US transition to clean energy by offering tax credits, subsidies, and investment to reindustrialise the US as a leader in the renewable energy transition to achieve net zero emissions by 2050 (Coleman, 2023). Its objectives are to boost domestic manufacturing while fighting the climate crisis and advance environmental justice for folk and flora. Securing the US' position as a leader in the transition, the IRA includes almost 400 billion dollars in funds, tax incentives, grants, loan guarantees and payouts to encourage private investment into clean energy technologies. Here, batteries are a particular focus, with subsidies targeted at reindustrialising the US as a leader in domestically produced batteries to meet global demand (Kumar et al., 2022). While targeting issues like the environment and technological innovation, the IRA's objectives are multi-layered. While focusing on issues like environmental justice, safeguarding healthcare and medicine prices, stable job creation, and inflation reduction, this thesis will only look at the IRA through its main investment point into the battery industry and supporting infrastructure. Although it aims to tackle severe geopolitical and environmental issues, European countries have raised concerns regarding the protectionist measures and high subsidies that may hinder global competition and trade and impede green and just transitions (NHO, 2023; Menon Economics, 2023).

2.6.2 How it came to be:

As a result of the negotiations surrounding the Build back better act, the inflation reduction act emerged as an improved amendment. First introduced by President Joe Biden during 2020-2021, the build back better act aimed to allocate significant investment into social, infrastructural, and environmental programs nationally. And was considered the largest nationwide public investment since the New Deal in the 1930s (Kaufman, 2022). The initiative stopped after US Senator Jo Minchin withdrew its support, and the act fell through. Following undisclosed discussions, Senator Joe Manchin and Senate Majority Leader Chuck Schumer revealed the Inflation Reduction Act of 2022, widely perceived as an unexpected development. Following, the bill received approval from the Senate and the House of Representatives, and it was signed into law by President Biden on August 16, 2022 (Tankersley, Friedman and Davenport, 2022).

Energy funding from the Bipartisan Infrastructure Law and the Inflation Reduction Act spans major funding themes, totaling \$370 billion.

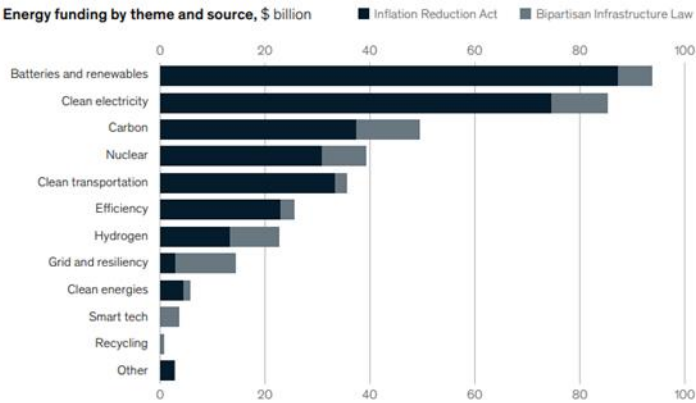


Figure 5 Kumar, et al. 2022

Across various industries, most funds are allocated to supporting energy storage through batteries and renewable energy systems. Here, the act is also supported by the Bipartisan Infrastructure Law, which gives 7.5 billion dollars to building up suitable and supporting infrastructure in the form of charging stations, support clean transport for school buses, and commercial transportation (Kumar et al., 2022).

Another supporting programme under the IRA is the Energy Infrastructure Reinvestment Programme, which aims to retool, repower, repurpose, or replace energy infrastructure that has ceased operations or improve the efficiency of currently operating infrastructure (Kumar et al., 2022). These grants aim at supporting the growth of the energy storage industry, specifically focusing on developing advanced battery technologies. The grants expect to significantly boost the sector, helping to drive innovation and increase the deployment of energy storage systems and new jobs in the area (Colthorpe, 2022).

According to Bloomberg (Boudway, 2022), by 2040, the global market will see fifty-six million electric passenger vehicles (EVs) sold, with 17% (9.6 million) in the US. On average, the US auto industry has accounted for 5.5% of the US GDP, and in the future, this could result in \$100

billion worth of imports, making it crucial for the US auto industry to capture the market (FCAB, 2021).

The law aims to do this by including generating investment into domestic manufacturing and production capacity, fighting the climate crisis and advancing environmental justice, securing US dominance in domestic clean energy manufacturing, and providing a path to achieve climate goals and net zero emissions by 2050 (Kumar et. Al, 2022). It aims to “*unlock truly transformative change that not only builds a low-carbon energy system with American-made technology*” (p.9, The White House, 2023).

2.6.3 Main provisions:

Concerning the battery industry, a few provisions are the most important and have gathered the most attention. Hereof are the mentioned subsidies and tax credits. Divided into two, the i) *Production Tax Credits for Clean Electricity from Renewables* (PTC) provide, as the name suggests, credits to produce electricity from renewable energy sources. And ii) *Investment Tax Credit for Energy Property* (ITC) gives tax credits for investing in renewable energy projects. Although not groundbreakingly new to the IRA, these tax incentives have helped the development of wind farms and solar production in the past couple of years and boosted the percentage of renewable resources in the US energy mix (Office of Energy efficiency and renewable energy, no date). However, in the new IRA, the ITC and PTC have been extended and modified to incentivise investment in poorer communities which is opening for a 10% credit increase if located in disadvantaged communities. Additionally, according to section 45, another 10% increase will be given if able to prove that a percentage of the products produced or processed have been so domestically (The White House, 2023). This would optimistically strengthen the domestic supply chain and resources for production, which, concerning batteries, is one of the largest points of contention (The White House, 2023).

The most controversial point of this bill is the local or domestic content requirements. Most subsidies and incentives will only be given to those who produce, invest, process, and sell on American soil to ensure the phase-out of foreign supply chains. Although this extends to the North American continent, it has also directly hit the EU and their battery industrialisation. From 2024, 40% of critical battery minerals must be mined, recycled, and manufactured or assembled in North America (Kumar et al., 2022). This will increase to 80% in 2026 and 100% in 2029. Manufacturers would then need that battery components have not been extracted, processed, or recycled by “*foreign entities of concern*” (Zimmerman, 2022). To this end, using

a battery passport is being discussed to encourage the purchase of more locally produced components and materials. The tax credit for alternative fuelling properties has been modified to cover up to 30% of the cost of installing a single unit, with a maximum credit of \$100,000 per unit, and is transferrable between taxpayers. The existing tax credit for clean vehicles has been extended, renamed, and reshaped to provide a maximum credit of \$7,500 based on the price of the vehicle, domestic content requirements, and income limits.

The US pragmatic approach to targeting the transport sector also goes beyond subsidies for investors and producers. Private persons also have commercial benefits such as \$7,500 in direct support for purchasing new EVs and \$4,000 for used ones. This is also given to companies investing in electric trucks and transporting vehicles. The success of these incentives will largely depend on the quality of the range and battery reliability, which will, directly and indirectly, support each other through the market (Ritoe, 2022). The IRA has also introduced two new tax credits for used- and commercial vehicles, with credits of up to 30% of the sale price or 15% of the purchase price, respectively. Furthermore, the IRA has introduced a new energy production credit to produce components for solar and battery components. The credits are transferable among taxpayers and are being phased out starting in early 2029 (The White House, 2023). The credits apply to various battery components, including electrode active materials, battery cells, battery modules, and applicable critical minerals. Additionally, the IRA provides direct investments into programs across government agencies to accelerate the development of clean energy infrastructure and technology, in addition to existing government funding.

2.6.4 Trade partners and “countries of concern:

The IRA actively tries to do something with the Chinese domination in the supply chain and cut off what they have called “countries of concern” to countries like Russia, Iran, and the middle east (Zimmerman, 2022). Understandably, cutting off all trade with the outside world will be impossible to receive subsidies past the domestic production requirements. The bill, therefore, extends some of its benefits to North America and the countries with trade agreements, strengthening bilateral relationships and trust in the Americas and significantly strengthening bonds with free-trade countries such as Canada and Mexico to accelerate the energy transition (Ritoe, 2022).

However, the IRA's pragmatic approach acknowledges that the US can only contain part of the supply chain. It aims to create a stable infrastructure and build bonds with countries like Canada and Mexico to cooperate on accelerating the energy transition. The amendment to tax credits

for commercial vehicles will significantly impact reducing CO₂ pollution. However, the transfer to clean trucks depends on range, battery reliability, and total ownership costs. The potential impacts of the IRA on the US economy have been analysed in a study by Young (2022), with the actions aimed at addressing inflation through measures such as controlling the money supply and stabilising prices. However, the act may significantly affect businesses, consumers, the job market, and economic growth. There are concerns about its potential discriminatory impacts on EV sales and exports to the US market (Young, 2022).

The EU is concerned about the impact on their own battery initiative as the many subsidies will take more work to match. If done slowly, prices may increase if the US moves away from cheap labour markets like China. Additionally, the US has been a challenging place for environmentally friendly investments and clean technology innovation on a national level. This might be further complicated politically down the line as all Republican senators voted against the IRA, and the Republicans gained the majority in the 2022 midterm elections.

2.6.5 Something new for climate governance?

The aims and actions within the IRA demonstrate a significant shift in the US environmental policy approach. Previously dominated by a market-based approach led by separate states and markets, the focus has shifted to nationwide state-initiated investments in targeted technologies that promote energy independence, efficiency, and advancements in the transport sector (Howell, 2017). The act of selecting preferred technologies to get special treatment for tax credits and support from the government has been the subject of considerable controversy in the past for several reasons. One leading cause is that it can create market distortions. By choosing certain technologies for subsidies, governments may give some technologies an unfair advantage, leading to market inefficiencies and unfair competition. Additionally, governments may need more information about which technologies will be the most effective in achieving their policy goals, leading to the potential misallocation of resources. With the IRA. However, this has been done deliberately (Gross et al., 2012).

Another discussion point is that political considerations and lobbying can influence selecting subsidy technologies. Industries and interest groups may lobby for subsidies for their preferred technologies, regardless of their effectiveness or efficiency. This can lead to subsidising fewer effective technologies or technologies that do not address the most pressing environmental issues. Lastly, some argue that subsidies should be technology-neutral and let the market determine the most efficient and effective solutions (Craig and Madland, 2014). By selecting

certain technologies for subsidies, governments may inadvertently limit innovation and hinder the development of new, more promising technologies that may emerge. Despite the controversy surrounding singling out some technologies for support, the IRA has chosen to precisely do this to boost the market, development, and climate goals.

It is worth noting that such incentives are a familiar phenomenon as the US Department of Energy (DOE) launched the SunShot Initiative in 2011 (Solar Energies Technology Office, no date), aiming to make solar energy cost-competitive with other forms of electricity by 2020. The program's objectives were to promote research, development, and deployment of solar energy technologies while enhancing solar manufacturing processes and cutting the non-hardware expenses of solar energy systems (Office of Energy Efficiency and renewable energy, no date). There were also temporal limitations on funding and long-term results. While the program was well-funded, with a budget of several billion dollars, the funding was only guaranteed during the initial period of the program (Solar Energies Technology Office, no date). This meant that many of the research and development efforts initiated under the program may only have been able to continue with other government or private sector funding. The IRA takes this further by prolonging the support until the specific decarbonisation goals are fulfilled. By extending the duration of these incentives, the IRA provides investors and companies with increased stability and certainty. Of note is the renewed opportunity for "picking tech," which had previously been controversial (Gross et al., 2012).

In conclusion, the Inflation Reduction Act aims to invest in climate and energy policy in the US, with a focus on boosting domestic manufacturing, fighting the climate crisis, and achieving net-zero emissions by 2050. The act provides funding, tax incentives, grants, loan guarantees, and tax breaks to encourage private investment in clean energy and transportation, particularly emphasising batteries and renewables. The act also mandates that EV manufacturers source critical battery minerals from domestic or free trade partners and demonstrate that battery components have yet to be extracted, processed, or recycled by entities of concern. While the act presents significant challenges for EV manufacturers, the incentives provided by the act may encourage the development of a reliable and transparent supply chain for critical minerals.

2.6.6 EUs concerns – How to respond?

The European battery industry has been facing challenges due to the economic climate in Europe, resulting in delays and suspensions for many battery gigafactory projects. Post-pandemic economy, energy crises, and inflation are some of the significant contributors. The uncertain environment has brought difficulties to the industry; however, some companies are

still pursuing their projects by seeking alternative solutions to overcome economic obstacles (Murray, 2022b). One such company is LG Energy Solutions, which has identified the US as its most important market and has significant investments in the country with plans to expand. The company is focused on developing energy storage solutions for residential and commercial needs, and they believe the US energy storage market has significant growth potential (Colthorpe, 2022a). To maintain the EU battery ecosystem, the EU body has called for immediate action to prevent the outflow of investments. The US is expected to win all competition in the global market, estimated to be worth more than 250 billion euros by 2025 (Murray, 2022a). Companies within the lithium-ion industry have been noticeably pivoting towards the US market, suggesting that companies were immediately jumping on the wave following the IRA's ratification to avoid the European economic crisis (Murray, 2023).

In response to the IRA, the EU recently announced that they will launch their initiative to support and subsidise the growth and innovation of the European battery industry. The Industrial Act, announced in March 2023, includes subsidies for R&D and the support of partnerships between businesses and research institutions to boost progress. The initiative aims to hinder the expected outflow of investments in the EU battery initiative due to the IRA and create more job opportunities in the region, highlighting the importance of the EU's initiative in ensuring the competitiveness of the European battery manufacturing industry in the global market (EFE, HINA and STA, 2022). The shift in EU companies streaming to the US for their lithium-ion projects marks a dramatic difference the IRA would make on clean tech businesses, startups and investing. The favourable regulatory environment, tax incentives, and growing demand for batteries in the US market have enticed companies to focus on the US for better opportunities and scalability. Despite the battery initiatives on creation, processing, technologies, recycling, and the notable growth of EVs through the pandemic, the US market still appears to be the most attractive for EV production and deployment (Murray, 2023).

Another reason for the change in the favourable environment for battery production is that while the EU is trying to wean off Chinese battery dominance, the largest Chinese battery maker, CATL, has announced further plans for a second facility in Germany. The fact that CATL still decided to invest in Europe shows that there is demand and the company's confidence in the future battery market. Developing new battery facilities in Europe could help reduce the region's dependence on battery imports and increase its competitiveness in the global battery market (Murray, 2022). However, even with the US stringently trying to lessen its reliance on other countries and focusing its production around free-trade countries, there are still constraints to

the growth of the energy storage industry in the US caused by supply chain issues. BloombergNEF highlights difficulties securing the necessary components for energy storage systems and a shortage of skilled workers as significant constraints to the growth of the EV sector (Colthorpe, 2022b).

Although working for years to build and facilitate a strong base for the future battery industry to fuel the renewable energy revolution in the next couple of years towards their net zero goals, The European Union (EU) faces numerous challenges to achieving a successful green transition. The pandemic, energy crisis in Europe, and the war in Ukraine are exacerbating tensions with China and further souring relations between the US, China, and Russia. Additionally, the EU needs help economically to keep up with the demand for batteries that the green transition requires. Since 2017, the EU has highlighted the future demand for batteries necessary for the green transition. However, due to the protectionist approaches of subsidising the domestication of US production and processing included in the Investment Tax Credit (ITC) and the potential violation of multilateral and bilateral trade agreements set by the World Trade Organisation, several EU countries feel blindsided and like they are playing catch-up with a trusted trade partner (E01).

Furthermore, this approach needs to consider the need for cooperation in the green transition and possible supply chain issues with the battery industry. Amaro (2023) points to possible mistakes the EU can make in addressing the ITC. Firstly, the EU could try to match a similar subsidisation structure due to the excessive number of subsidies offered by the US. However, this could lead to the potential overproduction of goods following a market crash. Secondly, they could overregulate the market to protect the EU industry and enterprise, negatively impacting innovation and competitiveness in the European Battery industry. Given the urgency for the next generation of batteries, finding the right balance to stabilise the EU market interest and competitiveness through innovation is crucial in their response to the US. The EU must also address the challenges of the pandemic, energy crisis, and the war in Ukraine, which could intensify relations with China and sour relationships between the US, China, and Russia even more.

In conclusion, the IRA is a turning point in the international environment and shifting the power of renewables over the Atlantic. The European battery industry faces challenges due to the economic climate, resulting in delays and suspensions for many battery gigafactory projects. The shift in EU companies streaming to the US for their lithium-ion projects marks a notable change, with the US market being the most attractive for EV production and deployment.

Developing new battery facilities in Europe could help reduce the region's dependence on battery imports and increase its competitiveness in the global battery market.

3. Theoretical Frameworks:

Chapter overview:

This chapter aims to establish a theoretical framework to analyse the Inflation Reduction Act (IRA) and its impact on the battery industry in the EU. The research question at the heart of this study is how the IRA can act both as a potential solution and a challenge to transatlantic cooperation in global climate governance and the transition to green energy. To answer this question, this thesis will draw from three theoretical strands in social science to develop an analytical framework: International Political Economy (IPE), World-Systems Theory, and Green Trade Protectionism. In addition, I will include aspects of environmental economics to show how the IRA completely changes the US' use of environmental policy instruments.

The first theory strand of interest is globalisation and Wallerstein's World-Systems Theory. This theory will help conceptualise the impact of the globalisation of natural resources, as exemplified by the destabilisation of energy security the EU is now facing because of the war in Ukraine. This theory is particularly relevant for the analysis in this thesis when considering the EU's dependence on Russia for gas supply and China's grip on the battery value chain. By examining the parallels between these situations in the analysis, we can gain insight into the challenges the IRA may pose to transatlantic cooperation in global climate governance and the transition to green energy. Although there are many layers to globalisation, the analysis will draw on a critical approach to dependency and world-systems theory as it does not seek to analyse the inequalities and structural disparities from the point of view of developing countries. Moreover, it aims to understand the dependence on foreign minerals to fuel the Western renewables that have led to an increasingly complex energy security situation in Europe and fuelling trade tensions across the Atlantic.

The second theory strand, International Political Economy, will help explain why the IRA was implemented in the first place and why it may have both positive and negative impacts on the battery industry. The US has been criticised for its lack of contribution to international environmental governance, which has raised questions about the motivations behind implementing the IRA. I draw on IPE and the mercantilist/economic nationalist approach to explain why countries tend to apply protectionist elements, such as those observed in the IRA. This is based on the primary goals and fears that set the IRA in place, (a) Expressing concern about the potential negative consequences of foreign ownership, specifically China and Russia,

of raw materials and value chain, and (b) expressing apprehension about the possible vulnerability in times of war if relying on foreign supplies (Marlin-Bennett, 2010).

Finally, the analysis will draw on the theory of Green Trade Protectionism to explore the implications of growing globalisation and dependence on other countries. Green Trade Protectionism builds on the economic nationalist theory. It reflects changes in environmental economics, including the US's shift in policy approach and policy instruments utilised in the IRA, such as market-based instruments and command and control.

3.1 Globalisation, World-Systems Theory, and sustainable development:

According to the Peterson Institute for International Economics, globalisation is defined as “*the growing interdependence of the world’s economies, cultures, and populations, brought about by cross-border trade in goods and services, technology, and flows of investment, people, and information*” (Iyall Smith, 2018). This phenomenon has emerged because of the expansion of free-market capitalism and the spread of liberal democracy (Guttal, 2007), creating an intricate web of interconnectedness between various parts of the world. By breaking down national barriers and expanding market access, access to natural resources, production, and technological advancement has, in turn, substantially increased global development and welfare (Ortiz-Ospina, 2017). However, the quest for never-ending profit maximisation has deprioritised the effects of social inequality and environmental degradation in developing countries (Zhang et al., 2022). Modernisation theory has infamously been patient with this inequality by claiming that development is linear, whereby increasing globalisation and contact with developed areas of the world like the US and Europe, economic, political, and environmental wealth and security would follow (Modernisation theory, 2013). Critiquing this idea, the 60s and 70s saw the emergence of concepts like dependency theory, which claims an uneven framework between developing and developed countries reinforced by free trade and solidifying the division of labour (Halperin, no date). Many contemporary global capitalism and globalisation critiques also stem from a dependency theory perspective. Here we also see the emergence of the world-systems theory (WST).

Wallerstein's world-systems theory draws extensively from the foundations of dependency theory. It posits a framework in which nations are interconnected in a multifaceted social system, resulting in increasing interdependence, with various structures and groups consistently attempting to influence one another. Due to constant interactions, some groups try to preserve the system's status quo, while others aim to challenge and transform it (Martínez-Vela, 2001). He highlighted this through the structural inequalities between the global economic system's

core, semi-periphery, and periphery regions (Chirot, Hall, 1982). This can also help us glimpse the structural challenges when turning towards sustainable development and greener technologies and the unalignment of knowledge.

According to Wallerstein, core countries, which today would reflect the modern West, represent an economic hegemony with solid governments and sophisticated production processes that benefit the most from the global capitalist system (EjioforOnyishi and Amoke., 2016). On the other hand, periphery countries are relatively poor, historically dominated by simple production capacity specialising in agriculture and raw materials production, with poor labour rewards. (“World Systems Theory,” 2021). In the middle are the Semi-periphery countries that can be categorised as core countries in decline or periphery countries trying to improve their situation. In analysing the power dynamics between the spheres, Wallerstein believed we had to look at the capitalist market as a defining factor in shaping these relationships (Pannilage, 2017). Despite being the founder of WST, Wallerstein himself, among authors like Janet Abu-Lughod (Nielsen, 1991) and Giovanni Arrighi (1998), critiqued the theory for its narrow and deterministic economic factors with a tendency to overlook the agency of individual states, political- and geopolitical competition in shaping the world system (Burayag, 2014). Despite these critiques, it sheds light on how interdependence has created opportunities through rapid development and economic growth. In contrast, this capitalistic dependence can simultaneously create geopolitical competition through marked capitalistic leverage.

To better understand the application of WST, we can use the production of batteries for EVs as an example. As seen in the map below (Randall, 2022), the most vital and rare minerals needed to produce the anode and cathode part of the battery are sourced from developing countries like Congo, Chile, Indonesia, and Russia. Further, the raw minerals, which are already majority owned by Chinese companies, are sent across the world to countries like China for refining, Japan and South Korea for cathode production and battery cell design, and lastly, sent to core countries close to automakers for cell production and sales of EVs in the US or Europe.

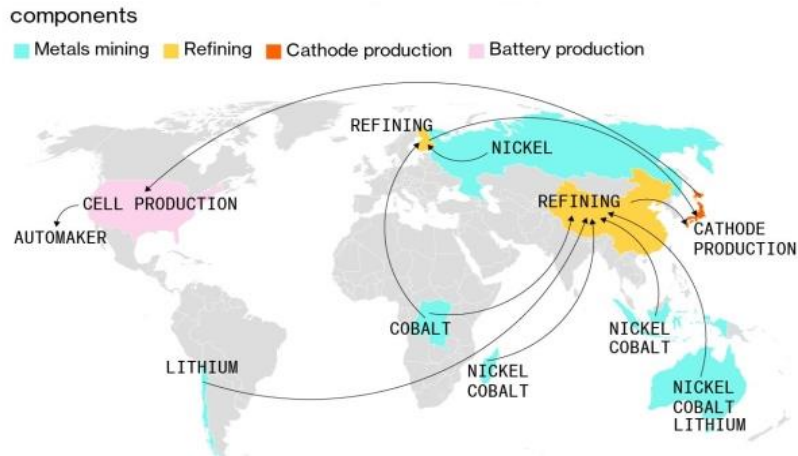


Figure 6: Randall, 2022

WST is highly relevant to development and renewable energy, as it sheds light on the power dynamics and unequal distribution of resources that shape access to renewable energy technologies and their benefits. Renewable energy is crucial to sustainable development, providing access to clean and affordable energy, reducing greenhouse gas emissions, and promoting energy security. However, economic, political, and social factors often impede the development and deployment of renewable energy technologies. According to Wallerstein's world-systems theory, these factors are deeply embedded in the global financial system, which is structured to benefit the core regions of the world at the expense of the periphery and semi-periphery areas (Chirot, Hall, 1982). The global shift toward renewable energy creates new power dynamics within Wallerstein's world system. Core nations, often the most significant renewable energy (RE) consumers, have the economic and political power to shape global policies and investment decisions around renewable energy. Regarding RE development and innovation, the Western core countries have concentrated on the wealth and benefits of access to these technologies. However, with no leverage over the supply chain, these securities and benefits might cause increasing challenges to green transitions in the West.

In conclusion, globalisation has led to a complex web of interdependence among the world's economies, cultures, and populations, facilitated by cross-border trade, investment, and technology. While globalisation has increased global development and welfare, it has also led to social inequality and environmental degradation, especially in developing countries which continue to shape sustainable development. Modernisation theory and dependency theory offer different perspectives on the impact of globalisation on growth, with the latter emphasising the structural inequalities between the core, semi-periphery, and periphery regions of the global economic system. World Systems Theory, founded by Wallerstein, builds on dependency theory

by examining power dynamics between these spheres and the role of the capitalist market in shaping relationships. While WST has been criticised for its narrow focus on economic factors and overlooking state and political agency, it remains a valuable perspective in understanding the global political and economic system dynamics. It can also help us understand the complexity and depth of the green transition. The following section will examine the International political economy (IPE) as it emphasises how political factors, such as power and institutions, shape economic outcomes and how economic factors, such as trade and finance, affect political developments. This interdisciplinary field draws on political science, economics, sociology, history, and other disciplines.

3.2 International Political Economy:

International Political Economy (IPE) is an interdisciplinary framework used to analyse the interactions and intersections between economics and politics in the international arena (Deauvergne, 2020). IPE first emerged in the 1970s as a sub-discipline of International Relations (IR) at a time when global economic development placed international economic issues at the forefront of the agenda of global politics and sought to understand how political actors impact economic policies, institutions, and mechanisms by combining insights from political science, economics, and sociology (CEC, 2020; Newmann, 2016). Due to the economic and political background of the IRA, these aspects of IPE can help further recognise the potential challenges and opportunities for the IRA on an international scale. Notable scholars who paved the path were authors like Keohane and Nye, whose landmark volumes on “*Transnational Relations*” (1971) and “*World Politics and Power and Interdependence*” (1977) are widely hailed as milestones in the construction of modern IPE (Cohen, 2007).

Keohane and Nye developed the concept of “complex interdependence” (Rana, 2015) by highlighting the role of transnational actors and thus challenging the classic realist paradigm of world politics that had long dominated the study of international relations in the US. For realists, states were the only significant actors in world politics. Still, for Keohane and Nye, economic interdependence was spawning a growing swarm of transnational actors, enabling them to participate meaningfully in political relationships across state lines. Here we can recognise the EU and the multiple initiatives and institutional actors as contributing to pushing for green growth and technological innovation globally. Hence, Keohane and Nye maintained that a broader paradigm would explicitly admit the full array of relevant actors. Another important figure was Robert Gilpin, who defended the realist tradition and acknowledged the emergence of transnationalism (Cohen, 2007). In “*Tree Models of the Future*” (1975), Gilpin proposed

three different models to predict IPE's future, including the *mercantilist model* that argued that nations would pursue economic policies that reflect domestic needs and interests without concerns for other states.

Although the ideas of mercantilism are not new, the model proposed by Gilpin was relevant for IPE as it provided a framework to understand the behaviour of states in the global economy. Throughout US history, economic nationalism has been a recurring sentiment, with proponents arguing for state intervention in markets to protect domestic industries, increase manufacturing, and promote exports of finished goods. Essential actors in the funding of the US, like Alexander Hamilton, greatly supported economic nationalism, asserting that a nation's prosperity depends on a favourable trade balance and domestic manufacturing. However, scholars like Adam Smith oppose this view, claiming it undermines free market principles (Smith, 1904). Despite the debate, economic nationalism continues influencing US economic policies and trade practices. Therefore, while supporting the realist perspective of states being the primary actors in the global economy, Gilpin's perception is well summarised through economist Eli Heckscher's definition of enhancing the power and wealth of a state through limiting imports and encouraging exports (Haley, 1936). This is achieved through protectionist measures such as tariffs, subsidies, and regulations, which aim to create a favourable trade balance.

A more modern take on mercantilism is Economic nationalism, a concept closely related to mercantilism that has been gaining increasing attention in recent years. As Gilpin's model of mercantilism provides a framework to understand the behaviour of states in the global economy, it is essential to note that economic nationalism involves state intervention in the market to protect domestic industries and promote economic growth. It is worth noting that mercantilism was a set of economic policies that aimed to increase a country's wealth and power through exports and trade surpluses. While there are some similarities between mercantilism and economic nationalism, the latter is a more modern and broader concept encompassing a range of economic policies and ideologies (Marlin-Bennett, Johnson, 2017). Scholars like Helleiner (2002) explain that countries choose economic policies for nationalist purposes. Sometimes the policies will be liberal, and others more protectionist as countries' policies are nationalist first and then financial. Gregory and Addis (1931) expressed disapproval of the concept of economic nationalism yet recognised its persistence due to six underlying factors. These factors included the apprehension of relying on foreign markets to export domestic products, the risk of foreign capital intervention, the unacceptability of foreign ownership of domestic resources, and concerns regarding dependence on other countries for food during times of war. In the "Political

Economy of Trade” (1986), Judith Goldstein discussed the concepts of free and fair trade. According to her analysis, free trade is aligned with the principles of liberal economics, whereas fair trade pertains to safeguarding US businesses against the trade practices of foreign countries. This implies that US trade policy ultimately promotes mercantilism, favouring interest groups that influence policymakers and lobby for their interests, much like the reasoning for the support of the IRA.

In conclusion, International Political Economy (IPE) emerged in the 1970s as a sub-discipline of International Relations to analyse the interactions and intersections between economics and politics in the international arena. Building on the ideas of WST, Keohane and Nye’s ideas to challenge the realist paradigm through complex interdependence further highlights the importance of transnational actors, especially in environmental policy and governance. However, Gilpin’s mercantilist model also provides a framework to understand why countries might act against the interest of vital trade partners despite being dependent on them. This can be reflected in economic nationalisms growing attention in recent years. As we move forward, it is crucial to consider how green protectionism, a new concept that combines environmental and trade policies, will shape the future of IPE. The following section will delve deeper into this topic and further examine its implications for the global economy.

3.3 Green Trade Protectionism:

International Political Economy (IPE) is an interdisciplinary framework used to analyse the interactions and intersections between economics and politics in the international arena (Deauvergne, 2020). IPE first emerged in the 1970s as a sub-discipline of International Relations (IR) at a time when global economic development placed international economic issues at the forefront of the agenda of global politics and sought to understand how political actors impact economic policies, institutions, and mechanisms by combining insights from political science, economics, and sociology (CEC, 2020; Newmann, 2016). Due to the economic and political background of the IRA, these aspects of IPE can help further recognise the potential challenges and opportunities for the IRA on an international scale. Notable scholars who paved the path were authors like Keohane and Nye, whose landmark volumes on “*Transnational Relations*” (1971) and “*World Politics and Power and Interdependence*” (1977) are widely hailed as milestones in the construction of modern IPE (Cohen, 2007).

Keohane and Nye developed the concept of “complex interdependence” (Rana, 2015) by highlighting the role of transnational actors and thus challenging the classic realist paradigm of world politics that had long dominated the study of international relations in the US. For realists,

states were the only significant actors in world politics. Still, for Keohane and Nye, economic interdependence was spawning a growing swarm of transnational actors, enabling them to participate meaningfully in political relationships across state lines. Here we can recognise the EU and the multiple initiatives and institutional actors as contributing to pushing for green growth and technological innovation globally. Hence, Keohane and Nye maintained that a broader paradigm would explicitly admit the full array of relevant actors. Another important figure was Robert Gilpin, who defended the realist tradition and acknowledged the emergence of transnationalism (Cohen, 2007). In “*Tree Models of the Future*” (1975), Gilpin proposed three different models to predict IPE’s future, including the *mercantilist model* that argued that nations would pursue economic policies that reflect domestic needs and interests without concerns for other states.

Although the ideas of mercantilism are not new, the model proposed by Gilpin was relevant for IPE as it provided a framework to understand the behaviour of states in the global economy. Throughout US history, economic nationalism has been a recurring sentiment, with proponents arguing for state intervention in markets to protect domestic industries, increase manufacturing, and promote exports of finished goods. Essential actors in the funding of the US, like Alexander Hamilton, greatly supported economic nationalism, asserting that a nation's prosperity depends on a favourable trade balance and domestic manufacturing. However, scholars like Adam Smith oppose this view, claiming it undermines free market principles (Smith, 1904). Despite the debate, economic nationalism continues influencing US economic policies and trade practices. Therefore, while supporting the realist perspective of states being the primary actors in the global economy, Gilpin’s perception is well summarised through economist Eli Heckscher’s definition of enhancing the power and wealth of a state through limiting imports and encouraging exports (Haley, 1936). This is achieved through protectionist measures such as tariffs, subsidies, and regulations, which aim to create a favourable trade balance.

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3.4 From Market to State - A Shift in Policy Approach:

When addressing environmental issues, policymakers have various tools to counteract externalities, pollution, and climate-related problems. However, the battery industry is notorious for using rare and toxic minerals, which raises ethical concerns about environmental mismanagement, child labour, and green extractivism (Voskoboynik and Andreucci, 2021). Mitigating harmful resource exploitation has become a critical goal in this industry. The battery industry poses various challenges, from mining to recycling and offers different governance approaches. There are four approaches to internalising climate-related externalities: command and control, market-based instruments, hybrid approaches, and voluntary initiatives. This section briefly explains the functions of command-and-control and market-based instruments and focuses on how they can be applied to the battery industry.

Command and control:

Traditional regulatory approaches like "command-and-control" reflect many environmental regulations in the US (Stavins, 2003). Many of these regulations are prescriptive, meaning there is a specific limit to how much an individual or company can emit of a particular toxin or outright ban explicit materials. Moreover, they often provide guidelines on how to achieve said requirements and standards. However, this type of instrument often offers minimal flexibility in achieving goals and innovations due to imposing similar pollution-control requirements on all firms, regardless of the cost, usually achieved through technology- or performance-based

standards. Here, tech standards prescribe the methods and equipment that must be used to comply with the regulation, while performance standards set targets for firms to reach.

Additionally, command-and-control regulations can hinder the development of technologies that could result in greater pollution control through bad habits of grandfathering (Environmental Economics, 2012) – where older emitters will often be excused from new standards, in turn, creating a bias against new facilities which will, be “punished” with stricter requirements. Therefore, as new technologies would be held to higher standards with little to no financial benefits opportunities, regulations that rely solely on a “command-and-control” approach might be counterproductive and stifle innovation (Stavins 2003).

Despite its shortcomings, it keeps companies accountable, especially in reducing toxic chemicals or actions that harm public health. Notably in a place with a market-driven economy like the US, where individual states have been in charge of how environmental policies have been implemented. Examples of importance here would be the Clean Air Act in 1970 and the Federal Water Pollution Control Act in 1972, which represented a shift in the involvement of environmental protection on a federal level (Metcalf, 2009).

3.5 Challenges and Opportunities Identified in Theory:

These theories can be applied to how we choose to understand the IRA. Whereas globalisation and WST can be especially applicable to how we understand the battery supply chains and the dynamic between the US, China, and the EU, it fails to explain individual states' geopolitical issues that we now see with the IRA. Here IPE draws forth and identifies interactions and intersections between economics and politics in the international arena. Keohane and Nye's ideas of complex interdependence can be applied to the concepts of dependency theory, where the development of technologies, especially RE sources, have relied on the webs of supply and minerals from across the world – a catalyst for innovative solutions but also making it difficult to wean off these resources to satisfy demand if one actor, China in this instance, gets a disproportionate amount of control over this web. Economic nationalism and green trade protectionism here stand to combat these dependencies and highlight traditional notions of the power in sustaining one's own nation – one of the primary goals, according to the White House (2023). International organisations were concerned about the global environmental and ethical effects of shifting production globally. These effects are still very – if not more relevant for international 2030 and 2050 goals. However, it also challenges the dependence on the global capitalist market that has enabled the development of lithium-ion batteries. With the thematic

analysis results, these theories will build on the IRA's challenges and opportunities outlined in the discussion and analysis.

4. Methods:

Aligned with the research question, the primary objectives of this thesis are to investigate how the IRA act both as a potential solution and a challenge to transatlantic cooperation in global climate governance and the transition to green energy. Specifically, the study focuses on the potential impact of the IRA on the US battery industry and its domestic transformation. Moreover, I assess the EU's response to the IRA's protectionist measures and their implications for the EU market. In this chapter, I will explain my research design and research approach and how data was collected to answer my research question. Lastly, I will present the study's limitations and the actions taken to mitigate the constraints of sampling and design.

4.1 Research Design:

This thesis employs an exploratory research design with an interpretive approach. By conducting a case study, I aim to determine how the IRA might serve as a possibility and challenge to transatlantic trade and green transitions. According to Fisher and Ziviani, an exploratory case study thus aims to explore and discover a situation with no definitive outcome (2004). Therefore, the data was collected to gather information about the case and to find potential correlations between the implementation of the IRA and the consequences for transatlantic cooperation. The data was collected between adopting the IRA in August 2022 and March 2023, when the EU decided on a response to the IRA – the EU Industry Act. Semi-structured interviews were conducted in March and April of 2023. A thematic analysis of qualitative data from primary and secondary sources was the most helpful approach to drawing inferences. The thematic analysis allowed me to identify underlying meanings, themes and contexts related to the IRA's economic and political effects (Thomas, 2020).

Thematic analysis is a widely used method for identifying, analysing, and reporting patterns within qualitative data (Braun & Clarke, 2008). However, it has been critiqued for lacking explicit guidelines (Nowell et al., 2017). Despite this, it fits well with this study's objectives and research question. The analysis involves familiarising oneself with the data, coding, and identifying potential themes. Themes capture essential aspects of the data related to the research question, and researcher judgment is necessary to determine them (Braun & Clarke, 2008). The approach is inductive and bottom-up, meaning themes emerge from the data rather than being predetermined. This allows for a deep understanding of the data without preconceived notions

or ideas, which is useful for exploring new or under-researched topics. A latent approach was also taken to understand the subtext in the literature and interviews.

4.2 Sampling strategy:

Utilising non-probability sampling, which involves non-random selection based on prior knowledge of the case (Bryman, 2016), allowed me to collect relevant data more efficiently. Due to the case's novelty, conducting semi-structured interviews with professionals to solicit their analytical opinion and understanding from various perspectives was determined to be an appropriate data collection strategy. This approach allowed for greater flexibility in comparing and contrasting interviews with information from secondary sources. As a result, I was able to integrate my participants' perspectives more effectively with existing literature and gain a deeper understanding of the themes that emerged from the data as a result.

4.2.1 Sample 1: Primary sources – Interviews:

For my interviews, I used a mix of purposive and convenient snowball sampling for a sample of 3 semi-structured interviews. Also known as judgement sampling (Bryman, 2016), purposive sampling allowed me to use my own experience and the aim of the study to find the best valuable sample for my research. It was, therefore, essential to find interviewees who knew the details of the battery industry and could elaborate and reason on this issue beyond reports in media articles. Due to the particularity of the case, convenient- and snowball sampling was also used once I could contact people in the relevant industries. These methods allowed me to reach people who were the most accessible and have them recommend sources they deemed appropriate and trustworthy. The inclusion criteria of the interviewees were based on their economic, political, environmental, or industrial expertise in the Inflation Reduction Act. The inclusion criteria listed below were designed to ensure that the participants had relevant knowledge beyond their field and could provide insightful and informed perspectives on the Inflation Reduction Act.

4.2.2 Interviewees:

Inclusion criteria were established to ensure participants deeply understand the Inflation Reduction Act and its potential impact on transatlantic cooperation and green transitions in the US and the EU. Specifically, individuals with experience and knowledge in economics, environmental policy, and international relations were included in the sample. Participants were selected based on their professional background and their involvement in policymaking,

research, or advocacy related to the subject matter. The goal was to gather diverse perspectives and insights from experts who could provide valuable and nuanced views. Potential participants were identified through literature review, personal networks, and online resources and were contacted through email or phone to invite them to participate in the interviews.

Based on the inclusion criteria, the three interviewees had extensive knowledge about the research topic and could provide informed and insightful perspectives. Potential interviewees were identified through recommendations from experts in the field, online searches of academic and journalistic publications, and other sources. Eligibility was confirmed through a screening process that included a review of the participant's professional background, education, and experience. Exclusion criteria were implied to sift out potentially unfit participants (Rangu, 2020).

The participants for this study were selected based on the inclusion criteria previously outlined. Exclusion criteria were also established to ensure the sample was representative of the population of interest. Participants with economics, political science, or environmental policy expertise were included. Additionally, individuals with knowledge or experience related to the Inflation Reduction Act, transatlantic cooperation, or green transitions were excluded. Participants were also excluded if they had a strong bias or affiliation with a particular political or economic ideology to ensure diversity within the sample. Overall, the inclusion and exclusion criteria were designed to provide that the sample was representative of individuals with expertise and knowledge relevant to the research question while also maintaining a diverse range of perspectives.

4.2.3 Semi-structured interviews:

Whereas structured interviews stick to a rigid structure with pre-determined and specific questions that will be asked the same way to each interviewee, a semi-structured interview usually follows an interview guide of topics and issues covered throughout the interview. Also known as non-directive interviewing (George, 2022), this type of questioning allowed me to ask questions about the same topics to people with different backgrounds and expertise. Due to the possibility of not all questions being relevant or 100% replicable depending on their background, having a list of topics allowed me to structure each interview in a way that initiated conversations about the same topic from different perspectives. This approach enables consistency in data collection across participants and allows participants to provide more detailed and personal responses. This also revealed details and information the other

interviewees might have yet to learn or admit. The phrasing and sequencing of the questions also varied from interview to interview to facilitate the discussions in the best possible way (Bryman, 2016). Semi-structured interviews are open-ended, and this helped me gather detailed information in a structured way, so it was simple to observe patterns and themes utilised in the analysis (George, 2022).

4.2.4 Interview Guide:

The interviews were recorded by audio and transcribed before being coded manually in Microsoft office word documents. The interview guide was structured in this way to identify best which challenges and opportunities were emphasised in the data material. Details about the coding will be elaborated on below.

Period:	Aspects:
Introduction	<ul style="list-style-type: none"> • Fundamental and most essential aspects of the IRA. • What this means for environmental governance.
Conflict: The EU and the US	<ul style="list-style-type: none"> • Clashing approaches to a common problem • Chinese dominance • Realistic outcomes of IRA • EU response
Rounding off	<ul style="list-style-type: none"> • Possible challenges to the relationship between the EU and the US • Possible opportunities/challenges to green transitions.

Interview overview:

Date:	Number:	Field:	Type of meeting;	Length:	Interview code:
01.03.2023	1	Economist	In-person	41 minutes	E01
29.03.2023	2	EU-correspondent/journalist	Virtual Meeting	45 minutes	ECJ01
03.04.2023	3	Political Scientist	Virtual Meeting	31 minutes	P01

E01 was chosen for experience with analytical work related to the IRA through their economic analyses done for external institutions. Comprehensive economic factors comprised much of the content of this interview, with complete details about these factors from both an EU and US point of view. ECJ02 was chosen for their proximity to the work in the EU commission and its understanding of the inner works and limitations the EU might face with responding to the IRA. This interview provided a lot of diplomatic and transnational contexts. Lastly, P03 was a recommended source from another planned interviewee that fell through and provided valuable information for the American point of view of the IRA. As a political scientist in the US who has done much work on collaborative efforts towards climate change and environmental policy.

4.2.5 Sample 2: Secondary sources:

Secondary sources for this study include thirty-two articles from news sites, government reports, official statements and other texts from government rosters, accredited and peer-reviewed journals and online newspapers discussing the Inflation reduction act. Using different databases like Google Scholar and Google, I found recent articles from news sites like Politico, the Economist, and the Wall Street Journal. I also utilised government websites like the EU Commissions' press corner and the White House for official statements. Overall, the secondary literature is a mix of different literary sources. The complete source list can be found in Appendix 1. Here purposive sampling was also employed, with inclusion criteria being that it has to look at the Inflation Reduction Act from an economic, environmental, or political perspective.

4.3 Coding and derived themes:

4.3.1 Code words:

The analysis initially employed code words as general markers to identify and categorise the themes. Subsequently, these code words were allocated to their respective themes based on relevance and content. Careful consideration was given to selecting code words encompassing both the challenges and opportunities pertaining to the transatlantic relationship between the US and the EU and green transitions. Certain code words had overlapping characteristics, so they were classified into the following categories:

Economic factors	Political factors	Trade and Industry	Environment
<ul style="list-style-type: none"> •Market •Market imbalance •Subsidies •ITC/PTC •funding •Single market •Economy •Green economy •Imbalance •Instability • Batteries • Investment • Support schemes • tax • Economically 	<ul style="list-style-type: none"> •China •Protectionism •Regionalisation •Local content requirements • Domestic • EU /US •Political •Dependence •Supply chain •Outsourcing •Geopolitical •Advantage • Batteries • IRA •Secure access 	<ul style="list-style-type: none"> •Trade •Trade partners •EU/US •Countries of concern •Import •Export •Industry •Processing •mining •Outsourcing • Batteries • Transatlantic • Policy 	<ul style="list-style-type: none"> •Lithium •Degredation •Environment •Climate •Climate policy •Net zero •Paris agreement •Cooperation •Batteries •Green/ green jobs •minerals •Sustainability •GHG •Batteries

Four themes were established to structure the results as these codes applied to the topic. The themes for the thematic analysis were identified through a combination of data saturation and supplementing with published sources; from there, economic, political, trade/industry, and environmental factors appeared as the most relevant. The researcher brought in new participants until no new data was added, indicating saturation had been reached. Qualitative methodologists generally agree that several factors can affect the number of interviews needed to achieve saturation (Mwita, 2022). However, due to the small sample size, more than saturation with interviews alone was required to accomplish this study (Marshall et al., 2013). To supplement the limited data, published sources on the topic were utilised. The researcher could identify themes and comprehensively understand the topic using primary and secondary data.

4.4 Limitations:

Due to ongoing case developments, this thesis will only cover actions and information published from August 2022 to March 2023. This section will look into some of the limitations of the thesis.

4.5.1 Sampling:

There are several limitations associated with non-probability sampling methods. For instance, non-probability sampling tends to have a higher sampling bias, weakening inferences about the population than probability samples (Bryman, 2016). Additionally, there is the issue of observer bias, which could impact the accuracy and validity of the findings. Convenient snowball sampling is a standard method in research studies, as it allows researchers to contact people

who are most accessible to them. However, this sampling method is also associated with certain limitations, such as selection and sampling bias (Bryman, 2016). This is because there is no way of knowing how representative the sample is, which could impact the generalisability of the findings. Due to the high complacency of joining the interviews, the sample size needed to be bigger, with only three interviewees. Such a small sample size cannot be represented or generalised. There was high complacency in participating, which may be an issue due to the highly political nature of the topic. Potential participants like research centres and battery companies also expressed uncertainty about sharing plans and policy-related information. Therefore, secondary sources were used to mitigate this limitation and to reach the point of saturation. A larger interview sample would be optimal (Bryman, 2016). I also employed theoretical triangulation by using several theories to enhance the validity and reliability of my findings in the discussion section (Bhandari, 2022). Additionally, I cross-checked evidence from primary and secondary sources to fact-check and validate the interview results, given the small sample size. This triangulation approach helped to ensure the validity of my results despite the limitations of my research.

4.5.2 Data:

Interviews: Semi-structured interviews have several limitations. Firstly, their flexibility can lead to low generalisability and reliability since the questions asked may vary among participants, making comparisons challenging. Secondly, there is a risk of leading questions, resulting in various types of research bias. Thirdly, semi-structured interviews are very time-consuming, which increases the risk of losing essential data. Finally, it can be challenging to keep semi-structured interviews focused, which can decrease the internal validity of the research (Thomas, 2020).

Secondary sources: There were limitations in substituting the need for interviewees with secondary sources, some of which could include bias of opinion on seeing the IRA as overly negative to the EU or with the protectionist “America first” attitude some criticise the bill for. Some literature also could have offered more contexts of detailed information to build on, which led to a chase to find sources and official statements of government personnel. Similarly, as the reason for the rejection of interviews with much reluctance to give official statements that might reflect poorly on themselves or their company, the official statements posted were carefully crafted. There might be some bias in the sources and the quotes utilised. The literature is regardless considered.

4.5.3 Thematic Analysis:

Thematic analysis is a popular qualitative research method used to identify and analyse patterns or themes in data. However, like any research method, there are limitations to using thematic analysis. One of the main limitations is that the analysis is subjective, as the researcher identifies the themes based on their interpretation of the data. This subjectivity can lead to potential bias, and the findings may not represent the participants' views and experiences (Nowell, 2017). Additionally, thematic analysis can be time-consuming and resource-intensive, especially when analysing large amounts of data. Another limitation is that the themes may need to be completed, meaning that some critical aspects of the data may be overlooked or missed (Braun and Clarke, 2008).

5. Results:

The research of this study involved interviews with three participants from diverse backgrounds and a thorough secondary literature review through a thematic analysis. Through the analysis, I discovered several overlapping themes that emerged from both data sets, despite the differences in the participants' backgrounds and literary sources. To provide a comprehensive overview of each theme and further divided into subthemes. This categorisation allowed for a clear and detailed understanding of the challenges and opportunities presented by each theme in the discussion. Direct quotes from the interviews and relevant official statements were included in the tables.

Theme 1: Economic Uncertainties:	
Source	Sub-theme: Economic challenges
Robert Mabeck, German economy minister	<i>“If we don’t address it and pass it, we’re going to lose economically as well.”</i>
Professor Loukas Tsoukalis	<i>“[...] since some governments have deeper pockets than others, a free-for-all competition of state aids would seriously undermine the European single market.”</i>
E01	<i>“For a company with stakeholders and investors, it’s easy to go to the US if you have to choose between an investment decision with a 10% margin or a 40% margin.”</i>
EU Commissioner Thierry Breton	<i>“Difficulty in knowing how to respond moderately without pouring all money into subsidies that will end up disrupting the internal market.”</i>
P03	<i>“I think there is a valid concern that Europe won't be able to compete with the kind of subsidies that exists there, and it's unclear what Europe can do in response. Part of the problem is that the European Union doesn't tax anyone, so they cannot match the tax credits or subsidies given in the US.”</i>

The Economist	<i>“Replicating [the IRA] set-up exactly would be unthinkable in Europe. The EU may see itself as an ever-closer union, but taxes are still a national affair, which rules out continent-wide tax incentives.”</i>
E01	<i>“There are subsidies and support programs for batteries in IRA, both directly and indirectly. While most of the support the EU provides is indirect or in the form of research funding, IRA has a direct support program that is much easier to qualify for. In the US, as long as you produce batteries, you can receive support, whether you are a car manufacturer or a direct battery producer.”</i>
Source:	Sub-theme: Economic Opportunities:
Tom Fairless, The Wallstreet Journal	<i>“The global economic map is rapidly transforming, with trade and investment between the U.S. and Europe booming as Russia’s war in Ukraine and fraying ties between the West and China draw the trans-Atlantic allies closer.”</i>
ECJ02	<i>“It is especially BUYAMERICA that causes the exclusion of people in the market. Some of the subsidies are used to attract investments, but I don’t think anyone loses sleep over this in the EU.”</i>
Ruben Maximiano, Politico	<i>“State subsidies will play — and are already playing — a key role in the shift to a sustainable economy”</i>
The economist	<i>“Although subsidies have long been part of America’s economic landscape, the new plans are notable for their scale and America-first emphasis.”</i>
Ursula Van de Leyen, President of the European Commission	<i>“We welcome the Inflation Reduction Act because it is a massive investment in the green transition moving towards a net zero economy.”</i>
E01	<i>EU already has several support schemes, and previous stimulus packages that have yet to be used will be relabelled as green technology support. Still, it is doubtful that anything similar to PTC support will be provided.</i>

5.1 Table 1: Economic Uncertainties: Challenges and Opportunities

The table above presents a range of opinions regarding the economic uncertainties related to the IRA, reflecting both pessimistic and more optimistic possibilities. Initial reactions to the IRA fostered many insecurities about how the EU would be able to respond, particularly given the differences in policy and the subsidies offered in the US versus those in Europe.

Interview E01 expressed that the US tax credits are much more easily accessible, offering battery companies direct pay-outs of up to 30% of production costs. With little to no qualifications or lengthy application periods, they explained that the subsidies are almost an immediate pay-out to companies if you are a battery company and intend to invest, process, or produce on American soil. In contrast, ECJ02 said that the EU provides support primarily in the research stage, with lengthy applications and qualifications – pointing to the multi-layered

bureaucracy being a potential halt to technological innovation for up-and-coming companies. E01 further explained that for companies with stakeholders and investors, the decision of whether to invest in the US might be influenced by the potential return on investment (ROI). Specifically, it suggests that if a company is presented with two investment decisions, one that offers a 10% margin and another that provides a 40% margin, it would be easier to choose the 40% margin investment, even if it involves moving across the pond. Due to this momentum, the German economy minister exclaimed the importance of acting as the EU cannot let this moment pass.

However, it is a paradoxical situation. EU Commission president Van de Leyen expressed the welcoming of such a law as it is a big step in the right direction for an economy based on sustainable principles throughout the supply chain. Maximiliano from Politico points out that subsidies are the way to shift the economy and that businesses have been flocking to the US when faced with free start-up- and production money. Therefore, the subsidies remove a lot of the financial burden, which will also reward the companies the more they produce by the provisions of the law. However, according to the economist, this way of distributing money will be difficult for the EU to emulate, given that taxes are a national affair. While the European Union already has some support schemes, it is still being determined if they can provide anything like PTC support, according to PE03. Additionally, although the EU provides indirect or research funding support for batteries, IRA has a direct support program that is easier to qualify for points to a challenge for the single market system in the EU. As it would be down to the countries themselves that they can support, the market imbalance would become a lot more evident, according to Tsoukalis.

Nonetheless, the challenges faced by the EU in offering subsidy support are still highly manageable, according to ECJ02. While the structure of subsidy support, long applications, and the constraints of European free-market rules pose challenges, efforts to rename funds and stimulus packages towards green technology development and support, such as the industry act, are already in the works. Here he went on to explain that the money put into the IRA is vast, and the incentives are tempting for businesses. Still, the stimulus packages and amount given in the EU for developing green transitions have been far more. In addition, the immediate economic results have been less severe than first expected by economists. While state aid competition could harm the European single market, there is recognition of the importance of subsidies in the shifting economy, particularly towards renewable energy. Furthermore, there is potential for positive market competition to emerge from this situation, as competition is

generally beneficial for economies, and a variety of sectors will limit the insecurity of the market.

This shift towards renewable energy could also create a new economy with significant potential for growth and development. However, the EU's challenges are wider than subsidy support, as opening the subsidy gates would completely disrupt the market principles, said EU Commissioner Thierry Breton. The ongoing war in Ukraine, the after-effects of Covid-19, the energy crisis, and high inflation all contribute to a challenging economic environment. Moreover, the growing ties between the US and Europe in response to Russia's war in Ukraine and fraying relations with China could impact investment between the two regions. There has also been a surprising turn as the economic relationship between the two has strengthened in the face of adversity. Therefore, there is reason to believe this can be an opportunity to build an even closer bond rather than hurt it. Despite these challenges, there is a recognition that subsidies are essential in the shifting economy and that the EU must find a way to balance support for the industry with free-market principles. The emergence of a new economy centred around renewable energy presents significant opportunities for growth and development, and there is hope that positive market competition can emerge from this situation.

Theme 2: Political Tensions	
Source:	Subtheme: Political Challenges
President Xi Jinping	<i>“We must tighten international production chains' dependence on China, forming a powerful countermeasure and deterrent capability against foreigners who would artificially cut off supply [to China].”</i>
Fremtidens næringsliv	<i>«As of today, it still looks bleak for states with Republican governors in the driver's seat. The governor of Texas, for example, leads strong anti-climate rhetoric and blacklists financial actors who do not want to finance fossil projects, but rather invest heavily in renewables».</i>
Fatih Birol, International Energy Agency:	<i>“The world is entering a new industrial age: the age of clean energy technology manufacturing ... Currently, there is one country [that] is making major inroads. It is China,”</i>
ECJ02	<i>«Politics and trade go hand in hand. Therefore, it is just wrong to give China that much influence.»</i>
Tobias Gehrke and Majda Ruge, Senior policy fellows, European Council on foreign relations	<i>“The initial reaction of the EU to the Inflation Reduction Act (IRA) has been centred around its efforts to obtain exemptions from the perceived discriminatory clauses. The EU has sought to achieve this by employing a counter-subsidy package as leverage while accusing the United States of betrayal and even war-profiteering.”</i>
P03	<i>“China has built up this incredible kind of manufacturing knowledge over time in this space, and you already see China also responding to these policies in Europe and the US by restricting exports of technologies and the batteries based because they don't want Chinese companies to now just set up plants in Europe and North America and take all their knowledge out with them. Also, China is trying to contain its lead and dominance.”</i>

E01	<i>“When it comes to producing the minerals needed for batteries, the US has a significant amount of minerals. The problem lies in the time it takes to get mines up and running. The investment and construction processes take time, and even if there is a surge in mining applications, there might need more capacity.”</i>
E01	<i>“Even if we get the minerals elsewhere, from Peru or Indonesia, it is usually sent to China for processing.”</i>
ECJ02	<i>«The background for this here is that America wants to ensure the supply of these minerals to countries that at least have democracy. The EU is afraid that they will be stuck with China. »</i>
Source:	<i>Sub-theme: Political Opportunities</i>
Gehrke, Ruge	<i>“The EU would be wiser to focus on what actually matters to the US: China.”</i>
Emmanuel Macron	<i>President Biden intends to make his country stronger, to create jobs here, to re-industrialize, and at the same time to address climate change issues and to build more green industries in your country. I do share this objective. I do respect this objective. And guess what? I have precisely the same for my country.”</i>
Charles Wessner, Srishti Khemka, CSIS	<i>“The European Union hopes these measures will prevent firms from shifting manufacturing to other places like China and the United States and accelerate Europe’s goal of becoming the first climate-neutral continent by 2050.”</i>
Aaron Brickman, senior principal at energy research nonprofit RMI	<i>«It seems like all roads are currently leading to Georgia; it’s really benefiting disproportionately from the Inflation Reduction Act right now. [it is a] complete game changer. We’ve just frankly never had that before in this country. The IRA has staggeringly transformed the landscape.”</i>
President Joe Biden	<i>“The goal is to revitalise the American economy and, in doing so, position it to prevail in the geo-economic struggle with China.”</i>
ECJ02	<i>“This was a political manoeuvre on the part of President Biden, aimed not only at reducing dependence on China but also at promoting the re-industrialisation of Republican states by creating green jobs and changing the anti-climate rhetoric.”</i>

5.2 Table 2: Political Tension - Protectionist Measures against the common enemy

Table 2 provides insights into the political aspects driving the IRA and highlights two broad categories of political concerns that underpin the act. The first category concerns the ideological and geopolitical worries related to China's growing monopoly in the global supply chain. The second category involves domestic political considerations aimed at boosting the American economy and enhancing its international standing to win the next presidential election.

The concerns about China's dominance in the global supply chain arise from various factors. President XI Jinping’s open plan to extort anyone who tries to wean off the increasing global power of supply chains in China is a straightforward statement of aggression. Understandably, the growing political right-extremisms in the West are a response to fear given rise to protectionist policies and a desire to reduce reliance on Chinese products. As ECJ02 mentioned, trade and politics go hand in hand, so it makes no sense for China to have this much influence. Secondly, China's control over producing clean energy technology is a potential threat. President Biden made it clear that through rebuilding the US economy, they will deal with the

geo-political issues we now face with China as it poses a more significant threat than just the access of batteries – but also the future world economy might end up in the hands of China, and their strengthening relationship with Russia. In other words, a clear threat to the US and the EU.

It could give China an unfair advantage in decarbonising the global economy while potentially exacerbating the ethical and environmental concerns already vailing their industry. Thus, there are calls for other countries to catch up in this area and reduce their dependence on Chinese-made products. Being left out and lumped in the same category as China concerning the benefits and subsidy agreements has led the EU to fear subsequently getting left to rely on China if they are cut off from potential ventures and benefit from boosting their transitions. Furthermore, ECJ02 also pointed to the fear of cut-off power as another factor driving concerns about China's dominance in the global supply chain. The ability of China to control critical supplies and influence the policies of other nations has raised concerns about economic and political pressure from Beijing. This fear is mirrored in the recent actions of Russia regarding its control over the supply of natural gas to Europe.

Apart from the concerns over China, the Inflation Reduction Act is also driven by domestic political considerations. The act is being positioned as the most significant policy for nationwide economic support and reindustrialisation since the New Deal. The Biden administration sees it as a means of building back better and improving the American economy's global status and a political manoeuvre by the administration, with an eye towards the next presidential election. The administration emphasises that one of the act's essential aspects is its potential to create jobs, especially in Republican-leaning states. According to Fremtidens Næringsliv, states led by Republican governors currently face a challenging situation in terms of climate policy. Specifically, the governor of Texas has been known for promoting anti-climate rhetoric and implementing policies that favour fossil fuel projects while penalising financial institutions that support renewable energy investments. Despite growing global concerns about climate change and the urgent need to transition to cleaner energy sources, these governors resist change and remain committed to their pro-fossil fuel stance. By focusing on building infrastructure, job creation and financial growth in those states, this political move by Biden could hold the key to changing the popular opinion and rhetoric on green tech and improving the US' global standing.

Despite the IRA addressing the severe problem of being subordinate to a political *enemy*, it has also created political tension in the transatlantic relationship. Macron, however, expresses an

understanding of the sentiment, and as the hysteria surrounding the economic hit mellows, there is respect and understanding for the objective. As Gherke and Ruge clearly stated, it is wiser and essential for the EU to focus on the obstacle to the goals we jointly try to achieve - China. Seeing how the EU has been affected by the Russian control over Europe's gas, the reliance on China, in the same way, could cause a much worse reaction.

Theme 3: Trade and Industry:	
Source:	Sub-theme: Challenges for Trade and Industry:
Emmanuel Macron	<i>"[the IRA is], at this very moment of the war, a killer for our industry [and] the result of the recent decision on this momentum, I would say, it is bad for Europe."</i>
Vise president Vestager	<i>"Part of the Inflation Reduction Act is a threat to the competitiveness of specific vital sectors for the green transition of the European industry."</i>
P03	<i>"I think the problem with the protectionist approach is that it pushes against the empirical reality of being unable to replace imports quickly. But we've undermined the world trade Organization rules because they prohibit local content requirements."</i>
ECJ02	<i>But ultimately, the goal of environmental sustainability and the preservation of the planet can only be achieved if industrial policy, innovation and trade are pursued in line with the principles of competition, which undergirds the operation of all functioning economies.</i>
ECJ02	<i>There is also the option to sue the US in the World Trade Organization (WTO), but this would take a long time and would be unlikely to produce results, given that the US is currently blocking appointments to the WTO appellate body – which is responsible for reviewing appeals – and challenging or ignoring its rulings.</i>
E01	<i>"Historically, when it comes to supporting industry and economic policy, the US has been more interventionist and market liberal than Europe. It is typical to think that the EU might be more interventionist regarding economic policy, but it is the opposite. Many do not know the economic history of the US. What the US is doing now is very much in line with what they have historically done regarding supporting industries."</i>
The economist, Anonymous Senior Diplomat Comment	<i>"Free trade is dead [...] When one side breaks the rules, others soon break the rules, too. If you stand still, you will lose the most."</i>
Source:	Sub-theme: Opportunities for Trade and Industry:
E01	<i>"If [batteries] are 100% tradeable and there is a market mechanism that ensures that there will still be production in Europe."</i>
National Security Advisor Jake Sullivan	<i>"Market access has been the orthodoxy of all trade policy for 30 years, and that no longer fits today's challenges."</i>
Thierry Breton, Commissioner for Internal Market	<i>"Our dependency on Russian gas has taught us several lessons. Let's not replace that dependency with a reliance on others to produce solar panels and other technologies we rely on. With the Net-Zero Industry Act, we are building a strong European manufacturing base along the clean technology value chain. To ensure our security of supply and remain an industrial leader that exports its products and technologies – not its jobs."</i>
Gherke, Ruge, European Council on Foreign Relations	<i>As a result of Russia's invasion of Ukraine, transatlantic trade and investments have boomed. Between September 2021 and September 2022, Germany's exports to the US rose by 50 per cent. Trade in goods and services across the Atlantic is over 40 per cent higher than between the EU and China.</i>
GHerke, Ruge	<i>"Finally, EU investments in the US in 2019 were ten times larger than EU investments in China, and the EU has attracted over 60 per cent of all American foreign direct investment in the past decade. To maintain this positive momentum, the US must refrain from further tilting the playing field in its trading relationship with the EU, and the EU must demonstrate to the US why it is worth doing so."</i>
Tom Fairless, WallStreet Journal	<i>"The global economic map is rapidly transforming. Trade and investment between the U.S. and Europe are booming as Russia's war in Ukraine and fraying ties between the West and China draw the trans-Atlantic allies closer."</i>

E01	<i>“A transatlantic trade row had been brewing since the end of last summer, and it found expression at the World Economic Forum in Davos, when European Commission President Ursula von der Leyen confirmed the European Union’s executive branch was drafting a new law to boost the bloc’s green technology industries.”</i>
ECJ02	<i>«There are some signs that in the aftermath of von der Leyen’s meeting with Biden, there might be some small talk about reinstating talks of some sort of a trade agreement.”</i>
Jake Sullivan, National Security Advisor	<i>“We do not see this as a zero-sum game. We think the IRA will grow the pie for clean energy investments, not split it up. And there’s no doubt that ROK companies will play an important role in our efforts to expand and intensify the clean energy ecosystem and combat the climate crisis”.</i>

5.3 Table 3: Trade and Industry: Trade Agreements and industry expansion

Table 3 incorporates some of the challenges facing the trade and industrial policies between Europe and the US and highlights several critical concerns for the industry, particularly the potential impact of US legislation on the global economy, with a specific emphasis on the green transition of European enterprises. It is clear from the table that there is a need for coordinated efforts to ensure that environmental sustainability can be achieved without compromising economic competitiveness. The industry recognises that protecting the environment is crucial but must not come at the cost of competitiveness. Therefore, policymakers must strive to balance these two concerns while promoting innovation in the industry.

Despite the welcome and positive tones shown in Table 2, President Macron also points to the weight the IRA is putting on European industry in a time of war – subsequently killing the development of a much-needed energy source and security while faced with an energy crisis. This highlights the importance of balancing protecting domestic industries and promoting competition and innovation, as vice president Vestager also expressed. While protectionism may seem appealing in the short term, it can ultimately undermine economic growth and development. ECJ02 points to the EU having considered reporting the US to the WTO, but with the need to respond and handle several crises simultaneously, they expressed that this might be futile. The industry recognises this is a slow and uncertain process, particularly given the US's current stance towards the organisation.

It is, therefore, crucial to find the right balance between protecting domestic industries and promoting competition and innovation. Due to the trade agreements within the IRA, ECJ02 expressed that in the aftermath of talks between European nations, the EU Commission and President Biden, there might be talks of reinstating the previous discussions of a trade agreement between the two. This would ensure that the European battery industry can be a part

of a more extensive network that positively impacts both sides of the Atlantic. Although protectionist policies and approaches to production are growing, coordination across the continents will be crucial. Sources like Wallstreet Journal and the European Council on foreign relations point to how transatlantic trade and investment have grown, particularly in recent tensions with Russia and China. This presents an opportunity for Europe and the US to benefit from increased cooperation and innovation in critical sectors and sticking to green trade protectionism in others.

Countries of concern are a big part of who receives the subsidiary benefits and who does not. However, national security advisor to the US, Jake Sullivan, has expressed that the IRA is a way to do something about the current market access but also will positively impact the US and its allies—talks of expanding this to countries like South Korea and Norway due to their already strong trade partnership. The industry faces several complex trade and industrial policy challenges between Europe and the US. Still, EU Commission president Von der Leyen has announced that the EU Policymakers must balance protecting the environment while maintaining competitiveness and promoting innovation and finding the right balance between protectionism and competition while avoiding further trade disputes. Dialogue and cooperation between nations are essential to finding mutually beneficial solutions, and the industry must prioritise these efforts to maintain positive momentum.

Theme: Environmental and Climate Policy	
Source:	Sub-theme: Environmental Challenges
P02	<i>“The impact of all of this mining for these large American Electric vehicles is an awareness right like this is not environmentally friendly.”</i>
Anna Pretylove, fremtidensa næringsliv	<i>«In the USA, the tales of environmental policy have been told to have a hefty price. Essentially, one must choose between economic growth or saving the climate.”</i>
P02	<i>“[With this bill, we need] bigger batteries, and they need much more minerals. And so, in this sort of competition over market share, we're not discussing how to get people to bike to work or how to use public transit. We're having a conversation about replacing one system of personal transit with another one”</i>
ECJ02	<i>“The EU Commission's climate policy is exposed to an enormous number of lobbying campaigns from the car industry.”</i>
E01	<i>"Some people say it's not realistic to get the mineral chain up in the USA: the USA has so many minerals, geographically speaking. But the problem is that it takes a long time to get mines into operation, both the investment process is long, and the construction process is long. So even if you have a big increase in mining applications, people say you need more capacity. There is also intensive processing that will also be done in the USA."</i>
Sources:	Sub-Theme: Environmental Opportunities
Maximiano	<i>“It's frequently argued that the depth of the environmental crisis constitutes an unassailable case for all green development subsidies.”</i>

Maximiano	<i>“The mere existence of such arrangements underlines the fact that governments need to formulate green industrial policy — and, indeed, all industrial policy — fully informed of market competition considerations and its effects on environmental sustainability.”</i>
Maximiliano	<i>“Ultimately, the goal of environmental sustainability and the preservation of the planet can only be achieved if industrial policy, innovation and trade are pursued in line with the principles of competition, which undergirds the operation of all functioning economies.”</i>
Reuters	<i>“From a European perspective, this should be welcome news, as Europe has long advocated for greener industries and for greater U.S. action to advance global sustainability and mitigate climate change.”</i>
Energy Innovation	<i>“Those reductions would put U.S. emissions at 37-41 percent below 2005 levels and make significant progress towards achieving the 2030 U.S. NDC of 50-52 percent below 2005 GHG emissions.”</i>
ECJ02	<i>«The EU can respond in other ways than copying policy. Not everyone can be a battery producer. What about other types of competencies? Education, innovation, and other technology? There are many options.»</i>
President Von der Leyen	<i>“A global clean-tech race has started. That is what we wanted, that is what we need. Because only when the most advanced economies compete for a net-zero future will we reach our common goals – to limit global warming and to protect our children's future.”</i>
E01	<i>“The global effect is still positive. It's a frugal game, but not everyone can be a battery maker. Maybe we can focus on something more high-tech.”</i>
Pau Ruiz Guix, Elcano Royal Institute	<i>“The IRA puts the US closer to meeting its Paris Agreement objectives, finally matching words with action.”</i>
Mitchell Orenstein, foreign policy research institute	<i>«Putin the green? [.....] Vladimir Putin [unintentionally] accelerated Europe's transition to green energy, decimating a key market for Russian exporters.»</i>

5.4 Table 4: Environmental and Climate: Is the Environmental factors lost?

The results of the environmental factors were mixed, reflecting different concerns. One aspect examined the IRA as a means for sustainable development and how it is necessary to reach decarbonisation goals. Energy innovation found that the US emissions would be around 40% below 2005 GHG levels by 2030, which is an excellent step in the right direction. However, businesses and economists expressed initial backlash and concerns about the potential economic impact, indicating the environmental factor was getting lost in all the other conflicts and losing sight of the initial goal. A third concern to remember, which most sources should have mentioned, was the mineral intensity and possible environmental and supply issues this might cause.

There seems to be consensus over the bill being a positive thing overall. EU commissions president von der Leyen, Guix, ECJ02 and E01 all agree that the overall global impact regarding the 2030 and 2050 goals is only positive. However, P03 and E01 pointed out that the increasing demand for energy-intensive and environmentally damaging minerals remains to be tackled. This also reflects in the literature on lithium’s environmental effects. P02 mentions here how

we increasingly need more extensive and more batteries. Instead of trying to change transportation habits, we are simply changing one personal transit system for another. However, according to Reuters, this should be welcomed news even from a European perspective.

Through the EU Industry Act, the EU has recognised that the crisis is an opportunity to wean off fossil fuels entirely. Putin's effort to cut off gas to the EU as a political and energy weapon, much like the war in Ukraine, has unintentionally boosted the green transition. According to Orenstein, Europe's dependence on Russian fossil fuels diminished drastically within a year, and it may even hasten Europe's energy transition in the long run. Here he used the term "Putin the Green" instead of Putin the Great – the title he sought to get for reuniting Ukraine and Russia. If the same were to happen to China, whose supply chain and production line the world is inevitably dependent on, even better results may be achieved. Von der Leyen expressed the need and long-awaited desire for a green-tech race. Leaning on the idea that the market will do much of the job in escalating the transition to a more sustainably sound economy.

Additionally, the EU does not necessarily need to respond in ways that compete with others. Both ECJ02 and E01 expressed that the EU have many other resources than just the ability to produce. Here lie other competencies like innovation, research, and development for better and more sustainable options than lithium and mineral-intensive technology. One example was a German university developing water-based batteries and one in Spain that is charged through the soil.

The EU has also criticised the US for failing to lead in green transitions and disappearing behind economic and political concerns, Von der Leyen subtly reminds us later in her speech. Now that the initial hysteria has calmed down, the EU's response has increasingly focused on the opportunities presented by the IRA despite other hurdles needing to be dealt with simultaneously, like situations like the energy crisis. However, most sources point to the need for a proper and robust policy approach to properly encapsulate the environmental issues that also come with the bill. E01 points to less emphasis and investment in mapping out where these mines will be situated in the US. Domestic environmental policy was also a sub-topic to the analysis as there has been a long-standing narrative in the USA that tackling climate change is costly and must be weighed against economic concerns, according to Fentidens Næringsliv and the economist. The IRA changes this narrative by finally matching words with actions, getting them a step closer to the Paris Agreement, says Guix.

The automobile industry has heavily lobbied for the EU Commission's climate policy, and the mining required for electric vehicle production is considered environmentally damaging. Some argue that the severity of the environmental crisis necessitates green development subsidies, while others advocate for green industrial policy informed by market competition considerations. Achieving sustainability requires pursuing innovation and trade in line with competition principles. Reuters expresses that, from a European perspective, the USA's efforts towards sustainability are welcome news. The market demands growing expectations for environmentally friendly, MadeinEU technology and merchandise have perpetuated growth, showing that these could and will go hand in hand. This indicates an opportunity for climate and the environment to grow together through the natural market mechanism – despite this not seem realistic in the eyes of economists of Reuters.

5.5 Summary of results:

Summary of Challenges:	Summary of Opportunities:
Economic loss: <ul style="list-style-type: none"> - Inability to Compete with US Subsidies. 	Trade and industry: <ul style="list-style-type: none"> - EU and US are growing closer after cutting ties with Russia.
Undermining the European Single Market: <ul style="list-style-type: none"> - Investment decision disparity - Contrast in policy 	Green transitions and sustainability: <ul style="list-style-type: none"> - State subsidies play an increasing role. - Massive investment in green tech. - EU green boom after cutting with Russia.
Dependence on China: <ul style="list-style-type: none"> - Supply chain dominance - Geopolitical advantage - Parallel with Russia 	Industrial Policy and Innovation: <ul style="list-style-type: none"> - Opportunity to explore alternative competencies.
Anti-Climate Rhetoric and Financial Blacklisting: <ul style="list-style-type: none"> - Domestic anti-climate rhetoric in the US 	Job creation and economic growth: <ul style="list-style-type: none"> - Objective of creating jobs in the green industry. - Expanding clean energy ecosystem while growing economy.
Growing Protectionism in the EU and the US: <ul style="list-style-type: none"> - Invasion of Ukraine - Energy Crisis - Inflation. - Prioritising energy security 	Competition and market access: <ul style="list-style-type: none"> - Competition is good and necessary. - Evolving trade policies beyond traditional market access approaches. - Due to battery tradability and lobbying from the European car industry, there will be batteries in the EU.
Threat to vital trade relationship? <ul style="list-style-type: none"> - EU is not a trade partner to benefit from IRA. - EU industry moving to the US. - Undermining WTO trade laws - “Free trade is dead”. 	International relations: <ul style="list-style-type: none"> - Focus on bigger issue – Russia and China as allies against the West. - Strengthening transatlantic alliance amidst geopolitical challenges.
Environmental Impact: <ul style="list-style-type: none"> - Mineral and energy-intensive - Mining investment 	Big picture good for the environment: <ul style="list-style-type: none"> - Lithium as entry, not the end goal. - Aligning actions with the Paris Agreement

	<ul style="list-style-type: none"> - Promoting global sustainability and mitigating climate change through green industries.
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The analysis revealed several factors underlying the challenges and opportunities the Inflation Reduction Act (IRA) posed to transatlantic trade and green transitions. By drawing from various sources, including industry experts, policymakers, and media outlets, the analysis highlighted key themes and implications of the IRA.

One of the major challenges identified is the inability of European industries to compete with the substantial subsidies provided by the United States. The IRA complicates the situation by challenging the European Single Market, resulting in investment decision disparities and policy contrasts among member states. Additionally, dependence on China emerges as a concern, as the IRA may inadvertently strengthen China's supply chain dominance and geopolitical advantage, posing potential risks to transatlantic trade and green transitions. Another challenge arises from anti-climate rhetoric and financial blacklisting within the United States, which can undermine progress in addressing climate issues. Moreover, the growing protectionism in the EU and the US threatens the vital trade relationship between these entities, potentially hampering their economic cooperation and shared objectives.

The IRA poses challenges and presents significant opportunities for transatlantic trade and industry. The act has brought the European Union (EU) and the United States (US) closer, contributing to a shift away from Russia and toward collaborative efforts to address broader issues. By emphasising the importance of competition, urging policymakers to embrace new strategies, and recognising the need for green transitions and sustainability, the IRA creates prospects for job creation in the green industry, fuels economic growth, and expands the clean energy ecosystem. Additionally, the act aligns with global climate commitments, such as the Paris Agreement, and actively promotes sustainability by fostering the development of green industries. In essence, the IRA catalyses transatlantic cooperation, forging stronger ties between the EU and the US while driving the growth of green industries and advancing global climate goals.

In conclusion, addressing the challenges posed by the IRA will require policymakers and stakeholders to find solutions that mitigate potential economic losses, ensure harmonisation within the European Single Market, reduce dependence on China, counter anti-climate rhetoric and financial blacklisting, navigate growing protectionism, maintain vital trade relationships, and promote sustainable environmental practices. The opportunities presented by the IRA

encompass closer collaboration between the EU and the US, the growth of the green industry, job creation, innovation, competition, and the advancement of environmental sustainability goals. Understanding and harnessing these opportunities will be crucial for policymakers and stakeholders navigating the evolving international trade and sustainability landscape.

6. Analysis/ Discussion:

Combining these four themes in the analysis, we can further identify the challenges and opportunities the IRA poses to transatlantic trade, cooperation, and green transition. Here, three challenges and opportunities were recognised.

6.1 Transatlantic Cooperation

Challenge 1: America's first and trade partners second.

The first challenge arises from the IRA's protectionist stance on content requirements and benefits for close trade partners. Despite the long history and strong alliance between the EU and the US, it is predictable that the US prioritises policies that serve its interests. The US has become accustomed to prioritising its best interests in bounded international cooperation, and domestically, the Republicans have increasingly opposed international trade agreements, leading to a halt in discussions after Obama and the EU's attempts. With ongoing conflicts across the Atlantic and a longstanding feud with China, there is a risk of moving into a territory where the US has complete control over production and demand without taking measures to secure its supply chain. Understandably, America prioritises its own interests is well reflected in Heckscher's definition of enhancing the power and wealth of a state by limiting imports and encouraging exports (Haley, 1936). The IRA aligns closely with the concept of economic nationalism, shifting from market-driven climate policies to government intervention and subsidies aimed at protecting domestic industries and promoting economic growth in the green technology sector.

The law aimed at increasing renewables and facilitating green transitions aims to do so by positioning the US as the global leader in clean energy technology, manufacturing, and innovation, according to the White House (2022). These ideas are not new, as American scholars have long advocated for protectionism and economic nationalism, prioritising domestic prosperity. Influential figures like Alexander Hamilton (1913) championed a manufacturing-based economy to shield the USA from the economic dominance of other nations. The IRA's

goals now centre around limiting imports, boosting exports, and achieving a favourable trade balance for the US. Helleiner's (2002) paper on the challenges of nationalistic economies argues that countries naturally prioritise nationalist purposes over economic or environmental considerations. This phenomenon transcends the position on the spectrum. In the past, nationalist challenges revolved around the search for oil, while today, the focus lies on securing the minerals essential for renewable energy transformation. It is in the best interest of the US to reduce reliance on others.

The response to the IRA has shifted away from its primary objective of reducing dependence on China. However, it is equally, if not more, essential for the EU to acknowledge the significance of this bill and adopt comparable measures to avoid a situation similar to that with Russia. Access to vital minerals in renewable energy technology is crucial for the EU as it transitions away from fossil fuels and Russian gas. One possible solution to this challenge is for the EU to implement measures akin to the IRA. The findings also indicate that such action aligns with the historical support the US has provided to industries and economic policies. The US has taken a pragmatic approach and invested in nurturing new initiatives. Recognising the policy and regulatory differences between the EU as a union and the US as a state is important.

As aforementioned, trade between the US and the EU significantly increased during the pandemic and the Ukraine invasion. However, it is important to note that the benefits offered by the IRA are limited to their trade partners, with local content requirements currently focused on the northern Americas. Nevertheless, discussions during the Biden administration about a potential trade agreement between the US and the EU, as mentioned by National Security Advisor Jake Sullivan, indicate the possibility of reinstating these talks. Despite the growing protectionist policies in the West as a response to war and uncertainty, coordination has been emphasised as necessary. Ensuring demand becomes crucial in this context. This situation presents an opportunity for Europe and the US to enhance cooperation and innovation in critical sectors while adopting green trade protectionism in others. However, economists express concerns that although protectionism may seem appealing in the short term, it can ultimately undermine long-term economic growth and development.

Challenge 2: Uneven distribution and access to minerals

The second challenge pertains to the potential exacerbation of existing disparities in mineral access by the IRA. In today's interconnected global markets, it is crucial to consider the economic implications of protectionist policies on mineral access. Key players in the central battery cell and technology industry, such as the EU, EEA, Japan, and South Korea, have

expressed growing concerns about the limited access to minerals extracted and processed outside China's influence. This situation leaves them reliant on Chinese sources instead of fostering a robust secondary market. Regrettably, the current provisions in the IRA categorise countries that do not meet local content requirements, disregarding both allies and countries of concern. The uneven distribution of resources that shapes access to renewable energy technologies and their benefits can be attributed to sourcing raw minerals from developing countries to core countries for production and sales. This phenomenon aligns with the world-systems theory (WST), which sheds light on power dynamics within the global economic system. In the context of renewable energy, WST is particularly relevant, as core nations are poised to exert significant influence over international policies and investment decisions in the renewable energy sector.

Moreover, the interconnection and globalisation emphasised by scholars like Keohane and Nye also contribute significantly to shaping the distribution of renewable energy resources. As countries become more interconnected and globalised, power dynamics shift and core countries emerge as dominant players in the global market. The mineral map, illustrating the distribution of minerals used in renewable energy technologies, reveals that developing countries often serve as sources for these minerals. In contrast, developed countries act as primary consumers. This reliance on developing countries for raw materials reinforces the existing power dynamics within the global economic system.

Challenge 3: “Free trade is dead”?

The provisions of the IRA, which promote green trade protectionism, have raised significant concerns about the potential erosion of free trade and the adoption of exclusionary measures. Many are apprehensive that US trade policy may prioritise lobbying groups' interests, promoting mercantilism and potential challenges to environmental regulations through free trade agreements. These concerns have been further heightened by economists who observe a decline in free trade and an increase in exclusionary measures since the signing of the IRA. Some have even threatened legal action against the World Trade Organization (WTO) for allegedly creating an uneven playing field by subsidising specific technologies. As Wallerstein, Keohane, and Nye noted (Cohen, 2007), trade has mainly been unrestricted due to globalisation and complex interdependence, which has been the prevailing orthodoxy in trade policy for the past three decades (Martínez-Vela, 2001). However, considering the political and environmental challenges, exploring alternative approaches to address these issues is crucial rather than relying

solely on this market structure. The rise of European protectionist policies and sentiments also underscores the need for innovative thinking in tackling these challenges.

Historically, the decision to restrict foreign trade has been influenced by various factors, such as concerns about dependence on foreign markets, foreign capital interference, foreign control of domestic resources, and the need to ensure food security during times of war. Judith Goldstein's work, "Political Economy of Trade" (1986), distinguishes between free and fair trade. Free trade is rooted in liberal economic principles, while fair trade protects domestic businesses from unfair competition. This suggests that US trade policy may exhibit mercantilist tendencies, where interest groups lobby policymakers to advance their interests.

The Sustainable Development Goals (SDGs) emphasise the importance of international trade in renewable energy infrastructure for countries to achieve their developmental and environmental objectives (Lopez, 2020). Incentives to promote renewable energy can foster the growth of local industries and increase demand, ultimately leading to enhanced competitiveness over time. However, implementing protectionist measures can raise importers' production costs, potentially hamper efforts to ensure affordable energy access, a key objective of renewable energy adoption. Senior diplomats have expressed that "free trade is dead" as a concerning response.

Amid the increasing global demand for renewable energy, many countries have implemented measures to develop their domestic capabilities in renewable energy infrastructure. These measures, while intended to protect and promote domestic industries, may contain elements of protectionism that could result in higher costs for importing countries. Additionally, the rise in global regulations on renewable energy imports to ensure consumer safety and environmental protection has increased non-tariff measures. This trend can potentially impact international trade and may affect the accessibility and affordability of renewable energy infrastructure, particularly in developing regions. Therefore, countries must balance promoting local renewable energy industries and ensuring affordable energy access for all while considering the broader implications of protectionist measures and non-tariff barriers on international trade. The response of the EU to these subsidies is paramount in maintaining healthy market competition and preserving the balance of the single market in the region.

While there are promising initiatives such as the Industry Act, IPCEI batteries for knowledge sharing, and the European Battery Initiative, implementing similar arrangements in Europe may face practical challenges (The Economist, 2023). This is because tax policies remain under the

jurisdiction of individual member states, making it impractical to establish cross-continental tax incentives. Furthermore, the EU has introduced several collaborative grant programs to support the development of clean technologies, indicating the need for further action in this area.

Opportunity 1: Will Cutting Off China Yield Similar Results as Cutting Off Russia?

Gehrke, Ruge, and Fairless have all drawn attention to the investment disparity between the US and China in 2019, with the former having an investment rate ten times that of the latter. Following the invasion of Ukraine and the cessation of trade with Russia, the EU has increasingly become the recipient of American foreign direct investment, accounting for over 60% of such assets in the past decade. This has led to a surge in trade relations between the two allies, with the US surpassing China in terms of investment for the first time in decades.

Green protectionism seeks to balance economic growth, environmental protection, and social development, drawing upon the principles of globalisation, world systems theory, and sustainable development, as highlighted by Mukherjee and Rathi (2017). However, due to the increasing trend of strengthened trade relations in the past couple of years and such a high investment percentage, one could argue that by aiming to cut further trade relations with China and Russia, transatlantic trade will increase as a response.

As Helleiner mentioned, countries enact policies that are nationalistic first and then economic. The implementation of the IRA can thus be interpreted as a statement – for political and environmental diplomacy. Following the reactions from the EU and other allies, ensuring and strengthening the bond of these trade partners will help smooth the transition and independence from China. The EU is turning away from Russia to enhance access to renewable energy sources for energy security. Turning away from Russia, we cannot turn to another risky situation and instead rely on Chinese resources. China's growing dominance in the global supply chain and its ambitious Belt and Road initiatives have sparked a need for the US and the EU to strengthen their trade ties. This is because China's supply chain domination creates significant vulnerabilities for the US and EU economies. In response, the IRA handbook outlines the US's intention to protect domestic industries and promote economic growth by prioritising battery development, which aligns with the principles of economic nationalism.

Similarly, the EU has recognised the benefits of increased trade with the US, despite potential impacts on its green transition efforts. The trend of increased trade is expected to continue, paving the way for closer ties between the two economies. Although the EU's battery initiatives

have already targeted the problematic aspects of dependence on China's unsustainable supply chain, there has been a slow transition away from this reliance.

While this shift may pose initial challenges for the EU's green transition, it is ultimately a welcomed development in the long run. By strengthening trade ties with the US, the EU can diversify its supply chain and promote sustainable economic growth. Moreover, closer relations between the US and EU can enhance their geopolitical influence and promote the principles of globalisation, core- countries (world-systems theory), and sustainable development. Thus, the US and EU must work towards building a more robust trade relationship to achieve their mutual goals of economic growth, environmental protection, and social development.

Opportunity 2: EU capabilities – can trade more than just batteries and minerals.

Based on feedback from interviews and literature, the Inflation Reduction Act may have a less negative economic impact than initially thought. However, it must be noted that predicting this legislation's potential effects and consequences is challenging, according to ECJ02. Nevertheless, previous research indicates that the EU has sufficient resources to support its industry, even with its dependence on the US. The growing trade and investment between the US and EU will likely continue, strengthening their economic relationship.

While some concerns have been raised regarding the impact of the Industry Act on the EU battery industry, experts argue that there are opportunities for growth and development in other areas. For instance, the EU's expertise in the automobile industry could be leveraged to create opportunities for innovation and collaboration with US battery producers. Although the question of battery tradability has been raised, it is essential to remember that the Industry Act encompasses more than just battery production. EU initiatives such as IPCEI and the European battery program have focused on research and development and promoting new technologies. As such, the EU can leverage its knowledge and expertise to enhance competition and exchange of goods and services with the US.

The Inflation Reduction Act may pose some challenges for the EU battery industry. However, it could also open up opportunities for growth and collaboration in other areas, such as more vital collaboration and coordination with the GBA and World Bank. With the EU's substantial investment in research and development and its close economic ties with the US, the region appears well-equipped to handle any potential impact this bill may have.

Opportunity 3: Competition is good!

This thesis has talked a lot about how unfair advantages, like local requirements and technology picking, can create uneven competition in the market. However, there is no doubt that

competition for the green transition is necessary for speeding up and improving the green transitions. According to EU Commission President Von der Leyen, this competition is well awaited and will be crucial in driving change and innovation towards new solutions, especially in the battery industry among core nations like China, the US, and the EU. China's attempts to disrupt the global hierarchy and gain an advantage in the battery market have forced the "hegemony" to respond. In this regard, the EU's response to the challenge of trading across the Atlantic should focus on high quality for sustainable practices and demand. This can drive up productivity, innovation, and overall success.

However, any healthy market mechanism that drives growth needs competition. When there are multiple players in a market, each competing to attract customers, they are motivated to innovate to gain a competitive advantage. Companies strive to differentiate themselves from their competitors by offering unique and better products, services or features that appeal to customers. Competition in the battery market, including minerals and other factors, could potentially push China to address any issues in their production processes that consumers have found problematic. Competition in the battery market, including minerals and other factors, could cause China to address any issues in their production processes that consumers have found problematic. Increasingly, countries and people care about ensuring sustainability throughout the whole supply chain.

Innovation, in turn, drives competition by creating new markets, disrupting existing ones, and setting new standards for quality and value. It can lead to the development of new products or services that are faster, cheaper, more efficient, or more convenient. While China's dominance in the battery market has led to overproduction and decreased demand and price, it has also allowed other countries, such as the EU and the US, to enter and compete. The challenge for the EU is investing in its battery industry and looking for venture capital to compete with production tax credits and other tax incentives like the US.

6.2 GREEN TRANSITIONS:

Challenge 1: Is the environment forgotten in the hysteria?

The IRA has created concern about the reactions and possible economic effects within the European Union. However, amidst the economic and geo-political debates, the environmental impact of the IRA has arguably been neglected at large. Yes, the IRA is a historical climate bill for the US, yet the age-old question of economy versus environmentally sustainable development continues to be discussed. Within the US, the narrative has always been that economic growth and environmental sustainability cannot coexist, particularly in industrial

republican states. Despite this, the environmental factors of the IRA have yet to receive much focus compared to the political and economic implications. Furthermore, the potential environmental risks have been overshadowed by anticipated technological advancements and industrial innovations in the coming years.

The IRA presents a unique opportunity to prioritise environmental policies that have often taken a backseat to nationalistic and economic interests. By placing environmental concerns at the forefront, the IRA can catalyse promoting sustainable development through the economy. However, two crucial points deserve attention. Firstly, how can the European Union collaborate within this framework to further reduce emissions and fill gaps left by the IRA? Secondly, how will the environmental consequences of the mining boom, driven by the high demand for minerals like lithium, be addressed in the future?

Efforts to recycle and establish circularity in using minerals are vital in mitigating the environmental consequences of the mining boom. However, the recycling process is highly energy-intensive and requires high temperatures. Additionally, establishing new mines is time-consuming and space-intensive, and the IRA has allocated relatively less funding to these areas. This means that these minerals will likely continue to be extracted from developing countries that lack the same infrastructure or environmental regulations as the US yet still fulfil the domestic content requirements for North America. It's worth noting that a considerable amount of Bolivia's mineral reserves are co-owned by China, thanks to extensive investment programs.

The increasing demand for minerals, especially lithium, for battery production poses significant environmental risks to the surrounding regions. Lithium mining requires a lot of water usage and land allocation, potentially harming workers and local biodiversity. In conclusion, implementing the IRA presents an opportunity to prioritise sustainable development through the economy. However, to achieve this, careful attention must be paid to the bill's environmental impact, and proactive steps should be taken to mitigate the consequences of the mining boom resulting from the high demand for minerals.

Challenge 2: Exclusion from the Green race

The exclusion of renewable energies from the market caused by the IRA is also a plausible challenge for the green transition. One major obstacle is the difference in environmental policy between the US and the EU, which makes it difficult for the EU to respond to the IRA adequately. According to interviewees, the EU faces market limitations in balancing its response without disrupting the principles of a fair and equal market. Certain countries may require

assistance financing sustainable options and may have no choice but to depend on less environmentally friendly alternatives due to market shifts. Nevertheless, effective collaboration has been crucial in addressing this issue thus far. However, despite this cooperation, a change in the market could have a significant impact as most of the EU's funds are allocated to larger countries like Germany, France, Spain, and Italy, leaving smaller countries needing support (ECJ02). The EU could help by adopting similar or more substantial support schemes and subsidies, empowering the countries themselves to respond to the energy crisis. However, market limitations could leave several European countries to fall behind if nation-states become pressured to lead domestic transitions alone with little access to EU funds and support.

One crucial factor in the green transition is the need for reliable, high-quality, and stable batteries. This is essential for both personal transport and heavy industry. However, the US and the EU have different approaches to environmental policy, which could make it challenging for smaller countries to keep up in the green transition race. The EU uses market-based and non-market-based instruments to encourage economic growth through environmental protection. They have established a range of institutions and bodies to support the implementation of climate laws, work with national parliaments, and prioritise compliance-based mechanisms, strategic legal sanctions, supportive bodies, and financial aid to overcome challenges. However, the free-market challenges environmental policies, as industries may resist regulations that could reduce competitiveness.

The subsidy support differences between the US and EU are another challenge in the green transition race. The US offers more accessible and immediate subsidies to battery companies, while the EU provides support primarily in the research stage, with lengthy applications and qualifications. This creates an imbalance in the market and poses a challenge to the single market system in the EU. Nevertheless, the EU is already working on renaming funds and stimulus packages towards green technology development and support. This shift towards renewable energy could create a new economy with significant potential for growth and development. However, the EU must find a way to balance support for the industry with free-market principles.

Additionally, the ongoing war in Ukraine, the after-effects of Covid-19, the energy crisis, and high inflation all contribute to a challenging economic environment for the EU. Despite these challenges, there is recognition of the importance of subsidies in the shifting economy, and there is hope that positive market competition can emerge from this situation.

Challenge 3: If the companies in European countries leave for America, European projects will be put on hold.

While the EU is committed to advancing renewable energy, environmental regulations must be balanced with industry interests and the free market. Here, another challenge highlights the potential impact of the Inflation Reduction Act on European projects if companies leave for America in pursuit of subsidies and tax credits.

As interviewees and literature suggest, there is a slim chance that the EU will be able to compete with the ITC and the PTC of the IRA. Therefore, it is clear that several European projects will continue to prioritise US production and set European projects on hold. One example of this is Freyr batteries. In addition to responding to the IRA, dealing with the energy crisis and repercussions of the Russian invasion has put a toll on the European Union. Interviewees like ECJ02 and P03 suggest that although they will take measures to protect the single market, this transition and development might take much longer than first expected. That is because of the uncertain economic environment-

The Single Market is a crucial factor in enacting climate policies as it poses challenges to environmental policies, and integrating solid and sustainable practices across national borders is challenging. Therefore, building on the strength of the Single Market is critical for making the European industry more competitive while balancing the free movement of goods and environmental protection. The EU must carefully consider the potential impact of the IRA on European projects and strive to maintain a competitive edge while advancing renewable energy.

Opportunity 1: Lithium is not the end stop- just the entry point.

Investment in the battery industry not only creates opportunities to produce batteries but also to develop new technologies. This allows the European Union (EU) to leverage its expertise and research and development capabilities in the field rather than solely competing with the US for large-scale battery production. By offering its knowledge and innovation, the EU can differentiate itself from other regions and establish a pivotal role in the market. This, in turn, can attract further investment and foster partnerships with countries and companies seeking to enhance their battery technology. Additionally, such assets can generate new job opportunities and stimulate economic growth, as technological innovation often necessitates a skilled workforce and increased demand for related services. By prioritising research and development, the EU can position itself as a leader in the battery industry and contribute to a more sustainable future powered by renewable energy sources.

While lithium-ion batteries currently dominate mass production, it is important to explore alternative technologies that are less reliant on mineral-intensive resources. The tradability of batteries, which can pose transportation challenges, can be addressed through innovative solutions, facilitating trade and green transitions across the Atlantic.

The International Energy Agency (IEA) report highlights that significant electric vehicle (EV) market development has been concentrated in the three central regions: the EU, China, and the US. This observation aligns with the perspectives of Modernization Theory and World-Systems Theory, which emphasise the technological advancement of core countries and their influence as primary sources of innovation. Initially, the adoption and diffusion of technology predominantly benefit these core countries, their economic and political interests, and their corporations. However, over time and under specific conditions, the diffusion process enables technology to reach semi-periphery and periphery countries, albeit often with a time lag. World-Systems Theory underscores the role of economic dependencies and unequal power relations in shaping technology diffusion. The interests and policies of core countries, international institutions, and global corporations can influence the adoption and diffusion of technology in developing countries as they consider economic and geopolitical factors.

Hence, by normalising the use of lithium-ion batteries in the Western markets and considering the competition, market demand, and increased environmental standards, there is potential for technology diffusion to extend beyond the core regions. This diffusion can contribute to the broader adoption of battery technologies and support the establishment of sustainable practices in other parts of the world.

Opportunity 2: Overall, the global impact is good.

Regionalising production and mineral extraction through the IRA ensure safer and more sustainable practices than reliance on China. According to analyses, up to 40% of emissions from 2005 levels could be reduced by 2030, directly and indirectly affecting the switch to renewable energies. Additionally, the environmental standards set by the IRA could improve other countries' practices, leading to a more sustainable global industry. This transition to renewables is crucial for achieving net-zero emissions by 2050, as Coleman (2023) emphasised.

The EU also recognises the undeniable positive impact of the IRA, taking sustainability a step further by focusing on environmental factors and renewables while aiming to create economic opportunities and invest in marginalised communities. The goal of reducing greenhouse gas pollution by 40% below 2005 levels by 2030 is a significant achievement in the fight against

climate change. These efforts will create jobs and contribute to the US's climate goals while promoting a fair and thriving clean energy economy.

In defence of green protectionism, Yu's (1994) work highlighted the contrasting viewpoint of environmental organisations towards free trade in the 90s. Organisations such as the World Wildlife Fund (WWF), Greenpeace, and the National Wildlife Federation published articles that highlighted the developmental concerns that are relevant today. The potential for companies to exploit free-trade treaties to challenge environmental regulations and the risk of international treaties losing their ability to enforce provisions through trade sanctions were noted. Additionally, relocating factories to countries with cheaper labour costs, such as China, was seen as a cause of increased pollution. These concerns regarding the relationship between free trade and environmental sustainability are still relevant today and have been the subject of continued scholarly inquiry. The main argument for green protectionism is that protecting the environment and preventing importing products that do not meet environmental standards is critical, particularly given global ecological challenges such as climate change and biodiversity loss (Lewis, 2014).

Overall, while protectionist policies may have negative aspects, the IRA has the potential to make significant improvements to the environment and economy. The IRA's focus on regionalising production and mineral extraction, promoting renewables, and improving environmental standards can lead to a more sustainable global industry and economy.

Opportunity 3: Putin- and Xi the Green

As Breton pointed out, the world has learned several lessons from its reliance on Russia for gas. Due to the lack of Russian gas and the boost in trade relations between the US and EU, Europe has seen a rise in initiatives for renewable energy. As a result, some have humorously dubbed Putin as "Putin the Green" instead of his preferred title of "Putin the Great" for his efforts in reuniting Ukraine and Russia. This lesson could also be applied to China's dominance over the mineral-intensive energy market. As the world increasingly relies on these resources, finding ways to protect the supply and security of this energy is crucial.

Aligning with sustainable development and economic transformation goals requires focusing on renewables and green technology to reach the imperative climate goals. The US has quickly developed content requirements to re-establish itself as the centre and push Chinese production away from its borders. Taking a prominent stance against China and investing in the domestic

economy is also an excellent way to turn the Republican states green in both industries and in mind.

Despite the initial impacts of the EU's green transition, the cut-off from Russian gas has also been welcomed for the better. The investment in the US has surpassed that of China, which has led the path of investments even in Europe through its Belt and Road initiatives. Both the IRA and the EU Industry Act and RePowerEU seek to break free from the growing reliance and see the benefits of being able to supply for their own demand. Cutting off Chinese supply might also lead to similar results, although it may take longer due to China's market dominance. China's dominance over the industry is paramount, and finding ways to reduce reliance on their supply could be a significant step towards a greener transition. Shutting off Chinese supply might also do the same – if not more, although it might take longer to get here due to the market share dominance.

Looking towards the future, it is evident that mineral-intensive energies will continue to play a crucial role in our daily lives. However, the dominance of China in this industry raises concerns about the security and stability of our energy supply. We must prioritise sustainable development and economic transformation through renewables and green technology to achieve our critical climate goals. Fortunately, the US has implemented content requirements and invested in domestic production, aiming to re-establish itself as a leader in this industry. This approach supports economic growth and stability while aligning with the goal of a cleaner, more sustainable future. By taking a strong stance against China, there is an opportunity to promote a greener industry and mindset that benefits the environment and encourages economic growth.

7. Conclusion:

In conclusion, the Inflation Reduction Act marks a significant shift in US climate policy, intending to establish the country as a leader in green transitions while cutting off reliance on problematic supply lines and countries such as China and Russia. While the local content requirements have been implemented to address this issue, they have also created challenges for transatlantic trade and green transition initiatives, especially in Europe. Through a thematic analysis of interviews and secondary literature, this thesis has highlighted the different aspects of the IRA and how it can challenge and offer opportunities for transatlantic trade and green transitions.

Challenges include America First and trade partners getting all the benefits. Green protectionism can hurt the already globalised world, which depends on the resources from other

countries. Especially a technology like batteries which is highly mineral intensive and needs minerals from all over the world. The current interconnectivity of global markets and the uneven distribution of resources emphasise the potential economic consequences of protectionist policies on access to minerals, as highlighted by reactions from central battery cell and technology industry players, and can be explained by world-systems theory, interconnection and globalisation, and dependency theory. Concerns about the potential decrease in free trade and the adoption of exclusionary measures, including green trade protectionism and subsidies for specific technologies, have led economists to express the decline in free trade. The growing demand for renewable energy has led to protectionist elements that may lead to higher costs for importing countries, making it crucial to balance promoting local renewable energy industries and ensuring affordable energy access for all while considering the broader implications of protectionist measures and non-tariff barriers on international trade. The Inflation Reduction Act may have some consequences for the EU's battery industry. However, it could also present opportunities for growth and collaboration in other areas. The EU's extensive expertise in the automobile industry could be utilised to create innovative and collaborative opportunities with US battery producers. Moreover, competition in the battery industry encourages innovation, and the EU and the US could work together to diversify their supply chains and promote sustainable economic growth.

It also has opportunities for green transitions. Although the environmental factors of this climate bill could have gotten lost in the hysteria of economic and political factors, overall, the positive global impact is undeniable. However, due to its market impact, green trade protectionism and, depending on the economic market in the EU, the IRA could slow down the transition outside of the US. The US has so far been regarded as an absent character in the global green transitions efforts and changes the narrative with the strict content requirements and subsidies to build a strong infrastructure and initiate a change in market demand through hefty subsidies – getting them on board with the Paris Agreement. The environmentally taxing mineral sources needed for producing the expected number of batteries is undeniable. However, with the amount of investment into the industry, lithium is only a means but not the end, as battery companies and research centres are working on alternative solutions, R&D, and innovation. As most of the high-quality resources have come from “countries of concern” like Russia and China, efforts to cut them out of the supply chain will force the industry to look for less mineral-intensive solutions. They could hold the potential to boost green transitions even further.

In conclusion, the Inflation Reduction Act provides a framework for the US to establish itself as a leader in green transitions while addressing concerns around the supply chain, ethical practices, and reliance on specific countries. However, it also challenges transatlantic trade and green transition initiatives, highlighting the growing protectionism on both sides of the Atlantic in response to war and economic instability. Lastly, it emphasises the need for collaborative efforts and strategies to promote sustainable growth and development. Further research should follow the development of the IRA and the EU’s Industrial Act.

References and Appendix:

Reference style: Harvard 10th edition.

Appendix 1. Table of Secondary sources for Thematic Analysis

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