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The EU reactions to the Inflation Reduction Act

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Abstract

The Inflation Reduction Act (IRA) is the most important legislation on climate change that has been created in the United States (US). While this historic legislation makes the US on track to follow the net-zero emissions by 2050, some authors express their concerns on the instruments used by the US government, since according to them they can promote protectionist reactions.

While some of the literature review around this legislation tries to understand the impacts that it can have on the various sectors and relations between US and their international partners, the analysis of reactions from a relevant trade partner, such as the European Union (EU), seems limited.

In this context, we analyse the reactions that the US may face from the EU, knowing previously that the Green Deal Industrial Plan (GDIP) had already been launched, being part of them the Critical Raw Material Act (CRMA) and the Net Zero Industry Act (NZIA), the last one a direct response to the American legislation. After the comparison between the IRA and the European response, this study explores briefly three other US legislations that have also climate objectives (the Energy Policy Act of 2005) or use similar instruments to those of the IRA, like local content requirements (LCR) (the American Recovery and Reinvestment Act of 2009 and the CHIPS and Science Act of 2022).

Throughout the study, a qualitative analysis was followed, using mainly documentation analysis (of either legislations or other scientific articles). This analysis has showed that the reaction of the EU, contributing to a "global subsidy race", still encourages to the built of strategic partnerships with third countries (idea present on the CRMA), making the European response less discriminative towards other countries. This also makes the EU reaction closer to the World Trade Organization (WTO) vision, being more focused on cooperation rather than nationalism, reducing the risk of triggering a trade war between countries. Additionally, the study of the previous US legislations allowed us to conclude (among other things) that is probable that no other reaction apart from the actions that have already taken by the EU, may occur.

Key Words

Inflation Reduction Act; Green Deal Industrial Plan; World Trade Organization; Climate Law; International Trade; External Trade Policy

Resumo

O *Inflation Reduction Act* (IRA) constitui a mais importante legislação sobre alterações climáticas adotada nos Estados Unidos. Embora esta histórica legislação coloque os EUA numa trajetória para alcançar as emissões zero até 2050, alguns autores expressam preocupações em relação aos instrumentos utilizados pelo governo norte-americano, já que, de acordo com estes, esses instrumentos podem estimular reações protecionistas.

Embora parte da literatura sobre esta legislação procure compreender os impactos que esta pode ter em diversos setores e nas relações entre os EUA e os seus parceiros internacionais, a análise das reações a esta legislação por parte de um parceiro comercial, como a União Europeia, permanece limitada.

Desta forma, neste estudo serão exploradas as reações que os EUA podem enfrentar por parte da União Europeia, sabendo de antemão que o *Green Deal Industrial Plan* (GDIP) já foi lançado, que inclui o *Critical Raw Material Act* (CRMA) e o *Net Zero Industry Act* (NZIA), sendo este último uma resposta direta à legislação norte-americana. Após a comparação entre o IRA e a resposta europeia, este estudo analisa brevemente outras três legislações norte-americanas que também têm objetivos climáticos (*Energy Policy Act* de 2005) e instrumentos semelhantes (como o conteúdo local mínimo) que foram utilizados no IRA (*American Recovery and Reinvestment Act* de 2009 e o *CHIPS and Science Act* de 2022).

Ao longo do estudo, foi seguida uma metodologia de análise qualitativa, baseada sobretudo na análise documental (tanto de legislações como de artigos científicos). Esta análise demonstrou que a reação da UE, apesar de contribuir para uma "corrida global aos subsídios", promove a construção de parcerias estratégicas com países terceiros (através do CRMA), tornando a resposta europeia menos discriminatória face a outros países. Tal abordagem aproxima igualmente a reação da UE da visão da Organização Mundial do Comércio (OMC), ao privilegiar a cooperação em detrimento do nacionalismo, reduzindo assim o risco de desencadear uma guerra comercial entre países. Adicionalmente, o estudo das legislações norte-americanas anteriores permitiu concluir, entre outros aspetos, que é provável que não surjam reações adicionais, para além das medidas já adotadas pela UE.

Palavras-chave

Inflation Reduction Act; Green Deal Industrial Plan; Organização Mundial do Comércio; Legislação climática; Comércio internacional; Política Comercial Externa

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List of acronyms

AB – Appellate Body

CMA – Critical Minerals Agreement

CRM – Critical Raw Materials

CRMA – Critical Raw Material Act

DSB – Dispute Settlement Body

DSU – Dispute Settlement Understanding

EES – External Economies of Scale

EI – Environmental Innovations

EU – European Union

EV – Electric Vehicles

EPA – Environmental Protection Agency

GATS – General Agreement on Trade in Services

GATT – General Agreement on Tariffs and Trade

GDIP – Green Deal Industrial Plan

GHG – Greenhouse Gas

GPA – General Procurement Agreement

GSP – Generalized System of Preferences

IRA – Inflation Reduction Act

ITC – Investment Tax Credit

KPI – Key Performance Indicator

LCR – Local Content Requirement

MPIA – Multi-Party Interim Appeal Arbitration Arrangement

NZIA – Net Zero Industry Act

NZSP – Net-Zero Strategic Projects

OBBB – One Big Beautiful Bill

OMB – Office of Management and Budget

R&D – Research and Development

STEM – Science, Technology, Engineering and Mathematics

TCTF – Temporary Crisis and Transition Framework

TRIPS – Trade-Related Aspects of Intellectual Property Rights

TTC – Trade and Technology Council

US – United States

UN – United Nations

WTO – World Trade Organization

1. Introduction

The IRA is an American legislation adopted by the US Congress in August 2022 that includes an ambitious package of decarbonization policies. This policy can be considered as historic, since it was the first time that a federal climate policy package became law in the US (Bang, 2024).

For Kleimann et al. (2023, p. 3420) the American legislation "is a significant and welcome climate law", being however and contrary to previous EU subsidies discriminative against foreign producers. Smeets & Beach (2024, p. 2) also describe the IRA as "massive US subsidy scheme to support investments in clean industry and renewable energy", that despite not triggering an immediate crisis have "implications across very different policy areas that needed to be addressed at the highest political level" and turned as a "wake-up call for EU leaders, who came to realize that energy prices were going to stay higher and that Europe faced a structural disadvantage, compared with the United States and China, in facilitating the green and digital transitions".

This legislation is considered by the White House (2023, p. 5) as "the most significant action Congress has taken on clean energy and climate change in the nation's history" and defined by Kleimann et al. (2023, p. 3421) as a "milestone in US climate policy".

All these linked with the current topicality of this legislation and the fact that in the IRA there exist some instruments like LCRs that are controversial and a possible disrespect to the WTO rules, makes this study even more relevant.

We follow a qualitative analysis, focusing on the analysis of the reactions by EU to the IRA, being this its main research topic, which is divided into three: (i) a better understanding of the American legislation ("What is the IRA?"); (ii) analysis of the reactions from the EU that already took place ("How did the EU react until now?"); and (iii) in a more exploratory way and having in mind also other similar situations, whether other type of reaction could have been implemented ("What more could the EU do?").

This dissertation is structured as follows. It starts with a literature review (chapter 2) on three main issues - impact of some instruments of foreign trade policy, main arguments of the discussion around free trade and protectionism, and WTO's principles and dispute settlement mechanism - with the objective of setting the theoretical context for the development of our own analysis. Chapter 3 describes the methodology that will be used in this dissertation, unveiling the secondary questions that were created to help the answering of the

research question. Chapter 4 is dedicated to the discussion, being divided in four parts: initially, the discussion focuses on the understanding of the IRA, shifting then to the analysis of the EU response; after this, the discussion briefly centres on analysing three prior US legislations (the Energy Policy Act of 2005, the American Recovery and Reinvestment Act of 2009, and the CHIPS and Science Act of 2022) that had similar objectives and/or instruments to the ones used on the IRA, and the EU reactions to them; and (iv) based on all these elements, it ends with an analysis of how the Net-Zero Industry Act (NZIA), a legislation that may be seen as a direct response to the IRA, could be more comprehensive. Lastly, chapter 5 presents the main conclusions, outlines the limitations, and offers suggestions for future research.

2. Literature Review

The literature review starts with the analysis of the instruments of foreign trade policy. Even though exist numerous instruments, the analysis focuses only in three: tariffs, LCR, and government procurement. The last two instruments were analysed because they were used in the policies under study. In turn, tariffs were analysed because, in addition to being the simplest instrument, their effects are easier to understand and broadly comparable to those of the other instruments.

After this, literature review explored the arguments in favour of both free trade and protectionism, with the focus on the arguments of efficiency gains, dynamic gains, market failures, national security, and infant industry. The arguments in favour of protectionism were explored following the protectionism present in the legislations studied. The arguments in favour of protectionism are present to serve as the other face of the coin.

Finally, the literature review was finalized with the analysis of WTO, focusing particularly on WTO principles, which are supposed to serve as the guidelines to the ideal international trade, and on the dispute settlement mechanism.

2.1. Instruments of Foreign Trade Policy

Foreign trade policy is a set of economic policy measures that governments adopt with the aim of influencing, directly or indirectly, the trade flow between their economy and the rest of the world.

These instruments can be as simple as a tariff, however in the modern world most of the government intervention in international trade takes other forms (Krugman et al., 2022). LCRs and government procurement are examples of other instruments that governments have at their disposal to influence the international trade flow with their own country.

In this section of the literature review, these three types of instruments of foreign trade policy will be analysed, the main reason for their choice being the strong link with the main objectives of the present dissertation.

2.1.1. Tariffs

According to Africano et al. (2018), a tariff is the most common instrument of trade policy, being an impost levied on the value of imported goods, that makes the price of this good in the national market increase, being higher than the price on international market.

A tariff is the simplest of the various instruments of trade policies and can take two forms, being classified as specific or ad-valorem. "Specific tariffs are levied as a fixed charge for each unit of goods imported" while "ad valorem tariffs are taxes that are levied as a fraction of the value of the imported goods" (Krugman et al., 2022, p. 238).

For Krugman et al. (2022, p. 239) "the importance of tariffs has declined in modern times because modern governments usually prefer to protect domestic industries through a variety of nontariff barriers". However, Zaid et al. (2021, p. 22) affirmed that tariffs have "been a controversial subject in recent years" and that "the debate between legal experts and economists is still a hot topic in any discussion".

The introduction of this instrument by a country has multiple effects (both on market and social welfare), that can be different according to the dimension of the country that impose the tariff and can be interpreted following the economic efficiency and the income redistribution (Africano et al., 2018).

Following Contractor (2025, p. 190), when considering the costs and benefits of a tariff, "most apolitical observers conclude that, overall, their economic and political costs typically greatly exceed the benefits". This author also adds that because the US is the biggest importer in the world, their tariffs could affect all the countries that export.

Some potential benefits when applying this instrument include the increasing of domestic jobs, the increasing of the revenue of the domestic country, the increasing of investment in the local economy or even the reducing of the vulnerability on strategic sectors. On the other hand, some potential costs are the risk of retaliation from other countries, the deterioration of the multilateral cooperation, the increasing of the costs of imported inputs for companies and the reduction of innovation capability of domestic firms (Contractor, 2025).

Considering now the effects on the market resulting from the introduction of a tariff, a country that have a big dimension on the global market can influence the price and the quantity traded, having monopsony power in the world market.

So, in the domestic market, the price will increase by the same amount of the applied tariff, the supply will increase (national producers will increase their production), the demand will

reduce (national consumers will decrease their consume, however the consumption of national goods will increase), and the imports will reduce.

On global market, following the reducing of demand for external goods, an excess of supply will be created, making the price reduce, which will reduce consequently the number of quantities produced and will increase the amount of goods that consumers want to consume, making the quantities available to export progressively smaller.

The difference between the national and international price will be the value of the tariff. Differently from the analyses of a small country that impose a tariff, in this case, the price on international market will be inferior after the application of the tariff, which means that a big country/economy can transfer part of the market effects resulted from the application of the tariff.

Passing now the analyses to effects on social welfare, with the increase of the price, the surplus of consumers will decrease. In contrast, the surplus of suppliers will increase not only because of the rising price but also because they will increase the quantity produced. Part of this increase occur on the expense of consumers. For the government, tariff revenues will increase as a result of this measure.

Adding these effects together, the overall impact of this policy cannot be determined with certainty. This means that when we speak about a big economy, the results of introducing this instrument, can in same cases be positive and in other cases negative. This is because the outcome of a tariff depends on the magnitude of efficiency losses (caused by distortions in production and consumption) relative to the gains in terms of trade (Africano et al., 2018).

It has been shown that, for a country that is a big player in the international market, the introduction of a small tariff could lead to net gains. The one that would maximize such gains is called the optimal tariff.

It should be noted that even this small tariff could trigger retaliations, leading to a trade war with negative impacts for all the involved countries, as it corresponds to a "beggar thy neighbour" policy. Indeed, the gains for one country, arising from better exchange terms, are losses for the other country(ies) (Johnson, 1953).

2.1.2. Local Content Requirement

An LCR is a policy that "typically call for a foreign investor to source a portion of its procurements from local suppliers in the domestic economy" (Emmanuel, 2016, p. 244). For Africano et al. (2016), an LCR requires that a part of the final price of the good that is produced needs to reflects domestic value added. This may happen as a wage that is paid to local workers or by using components that are produced locally.

This instrument "is a popular government policy in developing countries to regulate foreign direct investment" (Qui & Tao, 2001, p. 101) and "protect the local economy in many countries" (Gan & Xiao, 2020, p. 5).

Following Africano et al. (2018), this policy can protect imports at two bases. It can serve as a barrier to the import of products that do not meet the stipulated criteria and can serve as a limit to the imports of materials that are used to produce final goods domestically. For (Qui & Tao, 2001, p. 102), because of this protection "employment in the local parts industries is bound to increase".

Gan & Xiao (2020, p. 5), states that an "LCR policy is beneficial when the technical gap between local and global suppliers is low", since multinational firms in order "to maintain the quality of their final products" they "must transfer technology to the local parts industries" (Qui & Tao, 2001, p. 102). Krugman et al. (2022), adds that if for one hand, for the domestic producers, an LCR protect them as a quota does, for the firms that need to buy locally, the effect on the prices is an average of the price of imported and domestically produced inputs, since firms are not obligated to just buy locally produced goods.

Throughout the years, LCRs policies have "been studied for various industries" (Emmanuel, 2016, p. 244) and have been enjoying "growing popularity with the prosperity of international trade" (Gan & Xiao, 2020, p. 5).

Gan & Xiao (2020, p. 5), say that while the defenders "believe that this policy can help the government protect the local economy", "opponents criticize that LCRs may help governments achieve specific short-term objectives, but undermine trade fairness and long-term competitiveness" This idea is corroborated by Hufbauer et al. (2013, p. XIX), that defend that "many LCRs are inconsistent with the rules of the World Trade Organization (WTO) and regional free trade agreements".

According to Emmanuel (2016, p. 244), in the case that an LCR policy intends "to monetise the positive externalities from foreign investment (…) is a first-best policy" being a

"Pigouvian subsidy". The author also states that the business growth that may occur is a "function not only of the size of the positive externalities but also of the response of local suppliers to new business opportunities".

On their book, Hufbauer et al. (2013, p. XIX) state that some of the objectives that the political leaders have for using this instruments are the fact that "they seek to create jobs and channel business to domestic firms", the fact that "they may harbor aspirations of building a world-class industry, following the logic of infant industry analysis", the fact that "they may believe that LCRs offer a promising path to economic development" and the fact that "they want taxpayer money spent subsidizing ethanol, solar panels, or other renewable to feed back into the domestic economy".

Hufbauer et al. (2013, p. XIX), also adds to the debate some drawbacks that this instrument, for them, have, such as the fact that "most LCR measures use quantity rather than price signals to influence market outcomes, and the economic cost of quantity signals is notoriously difficult to establish", the fact that "they may not know what they are getting, as LCRs may mandate what the market would have achieved on its own" and the fact that "LCRs are usually opaque". Ultimately, this policy can distort the market that may last for an extended period (Hufbauer et al., 2013).

On his study of the "Optimal local content requirement policies for extractive industries", Emmanuel (2016, p. 245) adds some implications of this instrument. The first implication is that the investor must procure more local supply and incur higher procurement cost under an LCR policy than without it, thereby creating a "policy cost". Other implication is "the harvesting of the superior information of the investor" which essential occur in industries like the extractive ones that "has limited flexibility on its production location decision and thus is generally unable to engage in spatial cost arbitrage pitting production cost in one location against that in another" motivating the investor "to search diligently for cost saving opportunities wherever they could be found".

2.1.3. Government procurement

Government (national) procurement can be defined as purchases by the government or strongly regulated purchases made by firms that can be directed toward domestically produced goods even though these goods could be more expensive than the imported ones (Krugman et al., 2022).

According to Hufbauer et al. (2013, pp. 2, XIX) "government procurement and government-financed projects served as LCR transmission mechanisms" since "historically, LCRs have been associated primarily with government procurement". In this context, the impact of this instrument could be analysed in an equivalent way as the one described in the previous sub-point, regarding LCR.

One example of this instrument is the "Buy American Act", which stipulated that federal government agencies purchase products from American companies if the price was no more than 6% (12% for some Department of Defence purchases) higher than the price from foreign suppliers (Africano et al., 2018).

2.2. Free Trade and Protectionism

The choice between free trade and protectionism, according to Ma & Lu (2011, p. 70) "has been in dispute since the eighteenth century", having different arguments in favour of each perspective. Regardless of this "conflict", nowadays, there is not a single economy that is totally closed, even though the openness degree of every country varies, since there is not a country that is completely self-sufficient (Vijayasri, 2013).

Generally, protectionism tends to create distortions on markets, generating efficiency losses, however, in some scenarios it may generate a situation of bigger welfare then the one of free trade (Africano et al., 2018).

In this dissertation, the arguments in favour of free trade that will be discussed are the efficiency gains argument and the dynamic gains argument. On the other hand, the arguments in favour of protectionism are the market failure argument, the national security argument, and the infant industry argument.

2.2.1. Efficiency Gains Argument

The argument that combines efficiency and free trade, is based on the idea that protectionism generates inefficiencies in both consumption and production, even in cases where there is a large country, since net gains resulting from trade restrictions rarely occur. Thus, it can be concluded that free trade will generate efficiency, which can be demonstrated by the analyses of the passing from a scenario of restriction (like having a tariff in the domestic market) to a free trade scenario.

In this way, assuming the presence of a tariff, its abolition will cause an excess of supply that will lead to a fall in prices, the gain in consumer surplus will exceed the loss in producer surplus, making the impact on welfare positive (Africano et al., 2018; Krugman et al., 2022).

2.2.2. Dynamic Gains Argument

There is a widespread belief between economists that the efficiency gains, referred to in the previous section, do not constitute all the gains from free trade. In addition, the classic cost-benefit analysis is static, therefore it ignores the impact of competition on innovation and learning, and that these consequences should not be ignored.

Competition, resulting from free trade, will force those present in the domestic market to eliminate inefficiencies and innovate to survive and compete whether in the domestic and international markets. By providing entrepreneurs with incentives to find new ways to export or compete with imports, free trade creates more opportunities for learning and innovation than a system in which the government dictates trade patterns. In addition, the effect of imitation in relation to foreign competitors will bring benefits to companies, and free trade will also contribute to reducing costs and improving products, because of the agglomeration of experience at both production and commercial levels.

Another additional gain from free trade is associated with the existence of economies of scale. Thus, there are internal economies of scale that are important for various sectors, and they can only be properly exploited when there is no protection against external competitors. This happens when the economies of scale are external, because protectionism fragments markets, inhibiting the concentration of industries, sentencing production to an inefficient scale. In the case of internal economies of scale, beyond the market fragmentation, the protection leads to an increment of the firms on the protected market, turning the scale of production for each firm inefficient. Thus, free trade supports larger production scales, greater efficiency, lower prices, and a wider variety of available goods (Africano et al., 2018; Krugman et al., 2022).

2.2.3. Market Failures Argument

According to Krugman et al. (2022) some economists make a case against free trade based on the counterargument that costumer and producer surplus do not properly measure costs and benefits (especially the producer surplus); since "production or consumption affects population welfare, and the prices of goods do not reflect these benefits or external costs" (Dimulescu, 2008, p. 415).

This may happen when the production of a good has associated externalities whether positives, such as increasing national security, or negatives, such as pollution (Africano et al., 2018). These externalities can all be classified under the general title of domestic market failures (Krugman et al. 2022).

When these effects occur, the market in question does not fully functions, meaning that there are imperfections that prevent the efficient solution, and therefore the quantities that maximize the social welfare (Africano et al., 2018), which opens the "opportunity for the government to intervene" (Caldari & Masini, 2011, p. 717). In this case, when the externality is positive, the state could intervene using a subsidy and when the externality is negative, the government may intervene by using taxes (Caldari & Masini, 2011).

It is also important to note that the market failure argument against free trade is a specific case of the theory of the second best which says that hands-off policy is desirable in any one market only if all other markets are working properly; and if they are not, a government intervention that appears to distort incentives in one market may actually increase welfare by offsetting the consequences of market failures elsewhere (Krugman et al., 2022).

On the other hand, it appears that the failures of the domestic market must be corrected by domestic policies, and not by international trade policies, therefore the use of external commercial policy with a view to eliminating failures in the internal market will have higher costs than acting at the local level, ceasing to be the optimal policy as it leads to new distortions of incentives in the economy (Africano et al., 2018).

2.2.4. National Security Argument

According to Ma & Lu (2011, p. 72) "one of the reasons to protect national industry is the need to maintain an "adequate" national defence". Africano et al. (2018), affirms that the base of this argument is the idea that foreign trade policy instruments should protect

industries that are considered as vital to the security and defence of a nation. Following this, "national security offers a rationale for economic protectionism in what may be seen as critical sectors or against investment from questionable sources" (Enderwick, 2011, p. 326). Abboushi (2010) says that even though this argument has a strong patriotic appeal, it has also weakness.

The problem of this argument lies on the definition of what industries may be considered as vital, since "numerous industries qualify to be crucial for national security" (Abboushi, 2010, p. 387; Africano et al., 2018). Ma & Lu (2011, p. 72) add that the problem is on the definition of "the specific requirements of national defence and the proper way to meet those requirements". Abboushi (2010) includes as a problem of this argument, the fact that this protection is extremely costly for taxpayers.

The ongoing discussion within the EU on strategic autonomy (and particularly the development of the European defence industry) could turn some more light on this (Perotto, 2023).

2.2.5. Infant Industry Argument

The argument of the infant industry was first developed by Hamilton (1791) and assumes the homogeneity of goods and the absence of internal economies of scales, which means that there is a high number of producers that produce identical goods, being the market perfectly competitive (Africano et al., 2018).

According to Panagariya (2011, p. 8) this argument "as conventionally made, is that in the early phase of industrialization, a country may exhibit higher production costs in certain industries than their established counterparts in already industrialised countries despite no intrinsic cost disadvantages in those industries". This means that a new industry that has a potential comparative advantage may not start in a country unless it is given a temporary protection against foreign competition (Ma & Lu, 2011).

In this way, the basis of this argument is the existence of external economies of scale (EES), meaning that the higher the production of a sector, the lower will be the average cost of all participating companies (Africano et al., 2018). This creates a rationale for protecting domestic markets that offer opportunities to develop economies of scale (Ma & Lu, 2011).

Following this, one may verify that a geographical concentration of certain activities foments the development of various factors that generate EES (Africano et al., 2018); since protection would enable local manufactures to get competitive with foreign manufactures who

already enjoy economies of scale, affording them the time to improve their skills in management, production, marketing, and the application of technology (Ma & Lu, 2011). Along these lines, protection can "make industries that are unviable today, viable tomorrow" (Panagariya, 2011, p. 8).

Besides, it is defended that this protection should be temporary, being in place only long enough for the infant industry to become internationally competitive. The internal market should be big enough to become internationally competitive and the future gains compensate the losses occurred while the industry was protected (Africano et al., 2018).

A good example of this can be found on the failure of the "industrialization for imports substitution" strategy that Portugal followed in the 1950s. As the Portuguese internal market was too small, firms did not get enough benefits from scale economies, thus not turning internationally competitive (Lains, 2019; Mateus, 2013).

2.3. World Trade Organization

In 1947, some of the signatories of Havana Accord had developed a provisory regime of commercial liberalization, the General Agreement on Tariffs and Trade (GATT), with the aim of consolidating the growing concept for the necessity of reducing trade barriers to trade among at least some of the countries that negotiated the new international commercial order (Africano et al., 2018).

From the creation of this agreement and until 1994, "the GATT provided the rules for much of world trade and presided over periods that saw some of the highest growth rates in international commerce". In January of 1995, the WTO was created, which marked the biggest reform of international trade since the end of the Second World War" (WTO, 2025a).

"The WTO agreements are lengthy and complex because they are legal texts covering a wide range of activities" however, "a number of simple, fundamental principles run throughout all of these documents" being "the foundation of the multilateral trading system" (WTO, 2025b).

Since GATT was created, several rounds of negotiation have taken place, each lasting longer than the previous ones, reflecting both the increasing complexity of the agreements and the challenges of reaching consensus.

The Dillon Round was motivated by the creation of the European Economic Community (now EU), that brought a profound change in the structure of international trade and

required a derogation for participating states from the basic rules of the GATT, particularly the most-favoured-nation principle (Africano et al., 2018).
In the next pages the discussion will go through the various principles that guide the politics of WTO. Following that, the dispute settlement will be discussed.

2.3.1. Principles

"The WTO agreements are lengthy and complex because they are legal texts covering a wide range of activities" however, "a number of simple, fundamental principles run throughout all of these documents" being "the foundation of the multilateral trading system" (WTO, 2025c). These principles are the same that regulated GATT, being the principle of non-discrimination, free trade, reciprocity, transparency and predictability, and encouraging development and economic reform (Africano et al., 2018).

Non-discrimination

This principle defends in one hand the non-discrimination between commercial partners and in the other hand the non-discrimination between national and imported goods, thus having two complementary clauses: the most favourable nation clause and national treatment (Africano et al., 2018).
The first clause demands that "countries cannot normally discriminate between their trading partners" meaning that when a country "grants someone a special favour (such as a lower customs duty rate for one of their products)" this country "have to do the same for all other WTO members" (WTO, 2025c). Doing so, under this clause, the WTO guarantees that the goods of all members of WTO are subjected to the same tariff and customs regime when they enter on the national territory of a state member (Africano et al., 2018).
The most favourable nation clause has such importance that is the first article of the GATT, the second article of the General Agreement on Trade in Services (GATS) and the fourth article of the Trade-Related Aspects of Intellectual Property Rights (TRIPS), "although in each agreement the principle is handled slightly differently" (WTO, 2025c).
Despite the stipulations in this clause, some exceptions are predicted such as setting up "a free trade agreement that applies only to goods traded within the group", giving "developing countries special access to their markets", raising "barriers against products that are considered to be traded unfairly from specific countries" (WTO, 2025c). Other exceptions could

apply like when a country discriminates to protect both the life and health of people, animals, or plants or to protect national resources, and when the discriminations occur to protect the national security of the country (Africano et al., 2018).

In turn, the national treatment clause requires that once an imported good enters the domestic market, fulfilling all customs obligations, they can´t be discriminated relatively to national ones (Africano et al., 2018). This clause "is also found in all the three main WTO agreements (Article 3 of GATT, Article 17 of GATS and Article 3 of TRIPS), although once again the principle is handled slightly differently in each of these" (WTO, 2025c).

Free Trade

According to WTO (2025c), "lowering trade barriers is one of the most obvious means of encouraging trade" and is one of the main objectives since the first negotiation rounds of GATT and is still one of the principles of WTO (Africano et al., 2018).

Throughput the various rounds of negotiations these barriers were reduced, at first focusing on tariffs and later to "non-tariff barriers on goods" such as the elimination of quotas to imports or the removal of others administrative or technical barriers to international trade and to "new areas such as services and intellectual property" (Africano et al., 2018; WTO, 2025c).

WTO (2025c), also refers that while the opening of the markets can be beneficial, is something that needs to be adjust, allowing the members to introduce the changes in a gradual way, letting the developing countries extra time to fulfil the accorded goals.

Reciprocity

This principle reflects the idea that the liberalization of the commercial trade needs to generate equivalent advantages for all participants; suggesting that, while occurring the liberalization of international trade, is expected from each members concessions that originate to the other members trade gains identical to the ones that the country obtains with the concessions that are offered from the other members. Is important to refer, that this is not one of the formal principals of WTO (Africano et al., 2018)

Predictability and Transparency

Africano et al. (2018), the predictability of the rules is both important for the good functioning of international trade system as for the level of tariffs or quotas, adding also that without guarantees regarding future levels of protection, companies will be reluctant to enter new markets or to commit to them in the long term. This idea is shared by WTO (2025c), when states that "promising not to raise a trade barrier can be as important as lowering one, because the promise gives businesses a clearer view of their future opportunities".

WTO follows this objective throughout the definition of binding tariffs, which means that state members besides defining the value of the tariff for each line of product or service, they commit that in the future these tariffs will not exceed this maximum value (Africano et al., 2018).

In turn, transparency is promoted through the obligation of internal disclosure and notification to WTO of all the economic policy measures or others that may impact international trade (Africano et al., 2018). "The regular surveillance of national trade policies through the Trade Policy Review Mechanism provides a further means of encouraging transparency both domestically and at the multilateral level" (WTO, 2025c).

Encouraging Development and Economic Reform

For WTO (2025c), "the WTO system contributes to development", which is achieved throughout the implementation of the other principles and through positive discrimination measures.

One of these measures is the generalized system of preferences (GSP) that provides less developed countries with more favourable access to developed country markets and was established in 1968. The other measure is the fact that less developed countries are exempt from the principle of reciprocity in the global process of trade liberalization (Africano et al., 2018).

2.3.2. Dispute Settlement

The dispute settlement system is a central element of the WTO: as Shin & Ahn (2019, p. 1) underline, the large number of trade disputes that were brought to the WTO Dispute Settlement Body (DSB), "suggests that the DSB is the central functionary of the WTO system".

This system was created with the aim of resolving disputes between member states regarding

the application of the rules established in the WTO agreements and has become a fundamental pillar for the proper functioning of international trade (Africano et al., 2018).

For Fukunaga (2006, p. 383) "the WTO dispute settlement system has been making substantial contributions to improved compliance with the WTO Agreements" highlighting "the elaborate multistage mechanisms installed in the system that facilitate and ensure the implementation of the DSB recommendations".

The effectiveness of the Dispute Resolution System is based on its architecture. Following Shin & Ahn (2019, p. 5) there exist "two institutional mechanisms for settling a dispute under the WTO DSB".

The first one is through "DSB legal proceedings via panel and Appellate Body (AB) procedures" that "examine whether the measures of a responding party violate the obligations of the WTO Agreements, and if they conclude in the affirmative, the DSB recommends that the member concerned bring the measures into conformity with the Agreements" (Fukunaga, 2006, p. 384). The second is through "non-litigious bilateral consultations for seeking a mutually agreed solution, official withdrawal, or termination" (Shin & Ahn, 2019, p. 5).

The proceedings are conducted by a panel of experts who form a sort of tribunal whose task it is to assess the case in the light of WTO rules and propose a solution (Africano et al., 2018). This panel is appointed by the DSB, that has authority not only to establish this panels but also to "refer matters to arbitration, adopt panel, Appellate Body and arbitration reports, maintain surveillance over the implementation of recommendations and rulings contained in such reports, and authorize suspension of concessions in the event of non-compliance with those recommendations and rulings" (WTO, 2025d).

According to Fukunaga (2016, p. 385) "despite their significance and contribution, these mechanisms are not devoid of problems and shortcomings", since while "the DSB recommendations have largely properly implemented", "occasionally, they have not been properly implemented, particularly in cases involving the critical interests of the member concerned".

According to Van der Loo (2022, p. 6) despite being considered "as the "crown jewel" of the WTO, several WTO members have been critical of the WTO's dispute settlement system, alleging, inter alia, that the AB has too frequently overstepped its mandate". Some problems that this author state as arguments from the US are the fact that some AB members have the practice of "staying on after their term has expired to finish an appeal that began while they were still in office", the failure of AB to "complete appeals in the required ninety days" (Van der Loo, 2022, p. 7).

It is important to notice however that part of the arguments presented by the US have some fundaments since "appeals frequently do violate the ninety-day rule and AB members have remained past their terms of office" and is not the only one concerned with AB. Despite this, "no other WTO member supports the US' blockage of the AB" (Van der Loo, 2022, p. 8).

According to Pelc (2024, p. 2) "the United States' move against Appellate Body (AB) adjudicators has rendered the trade regime's enforcement body inoperative since late 2019" because Trump's administration refused "to agree to appoint new AB members and/or re-appoint incumbents" (Van der Loo, 2022, p. 6). Despite this blockage several countries continue to appeal to the Pannel, being this practice "considered as preservation of rights were the AB to be reconstituted in the future" (Van der Loo, 2022, p. 6).

The dysfunctionality of the AB is considered by Pelc (2024, p. 2) as "one of the most significant clawbacks of power against an international tribunal since WWII" and by Van der Loo (2022, p. 5) "as one of the most important issues on the WTO reform agenda" putting "the multilateral trading system (…) in its deepest crisis since its creation".

According to Van der Loo (2022, p. 10) "with the multilateral WTO dispute settlement procedure in limbo (or in any case the AB), the EU led an effort to use the general arbitration mechanism in Article 25 of the DSU[1]" creating with other members of WTO "the Multi-Party Interim Appeal Arbitration Arrangement (MPIA), a stop-gap solution to circumvent the impasse" that was contested by US since their creation (Pelc, 2024, p. 2).

"While the MPIA is designed to mirror the paralyzed AB, it also modifies several of its procedures in ways that address criticisms of the old system" creating the possibility to "provide a blueprint for future reforms of the dispute settlements system" (Pelc, 2024, p. 2), for example by "including rules that encourage procedural efficiency to preserve the DSU's 90-days timeline on appeals" (Van der Loo, 2022, p. 11). Finally, according to Van der Loo (2022, p. 11) "MPIA appeals are only available to parties to the MPIA, but other WTO members may join the MPIA at any time".

[1] DSU - Dispute Settlement Understanding

3. Methodology

The primary goal of this dissertation is to analyse the EU reaction to the IRA. Because this legislation was adopted only recently, analysing its economic implications in depth would be extremely challenging.

By this reason, this study follows a qualitative analysis of the EU reactions to the IRA, instead of a quantitative analysis. The qualitative research is mainly based on an analysis of available documentation, complemented, where appropriate, by comparative analysis. With the intention of answering the research questions, three groups of questions were established.

The first group of questions had as main goal the "understanding of the problem", meaning that the focus of such questions was to find out more about this historic American legislation. The research conducted with the intention of answering these questions is presented in points 4.1 and 4.2 and was based on available documentation, in particular legislative texts associated to the policy and scientific articles that analyse it.

- What is the IRA?
    - What was the context for the IRA?
    - Which instruments are used in the IRA?
    - How can the IRA affect other countries?

The second set of questions had the goal of understanding the initial reactions from the EU by the time this study was conducted. The research conducted to answer such questions is presented on points 4.3 and was again mainly based on a documentation analysis.

- How did the EU react until now?
    - What were the initial reaction of the EU?
    - What is the CRMA and the NZIA?
    - How the NZIA could be more comprehensive?

Finally, a third group of questions were placed with the goal of analysing whether the initial EU reactions would be enough or whether the EU could take a step further. The analysis conducted to answer these questions is presented on point 4.5 and was based, once again, on the analysis of available documentation, this time complemented with a comparative

analysis, regarding previous actions IRA-alike by the US and reactions from the EU, this one presented on point 4.4.

- What more could the EU do?
    - Which previous US legislations were like the IRA, in terms of instruments utilized?
    - How was the EU reaction to these legislations?
    - What the EU has done and has not done yet to react to the IRA?

4. Discussion

According to Bown & Clausing (2023, p. 1) "recent efforts to reduce greenhouse gas emissions have revealed different policy priorities; the United States and China have emphasized subsidy-based approaches, and the European Union has emphasized carbon pricing". For the US, the most significant legislation comprehending both scale and scope is the IRA that includes "more than $100 billion in spending" on energy efficiency and industrial decarbonization for example and "about $270 billion in clean energy tax credits" (Bown & Clausing, 2023, p. 5).

Suárez-Cuesta et al. (2024, p. 1) affirm that the implementation of the IRA "relies mostly on subsidizing green technologies" which contrast with the EU action, since typically it "relies on carbon pricing mechanisms". This exemplifies two different approaches to policy. On the one hand, EU policy was centred on the imposition of a cost for carbon emissions. On the other hand, the US IRA aims at reducing the associated cost on transitioning to less carbon-intensive processes.

Within this context, this chapter starts with an overview of the IRA, exploring the background of its introduction, the instruments used and the possible positive and negative effects, not only in the US, but also for its partner countries. Then, the study shifts to understand what the reactions of the EU were, with a concrete analysis of the CRMA and the NZIA. Based on these topics, a comparison between the EU and the US climate policies is presented, focusing on the comparison between the IRA and the NZIA. The study then focuses on analysing some previous US legislations that had similar instruments and/or objectives of the IRA, and the European reactions to them. Finally, and joining all the analysed elements, the NZIA is further developed to figure out how it could have become more comprehensive, focusing on its problems and possibles improvements.

4.1. IRA: an overview

The IRA is a "historic commitment to build a new clean energy economy, powered by American innovators, American workers, and American manufacturers, that will create good-paying union jobs and cut the pollution that is fuelling the climate crisis and driving environmental injustice" (White House, 2023, p. 2).

The enactment of this legislation "was unexpected given the history of federal climate policy initiatives" (Bang, 2024, p. 5). Several Democratic presidents and lawmakers tried to implement federal climate policies involving carbon price: however, despite being introduced to US Congress they all died there. Some examples can be found in the failure attempt to implement a BTU[2]-tax in 1993 by Bill Clinton and the 2009 Waxman-Markey bill.

Even when legislation was approved – such as President Obama's initiatives to cut GHG[3] emissions, most notably the Clean Power Plan and the methane rule – it passed with great difficulties due to the polarized political climate.

According to White House (2023, pp. 3, 5), the former President Biden saw "action on climate change as an opportunity" for America to lead "the global clean energy economy" and the signing of the IRA into law made this legislation "the most significant action Congress has taken on clean energy and climate change" in US history.

To overcome past difficulties, most of the IRA's investments and subsidy programs were designed to bring together climate action with green economic growth at the state level with the intention of creating jobs and display the economic benefits: as Bang (2024, p. 16) showed, " interests of the pro-climate coalition aligned around three key pillars for climate action: cutting climate pollution, addressing environmental injustice, and incentivizing green growth and more jobs".

Ultimately, the landscape for the full implementation of the IRA is considered as fragile because of the lessons from previous contentious policy reforms. Furthermore, "republicans in the US House of Representatives made 40 attempts at repealing the IRA in the period 2022-2024, even if Republican-led states and congressional districts disproportionally benefitted from the IRA subsidies during its first two years" (Bang, 2024, p. 17)

The IRA is "a key pillar of President Biden's economic and industrial strategy, which is centred on investing in America's workers and communities to ensure long term, sustainable growth and prosperity" and has the intention to deliver results throughout a combined set of policies such as grants, loans, rebates and incentives (White House, 2023, p. 7). Included in these measures there are also tax provisions with the objective of both helping families to save money on energy bills and accelerating the deployment of clean energy, vehicles, buildings, and manufacturing (White House, 2023).

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[2] A BTU-tax is a tax with the primary goal of raising money, while promoting the conservation of the environment, and national security. The BTU-tax introduced the idea of a broad-based tax on consumption that would produce more revenue, in a quicker way and with less administrative costs (Coburn, 1993).

[3] GHG – Greenhouse Gas

The investments of $370 billion included on the IRA were "designed to incentivize rapid innovation in renewable and emission-free energy technology, uptake of electric appliances and vehicles by householders, and local content requirements intended to incentivize production sites for EVs[4] batteries, and other renewable energy technology on American soil" (Bang, 2024, p. 1). This investment was also made under the promises that it will:

> "Lower energy costs for families and small businesses, accelerate private investment in clean energy solutions in every sector of the economy and every corner of the country, strengthen supply chains for everything from critical minerals to efficient electric appliances, and create good-paying jobs and new economic opportunities for workers" (White House, 2023, p. 5).

The IRA is divided in five segments (White House, 2023), each of them having a set of policies and instruments to achieve their goals.

The first segment is dedicated to the advance and deployment of American-made clean energy technologies (figure 1) and have included more than two dozen of new or modified tax incentives. In addition, it also has billions of dollars dedicated to grants and loan program with the intention of unchaining new clean energy technology investments and accelerate the transition of US to a clean energy economy. These incentives were designed to build a low-carbon energy system with American-made technology. They also aimed to lower the energy costs and create well-paid jobs.

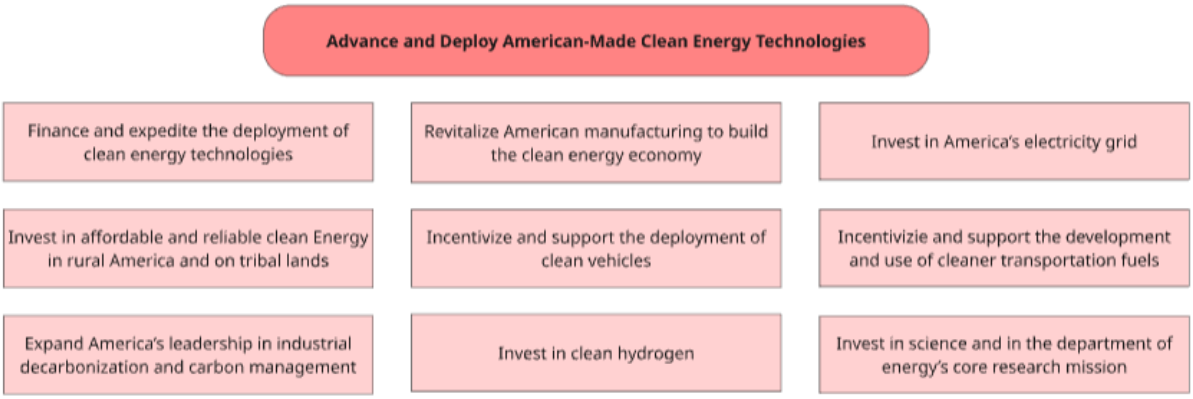


Figure 1 – Policies to advance and deploy American-made clean energy technologies (White House, 2023)

[4] EV – Electric vehicles

In this part of the legislation, some LCRs specification are present to achieve a credit bonus. One example of this is in policies that have the intention of finance and expedite the deployment of clean energy technologies, more precisely on the attribution of tax credit for clean energy production and investment when is said that:

> "A project of facility can earn bonus credit if it meets Davis-Bacon prevailing wage and registered apprenticeship requirements, meets certain domestic content requirements, and/or is located in an energy community (…) the ITC[5] offers additional bonuses for wind and solar projects in low-income communities". (White House, 2023, pp. 9-10)

Other example of local content requirement restrictions on the IRA can be found within the policy of incentivizing and supporting the deployment of clean vehicles, more precisely in the credit for clean vehicles, when states that:

> "To qualify for the maximum $7,500 credit, the vehicle must meet certain standards for North American assembly; the battery's components must meet certain standards for manufacturing or assembly; and the battery's critical minerals must meet certain requirements for sourcing or processing in the United States or from trusted trade partners". (White House, 2023, p. 46)

The second segment of the IRA is dedicated to policies to protect communities from harmful air pollution (figure 2). This policy has this goal since despite the levels of harmful air pollution have been decreasing across US while the economy has grown, some communities are still facing exposure to unhealthy levels of pollution.

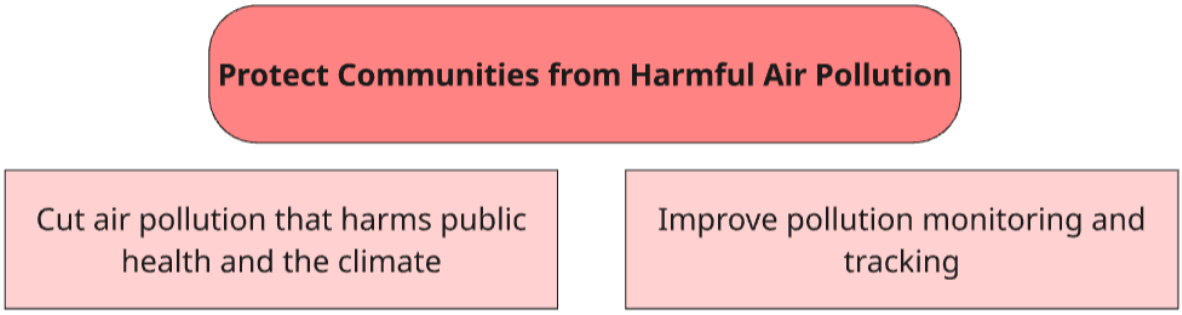


Figure 2 – Policies to protect communities from harmful air pollution (White House, 2023)

[5] ITC - Investment Tax Credit

The third segment is dedicated to make homes and buildings cleaner and more efficient (figure 3). Doing so, the policies presented here have the intention of saving consumers money and cut pollution, helping households to afford energy efficient appliances and upgrades.

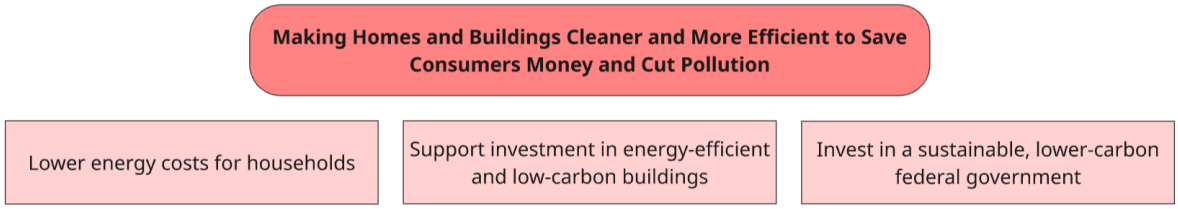


Figure 3 - Policies to make homes and building cleaner and more efficient (White House, 2023)

The fourth segment is intended to harness nature-based solutions and climate-smart agriculture (figure 4) with the intention of reducing the greenhouse gas emissions, the encouraging of new economic activities in rural areas, and the protection of communities that are most vulnerable to natural disasters and other impacts of climate change.

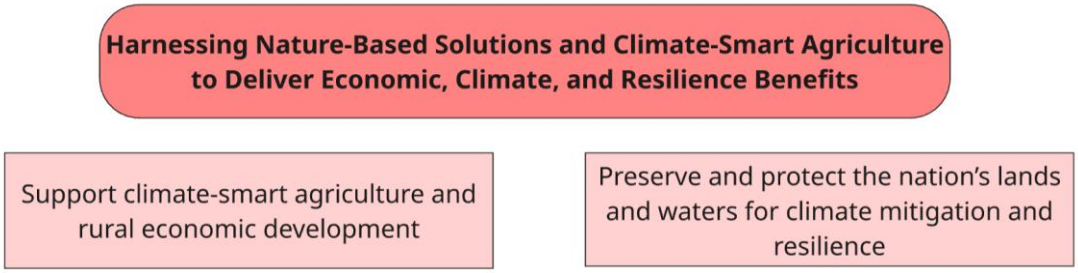


Figure 4 – Policies to harness nature-based solutions and climate-smart agriculture (White House, 2023)

Lastly, the policies present on the fifth segment are intended to increase the resilience of US communities in a changing climate (figure 5), with the desire of preparing for and adapt to inevitable impacts of climate change, by creating new fundings to mitigate extreme drought, supporting communities and tribes that are vulnerable to climate impacts and trough the improving of the US ability to forecast extreme weather.

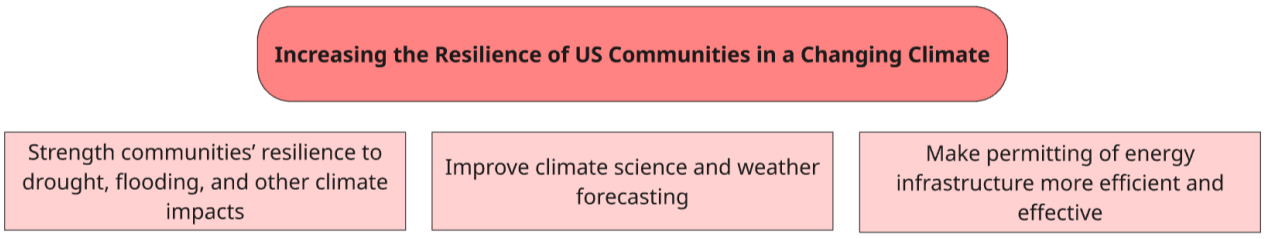


Figure 5 – Policies to increase the resilience of US communities in a changing climate (White House, 2023)

4.2. IRA: a critical view

The IRA is considered by Suárez-Cuesta (2024) as "the central piece for climate action in the US" being historic since provides "for the first time a federal climate policy package enacted into law in the United States" (Bang, 2024, p. 2). It also represents a significant shift in terms of geopolitics by US and in terms of the climate policies approach from US which could lead to "a point of no return towards a subsidy race among regions" Suárez-Cuesta (2024, p. 6).

According to Kleiman et al. (2023, p. 3422) the IRA "consists of three sets of measures: a tax reform, a healthcare reform, and energy and climate legislation", being subsidies on energy and climate the most relevant measures to the IRA's international impact. They consider it as a "game changer in several aspects", since it "is expected to close two-thirds of the greenhouse-gas emissions gap between current policy and the US 2030 climate target" contributing in a significant way to the global efforts to reduce carbon emissions (Kleiman et al., 2023, pp. 3431-3432).

The IRA was "surprisingly adopted" and constitutes "an ambitious package of decarbonization policies" (Bang, 2024, p. 1), with the primary focus on providing access to clean energy (Rao, 2023). Kleiman et al. (2023, p. 3421) describe this legislation as a package that combines "largescale green subsidies with healthcare savings and new revenue measures".

For Bistline et al. (2023, p. 78) the incentives that exist on the IRA can "span the entire energy sector, since producers of raw materials to end-use consumers, and will set considerable new forces in motion."

The policies programs in this legislation were "designed to incentivize rapid innovation in renewable and emissions-free energy technology" (Bang, 2024, p.1), including "several outlays for clean energy production via tax credits and grants" to achieve that goal (Rao, 2023, p. 1917). According to Bown & Clausing (2023, p. 10) "several IRA subsidies included "adders" (more generous tax credits) for goods that meet threshold levels of domestic content or, in some cases, content from free trade agreement partners".

The passing of this legislation has "catapulted governmental support for research and development (R&D) for environmental innovations (EI) back in the political agenda in pursuit of hitting the net-zero emissions target by mid-century as well as capturing a front-row seat in the clean energy market" (Meissner et al., 2024, p. 2). This legislation also "places the US on

course with the UN[6] Sustainable Development Goals" (Rao, 2023, p. 1912).

Even though this legislation represents the largest US federal response to climate change to date (Bistline et al., 2023), Kleimann et al. (2023, p. 3421) highlight the fact that the IRA possess protectionist elements which "includes subsidies conditional on local-content requirements (LCRs) that are prohibited by the rules of WTO", and "large-scale manufacturing subsidies that are probably market and trade-distortive". Following Bown & Clausing (2023, p. 18), one reason that led some authors to view the local content provisions present on the IRA as inconsistent with WTO rules is the fact that the rules of WTO prohibit not only export subsidies but also "subsidies that are contingent on the use of domestic over imported inputs".

Furthermore, Rao (2023, p. 1919) adds that "IRA legislation shies away from imposing mandated rules, requirements, and regulations, compatible with minimum free-market interference doctrine".

Bown and Clausing (2023) highlight that according to the policies presents on the IRA, the US might be underestimating future challenges, since the WTO would find the domestic content provisions in the IRA to be a form of prohibited subsidies, and in that case trading partners can respond with a remedy without needing to show that the subsidy had a negative impact on their own domestic industry. Nevertheless, the "IRA opens up enormous opportunities for companies, sustainability experts, and regulators to begin combating climate change" (Rao, 2023, p. 1925).

Moreover, the use by the IRA of subsidies under the condition of LCR, prohibited under WTO rules consist in a "further blow to the international trading system" since it "signals the willingness of the US to disregard WTO rules, and because it may trigger protectionist responses in other countries". Additionally, the inclusion of large-scale manufacturing subsidies that could be market and trade distortive has "exacerbated European Union fears that clean-tech manufacturers and adopters will shift their production to the US, in search of an attractive mix of subsidies and low energy costs". As a result, the economic impact of the IRA could be substantial for the EU, both through competitiveness effects and innovation spillovers (Kleiman et al., 2023, pp. 3421, 3433).

For Kleiman et al. (2023, p. 3423) some of the trade distortive subsidies included:

[6] UN – United Nationsffs

> "The consumer electric car tax credit conditional on LCRs ($7.5 billion), most spending on clean-tech manufacturing support ($32 billion of the total $37 billion), the bulk of the clean-fuel and emissions-reduction subsidies ($16 billion), and the share of subsidies for green-energy production and investment expected to include local content bonuses"

According to Bown & Clausing (2023, p. 10) before the implementation of the IRA "outside of government procurement, the US government had not generally relied on domestic content provisions as a policy tool and had strongly opposed their use abroad". Adding the fact that the US had helped to "design international rules under the General Agreement on Tariffs and Trade (GATT) and WTO to restrict the use of such provisions, and it challenged other WTO members when they implemented national climate policies containing such provisions", the approval of this legislation was even more shocking. Basically, with the IRA "US government simply ignored these WTO obligations, implementing the domestic content policy tool largely without even acknowledging any inconsistencies".

Additionally, domestic content provisions can have perverse effects on the competitiveness of domestic industries, since they may encourage inefficient sourcing and reduce the international competitiveness of companies that were subsidized. Furthermore, the potential effects of using instruments such as local content requirements can be more problematic towards the world trading system. However, according to Kleiman et al. (2023, p. 3421) "the magnitude of its effects is very uncertain".

It should be underlined, however, that since Donald Trump took office as the 47th president of the US on January 2025, he has initiated significant changes on the IRA, through either executive order or legislative actions. According to Guarna & Turner (2025) "the administration's interference with IRA implementation has had drastic implications for climate action, whether through laying off necessary agency staff and revoking IRA-related guidance, unlawfully freezing funding or, in some cases, terminating funding awards outright".

This began on the first day of President Trump return to the White House, since in January 20 of 2025, the new president of the US issued the "executive Order 14154, entitled Unleashing American Energy, directing all agencies to immediately stop disbursing funds appropriated by the IRA (…) and to review the processes for issuing grants, loans, contracts, or any other financial disbursement of appropriated funds". Additionally, "the White House Office of Management and Budget (OMB) issued a memorandum to agency and department

heads (…) requiring agencies to temporarily pause all grant, loan, and financial assistance programs pending review".

Despite being challenged by multiple lawsuits "many IRA awardees reported an inability to access their funding". Additionally, President Trump has also targeted some individual IRA programs. For instance, "the Environmental Protection Agency (EPA) took the extraordinary step of terminating $20 billion in National Clean Investment Fund and Clean Communities Investment Accelerator grants (…) one of the most critical climate spending programs in the IRA". In three months, "the IRA Tracker has recorded 28 distinct actions to roll back implementation of the IRA" (Guarna & Turner, 2025).

With the approval of the One Big Beautiful Bill (OBBB) on 4th of July 2025, a further blow on IRA took place. Following the article in the White House web page that list "50 Wins in the One Big Beautiful Bill", this new legislation "repeals and rescinds every "green" corporate welfare subsidy" (The White House, 2025).

Being more specific, the OBBB "further restricts the major IRA clean electricity credits", reducing gradually the investment tax credit and the production tax credit available for clean electricity is "fully eliminated for projects entering service after 2028, without a transitional phaseout period". This version of the OBBB "also further tightens the credit eligibility timeline" (Tax Foundation, 2025).

4.3. The EU reaction

For Smeets (2024, p. 1) "2023, arguably, was the first moment in a long time that the EU was not in the midst of a severe crisis" even though "there was still plenty of "crisis" in its environment". Despite this, "major medium to long-term challenges to the EU remained". The IRA was the most highlighted, since while this legislation did not unleash "an immediate crisis, it constituted a major horizontal challenge with implications across very different policy areas that needed to be addressed at the highest political level" (Smeets, 2024, p. 2).

Following this idea, the IRA is considered by this author as a wake-up call for the leaders of EU, by realizing that the price of energy would continue to stay high, and EU was facing a structural disadvantage on the facilitation of the green and digital transformation, in comparison to US and China. According to Veugelers et al. (2024, p. 20), with the adoption of a more protectionist stance by US and the increase of China's dominance on the clean technology value chains, EU was facing a "critical juncture that demands a re-evaluation of its

green industrial policy approach".

According to Bown & Clausing (2023, p. 11), political leaders of EU reacted to US's IRA "with both enthusiasm and dismay", since despite they welcome with open arms the policy action on climate change mitigation, the format and scale of the subsidies presented in the legislation increased the fear of the possible effects on the world trading system, specifically in terms of their norms, and on European industrial competitiveness.

On December 2022, the leaders of the biggest economies on EU (German and French) release a statement were they argue that the IRA implied that Europe had the need to adopt a more aggressive industrial policy, trough the modification of existing state aid rules (with the allowance of both tax credit and subsidies on targeted strategic sectors); the alignment of the priorities of EU funding in accordance with the challenge; and the use of the trade instruments that EU have to make the "playing field" more equal.

These kinds of impulses go against the aim of EU rules on state aid, that intend to balance competition on Europe, by forbidding the Member-states to take political strategies (such as government guarantees and tax credits) to provide companies with advantages over their competitors, leading to the distortion of the "competition and intra-Europe trade".

To Meissner et al. (2024) the response of EU should be carefully thought out, since depending on how EU intends to level the "playing field" it could lead to a subsidy war and could replicate the inefficiencies present on the IRA in the EU programs.

On February 2023, the European Commission presented its Green Deal Industrial Plan (GDIP), with the goal of enhancing the competitiveness of European industry, by the simplification of the regulation of the production of goods that help to meet the climate goals and through the extension and acceleration of public funding to the energy transition industries and the temporary change of state aid rules along multiple dimensions. On March of the same year, the European Commission has presented the NZIA and the CRMA (Bown & Clausing, 2023).

Together with these reactions, the EU also engaged in negotiations with the US. A few months after the launching of the IRA, "Bjoern Seibert, Head of cabinet to European Commission President Ursula von der Leyen met in Berlin on 25 October 2022 with the US Deputy National Security Advisor, Mike Pyle" launching "the US-EU Task Force on the Inflation Reduction Act (IRA)" to "continue promoting deeper understanding of the law's meaningful progress on lowering costs for families, our shared climate goals, and opportunities and concerns for EU producers". At the time, both EU and US, agreed that was

important a "close coordination to support sustainable and resilient supply chains across the Atlantic, including to build the clean energy economy" (European Commission, 2022; The White House, 2022).

Throughout 2023, "the European Commission has adopted its negotiating directives for a Critical Minerals Agreement (CMA) with the United States", with the objectives of "enable critical minerals extracted or processed in the EU to count toward certain electric vehicle (EV) tax credit requirement of Inflation Reduction Act of 2022 and deepen US-EU cooperation on diversifying critical mineral and EV battery supply chains" (Akhtar, 2024; European Commission, 2023a).

Furthermore, according to the European Commission (2023a) "the deal will help reinforce the Commission's proposed Net Zero Industry Act and Critical Raw Materials Act, which aim to scale up EU manufacturing of key carbon neutral technologies". However, at the time of this dissertation no negotiations have been concluded on this. Despite this, in the latest negotiation between the EU and the US because of the tariffs imposed by President Trump, the two sides achieved a commitment "to strengthen cooperation and action related to the imposition of export restrictions on critical mineral and other similar resources by third countries" (European Commission, 2025c).

4.3.1. Critical Raw Materials Act

The CRMA is a regulatory framework that tries to "respond the supply disruption risk in critical raw materials, by boosting their domestic production, refining, and recycling" (Veugelers et al., 2024, p. 11). This way, the legislation could be defined as "the first comprehensive attempt to regulate critical raw materials management and steer related industry practices" (Hool et al., 2024, p. 662).

This legislation "aims at specific objectives of increasing the EU industry's awareness and mitigation of CRM[7]-related risks in supply chains, increasing the EU's domestic capacity for extraction, processing, and recycling, and reducing the environmental footprint of the EU's CRM consumption" (Hool et al., 2024, p. 662), by setting a list of identified "strategic raw materials that are considered crucial for the manufacturing of green, digital, and defense technologies and sets precise domestic targets to be achieve by 2030" (Veugelers et al., 2024,

[7] CRM - Critical Raw Materials

p. 11).

"While the CRMA presents opportunities for job creation, economic development, and market advantages for companies that comply with its provisions, it also brings forth challenges" since this policy will affect sectors like mining, processing and recycling industry pushing them to meet the benchmark and secure investments and the manufacturing industry that would need to adapt their supply chains and sourcing strategies (Hool et al., 2024, p. 665).

CRMA includes measures such as the strengthening of the domestic supply chains and the reinforcement of international engagement to develop mutually beneficial partnerships with third countries (European Commission, 2025a).

The key pillars for CRMA, according to the European Commission (2025a) are:

- **Setting clear priorities for action**, besides updating the list of critical raw materials for the whole EU economy it also lists strategic raw materials (materials that are extremely important for the strategic technologies used on green, digital, defence and aerospace applications. Alongside this, EU set benchmarks for domestic capacities along the strategic raw material supply chain to be reached by 2030.
- **Building European capacities**, through the strengthening of the value chains of raw materials, passing through mining, refining, processing and recycling.
- **Improving resilience**, focuses on the improvement of EU's ability to withstand disruptions on supply chain
- **Investing in research, innovation and skills**, through the strengthening of the uptake and deployment of breakthrough technologies in critical raw materials
- **Promoting a more sustainable and circular critical raw materials economy**, through the encouragement of the recovery of critical raw materials from extractive waste facilities

In this way, the CRMA "can contribute to sustainable resource management and advancing the EU's clean tech industries" (Hool et al., 2024, p. 665).

4.3.2. Net-Zero Industrial Act

"While the CRMA is quite careful on how to implement an "open strategic autonomy, assuring resilience", the NZIA (…) takes targeting and "strategic autonomy" through local manufacturing capacity in clean energy a few steps further" (Veugelers et al., 2024, p. 11).

According to the European Commission (2024) this legislation addresses technologies that

would make a serious contribution to the decarbonisation process, supporting strategic net-zero technologies that besides being commercially available have potential for a rapid scale-up. These technologies will be responsible for the strengthening of the industrial competitiveness and the resilience of the energy system of Europe, while allows the clean energy transition.

Doing so, this regulation has the goal of boost the "industrial deployment of net-zero technologies needed to achieve EU's climate goals, using the strength of the single market to reinforce the Europe's leadership in industrial green technologies" (European Council, 2024). Other intentions of this policy are the ease of the conditions for the investment in green technologies; the ease of the access to market "for strategic technology products, enhance the skills of the European workforce in these sectors (…) and create a platform to coordinate EU action in this area".

According to Kleiman et al. (2023), the NZIA proposal of an industrial policy with the intention of promoting a cleantech manufacturing is organised in four steps. First the legislation starts with defining a list of clean-tech technologies that are considered as strategic (figure 6).

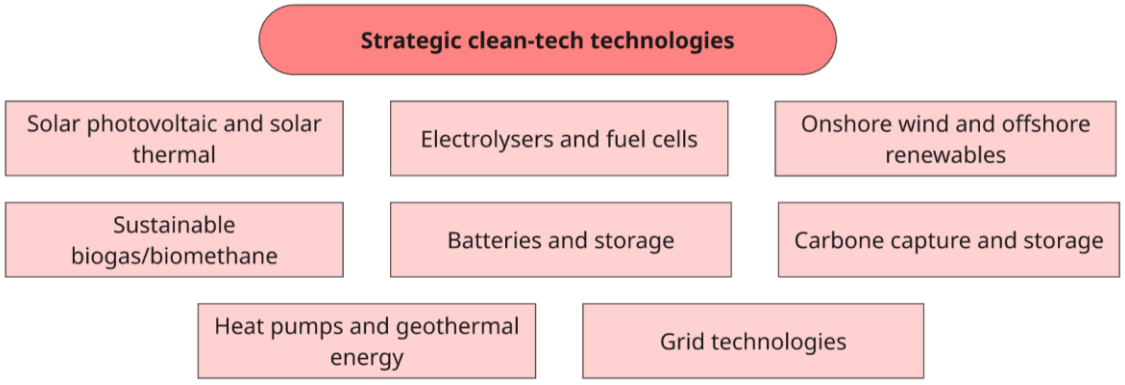


Figure 6 – Strategic clean-tech technologies (European Commission, 2024)

Additionally, "other net zero technologies are also supported by the measures in the act" such as alternative sustainable fuels technologies, advanced technologies used to the production of energy from nuclear processes with a "minimal waste from the fuel cycle, small modular reactors, and related best-in class fuels" (European Commission, 2024).

Secondly, the European legislation defines how the progress to this transition will be measured. According to the European Council (2024) the objectives will be measured using two indicative benchmarks, being them the reach of "40% of the production required to cover EU's needs in strategic technology products" and "their evolution in comparison to world

production for products such as solar photovoltaic panels, wind turbines, batteries and heat pumps".

The third step is the outlining of "a governance system based on the identification of Net-Zero Strategic Projects (NZSPs) by Member-states, with a minimal check by the European Commission" that need to "contribute to CO2 reductions, competitiveness, and security of supply and should involve technologies close to commercialization" (Veugelers et al., 2024, p. 11). According to Kleiman et al. (2023, p. 3427), "this approach represents a break with what has been done so far in the EU: support focused on earlier stages of technology development, including research, early-stage development and prototyping".

Lastly, the NZIA designs a set of policy instruments, the majority being at a national level, to support the selected projects. Kleiman et al. (2023) highlight four of them: accelerate the permitting and related administrative procedures; coordination of private funding; limitation of public subsidies; and public procurement procedures and auctions.

According to Kleiman et al. (2023, p. 3427), it is important to analyse NZIA and the Temporary Crisis and Transition Framework (TCTF) at the same time, since NZIA assigned the EU countries "the role of main provider of public funds for NZSPs". The most significant modification in the TCTF, according to the authors, relates to the state aid that a Member State can provide, being "perhaps the clearest revision of the state-aid guidelines as a reaction to the IRA".

According to the European Commission (2023b) the new version of the TCTF "introduces new measures, applicable until 31 December 2025, to further accelerate investments in key sectors for the transition towards a net-zero economy", that in exceptional cases let the Member States "provide higher support to individual companies, where there is a real risk of investments being diverted away from Europe". In this way, the Member States can provide "the amount of support the beneficiary could receive for an equivalent investment in that alternative location (the so-called 'matching aid')" or in alternative to provide "the amount needed to incentivise the company to locate the investment in the European Economic Area (the so-called 'funding gap') whichever is the lowest".

"With the European Green Deal, Europe has pledged to become the first climate-neutral continent by 2050" (Veugelers et al., 2024, p. 2). However, it is difficult for Europe to fulfil the promise of making this climate plan to become its new engine for growth, considering the importance of carbon-intensive industries (such as the automotive industry) in European economy.

4.4. The NZIA and the IRA: how do they compare?

Following Meissner et al. (2024), when looking to the climate policy setting of both EU and US, we can see that in their general they differ significantly. On the one hand, EU countries were among the first to commit to the reduction of emissions since they are part of the Kyoto Protocol. Additionally, even though the EU strategy for climate policy can encounter critics based on its broad scope, it is aligned with the recommended optimal policy, since they combine carbon price to address the environmental externality and an EI policy to combat the additional market failures.

On the other hand, US did not ratify the Kyoto Protocol and recently have been jumping in and out of the Paris Agreement. Furthermore, despite emission prices were an idea that have its origins in the US, carbon pricing schemes do not exist at a national level. To distinguish even more the two approaches, the IRA is considered by Meissner et al. (2024, p. 16) as "only a second-best policy combining environmental, social, and competitiveness aspects into one policy tool".

The IRA and the NZIA are both policy packages with "substantial financial programs to boost the development and expedite the deployment of clean, emissions-free technologies to both decarbonize and strengthen their respective economies" - however they differ in a considerable way on the instruments, technology focus, and expected environmental effectiveness (Meissner et al., 2024, p. 15).

According to Kleiman et al. (2023) the green subsidies presented on the IRA have a similar size of those from EU, differing only the subsidies for renewable energy production that are larger on EU.

They also conclude that there are significant qualitative differences between the IRA and green subsidies from the EU (that predated the IRA), highlining as main differences between them the fact that European subsidies discriminate less (since the IRA subsidies can discriminate against foreign producers), are more fragmented than the US subsidies, and are more focused on innovation and early stage deployment of new technologies while the IRA subsidies are focusing on deployment of current generation technologies.

Continuing the comparison between the IRA and the NZIA, accompanying Meissner et al. (2024) we understand that the IRA focusing on tax credits could contribute to the increasing of the competitiveness of mature technologies and contribute to the acceleration of their

deployment. Despite that, the success of this legislation to achieve the reduction of emissions is limited to the short term, since it focuses on specific and mature technologies. Additionally, the excessive use of tax credit rates could turn out to be inefficient as they use a single instrument to combat different market failures. This would happen, since there is the possibility of stacking various credit rates, meaning that "the production process may not be chosen for efficiency reasons but for financial reasons by choosing the process by which the most tax credits can be reaped" (Meissner et al., 2024, p. 17).

The authors also question "whether the IRA can achieve actual emission reductions both in the short and long term, not only due to its focus on existing technologies but also due to possible rebound effects" (Meissner, 2024, p. 18). Ultimately, even the IRA could be questioned, the enormous amount of subsidies present on the IRA can lead to the improvement of global welfare through the reduction of the cost for EIs, the increase of their take-up in a global way, and through the potential reduction of global emissions.

Looking to the EU's GDIP, and when comparing to the IRA, it is easy to see that they use a bigger amount of instruments and less technologically specific by focusing on both public procurement strategies, tax credits, grants, and competitive auctions. In other words, we can say that the EU plan "can capture a broad spectrum of technologies and is open to novel clean technologies" (Meissner et al., 2024, p. 18).

The cover of a bigger set of instruments and technologies (that are in distinct stages of maturing) used on EU's GDIP allied with a strong carbon pricing schemes and other policy and funding schemes, could turn the European approach more cost-efficient and more effective on reducing emissions.

In table 1, there is a comparison between the IRA and the European response to this act, highlighting the goals, the instruments, the existence of LCR and government procurement policies, the possible impacts on other countries, the challenges for the international economic order, and the geopolitical potential of both US and European policies, demonstrating their similarities and differences.

Table 1 - Comparative table: the IRA vs the European Response. Own Elaboration

Dimension	Intended objectives	Instruments used	Local Content Requirements & Government Procurement Policies	Impacts on third countries	Challenges for the international economic order	Geopolitical potential
IRA (US)	• Lower costs of green transition • Create jobs and strengthen US manufacturing • Lead the global clean-energy market. • Combine climate with competitiveness and justice	• Massive subsidies (≈ $370bn) • Tax credits, grants, loans, rebates, incentives • Strong local content requirements • Focus on mature technology deployment	• Strong LCRs: bonus credits tied to US labor standards, domestic assembly, and sourcing • EV credit requires North-American assembly and domestic/FTA-sourced minerals	• May divert investment to US (competitiveness/innovation spillovers) • Local content requirements disadvantage foreign suppliers • Potential WTO rule violations	• LCRs conflict with WTO rules • Large-scale subsidies distort trade • US disregards multilateral commitments	• Positions US as leader in clean-tech race • May trigger global subsidy race • Reduces dependence on Chinese imports
European Response (GDIP, CRMA, NZIA)	• Achieve climate neutrality by 2050. • Strengthen industrial competitiveness and resilience • Reduce dependence on external suppliers (China/US) • Secure critical raw materials and scale net-zero technologies	Mix of instruments: • Subsidies & tax credits (NZIA, GDIP) • Regulatory frameworks (CRMA) • Public procurement and auctions • Permiting refomrs Focus on both innovation and deployment	• CRMA: benchmarks for domestic mining, refining, processing and recycling by 2030 • NZIA: procurement & permitting reforms; state-aid "matching" allowed under TCTF	• CRMA explicitly promotes partnerships with third countries for raw materials • EU aims to reduce reliance on imports while building domestic capacity	• State-aid relaxation (NZIA/TCTF) risks asymmetry within EU • Danger of subsidy competition if not carefully managed	• Pursues "open strategic autonomy": reduce dependence on China, strengthen EU clean-tech industry, enhance resilience
Similarities	Both aim to cut emissions, create jobs, strengthen competitiveness	Both deploy public financial support (subsidies, credits, procurement) to accelerate clean tech	Both use procurement policies to support green industry and job creation.	Both have global trade and investment impacts	Both raise risk of subsidy wars and strain multilateral trading system	Both aim to strengthen strategic autonomy and reduce China dependence
Differences	**US:** focus on short-term deployment of existing tech **EU:** longer-term strategy including innovation & supply-chain resilience	**US:** concentrated on subsidies/tax credits **EU:** broader mix, including carbon pricing and regulation	**US:** explicit protectionism, subsidies tied to domestic sourcing **EU:** procurement and industrial policy less discriminatory, more rules-based	**US:** more protectionist, trade-distorting **EU:** more cooperative, engages third countries via CRMA	**US:** direct WTO confrontation **EU:** risk of internal market fragmentation	**US:** unilateral, protectionist **EU:** more cooperative, rules-based autonomy

4.5. Previous US legislations and EU reactions

Energy Policy Act (2005)

Despite being a historical legislation, as stated before, the IRA comes after a long period of time where various US presidents tried to pass climate laws. The Energy Policy Act (Public Law 109-58) from August 8 of 2005 is one example of a legislation that had already tried to expand the support for renewables energy and tried to push for a climate and environment policy (Energy Policy Act of 2005, Pub. L. No. 109-58, 2005). According to the Environmental Protection Agency (2024) this law addressed the "energy production in the US including: energy efficiency; renewable energy; oil and gas; coal; Tribal energy; nuclear matters and security; vehicles and motor fuels, including ethanol; hydrogen; electricity; energy tax incentives; hydropower and geothermal energy; and climate change technology".

Furthermore, this legislation had the goal of ensuring jobs for US future with secure, affordable and reliable energy, being the first chapters of this legislation dedicated to the energy efficiency (Title I); renewable energy (Title II); oil and gas (Title III); coal (Title IV); nuclear matters (Title VI); vehicles and fuels (Title VII); hydrogen (Title VIII) and research and development (Title IX).

In terms of instruments used, this legislation used a mix of regulatory, market-based, and financial instruments. Some of these instruments were tax incentives and credits (instruments also used on the IRA), leading to incentives for energy production as stated in section 1402:

> "A state may provide to any entity (1) a credit against any tax or fee owed to the State under a State law, or (2) any other tax incentive, determined by the State to be appropriate, in the amount calculated under and in accordance with a formula determined by the State, for production described in subsection (b)". (Energy Policy Act, 2005, § 1402)

The subsection (b) indicated that this tax incentive "shall apply with respect to the production in the State and used in the State of electricity from coal mined in the State and used in a facility, if such production meets all applicable Federal and State" (Energy Policy Act, 2005, § 1402). While it does not technically constitute an LCR, this provision, by conditioning the

incentive to the generation of electricity from coal extracted and used within the same State, can generate similar effects to an LCR, thereby operating as an indirect mechanism of favouring locally sourced inputs.

Other instruments used in the Energy Policy Act (2005) were loan guarantees (such as the "commercial byproducts from municipal solid waste and cellulosic biomass loan guarantee program", section 1510; and the "Sugar ethanol loan guarantee program", section 1516), regulations and permits (such as the "permitting for geothermal development of public lands and National Forest System lands under their respective jurisdictions", included on section 225).

As previously mentioned, the application of some tax incentives present on this legislation were conditional to certain requirements, that could be interpreted as mechanism of favouring locally sourced inputs, functioning as a disguised LCR, a policy instrument that is present on the IRA. Other policy instrument common to these two policies is the government procurement. In terms of government procurement, the Energy Policy Act had some mechanisms included, such as federal procurement mandates; and government purchasing standards. For example, regarding federal purchase requirements (section 203), from the total electric energy consumed, the Federal Government were obligated to consume, not less than 3 percent between 2007-09, 5 percent between 2010-12 and 7.5 percent from and after 2013, from renewable energy.

There does not seem to have been any significant response from the EU to this legislation.

American Recovery and Reinvestment Act (2009)

Looking back in time, we can find other US legislations that ended up using similar instruments as the ones presented on the IRA, particularly in terms of LCR and government procurement: one of them was the American Recovery and Reinvestment Act of 2009.

This legislation had the purpose of preserving and creating jobs, promoting economic recovery; assisting the ones that were most impacted by the 2007 recession; providing investments that were needed to increase the economic efficiency; and stabilizing State and local government budgets, with the intention of minimizing and avoiding reductions on essential services and counterproductive state and local tax increases (American Recovery and Reinvestment Act of 2009, Pub. L. No. 11-5, 2009).

This legislation used a variety of policy instruments such as direct government spending (such as "$24,000,000, for necessary construction, repair, and improvement activities" for

Agriculture Buildings, Facilities and Rental Payments (American Recovery and Reinvestment Act, 2009, 123 STAT. 116)); grants; loans and loan guarantees; tax incentives and transfers and social benefits (like the temporary increase of benefits under the supplemental nutrition assistance program).

Looking to this legislation, it is easy to find government procurement policy that is directly linked with a LCR, as described regarding how the funds of this legislation could be used. Indeed, as mentioned on section 1605:

> "None of the funds appropriated or otherwise made available by this Act may be used for a project for the construction, alteration, maintenance, or repair of a public building or public work unless all of the iron, steel, and manufactured goods used in the project are produced in the United States" (American Recovery and Reinvestment Act, 2009, § 1605).

When this legislation was in the US Congress, the EU had already flagged out its concerns about their policies. According to Brunsden (2009), the European Commission have "warned the US government that it may launch a legal challenge at the World Trade Organization (WTO) if the US's massive economic stimulus package" that at the time was being debated in the Congress, were "approved with a 'Buy American' provision". In its concerns there was, for instance, the fact that the legislation could "unfairly discriminate against EU businesses, because it stipulates that iron and steel to be used in infrastructure projects contained in the package must be produced in the US".

Additionally, the EU have also defended that some of the amendments on this legislation could break the international agreement on government procurement (GPA)[8] that the US had signed up. Whitin this agreement there was "a list of government bodies and agencies in each signatory country that are not allowed to discriminate against foreign competition when allocating public procurement contracts" being possible to governments to "complain to the WTO if they think a country is breaking the agreement" (Brunsden, 2009).

These concerns may have been listened by the US as in the final statement of the legislation some exceptions to the LCR were presented as conditioning the government procurement:

[8] The GPA "is a plurilateral agreement within the framework of the WTO" with the aim to "mutually open government procurement markets among its parties" establishing "rules requiring that open, fair and transparent conditions of competition be ensured in government procurement" (WTO, 2025e).

> "(1) Applying subsection (a) would be inconsistent with the public interest; (2) iron, steel, and the relevant manufactured goods are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality; or; (3) inclusion of iron, steel, and manufactured goods produced in the United States will increase the cost of the overall project by more than 25 percent" (American Recovery and Reinvestment Act, 2009, § 1605).

CHIPS and Science Act (2022)

One week before the passing of the IRA, President Biden passed the CHIPS and Science Act that had the goals of "revitalize the U.S. semiconductor industry, including increasing semiconductor manufacturing and development in the U.S. and advancing the U.S.' competitiveness in developing semiconductor technologies" while "helping the U.S. respond to the economic and national security issues resulting from the demise of the U.S. semiconductor industry, which has substantially moved to other countries over the past few decades" (Raza, 2022). With this legislation, the US aimed to strengthen the domestic semiconductor manufacturing, by investing in R&D, developing the workforce, and improving the resilience of the supply chain (CHIPS and Science Act of 2022, Pub. L. No. 117-167, 2022).

To achieve its goals, the legislation included a variety of instruments like subsidies and grants (for example, in section 102 for creating a helpful incentives to produce semiconductors (CHIPS) for America Fund; "$2,000,000,000 shall be to provide Federal financial assistance to covered entities to incentivize investment in facilities and equipment in the United States for the fabrication, assembly, testing or packaging of semiconductors at mature technology nodes"); R&D funding; tax incentives, and the development of the workforce (section 10318 dedicated to microelectronics workforce development activities:

> "The Director shall make awards under the Scientific and Advanced-technology Act of 1992 (…) to support programs for skilled technical workers in STEM[9] disciplines that are aligned with skilled workforce needs of microelectronics industry and lead to an associate's degree, or equivalent certification, by providing funding and other assistance, including opportunities for internships and other hands-on experiences in

[9] STEM – Science, Technology, Engineering and Mathematics

> industry related to the students' microelectronics studies" (CHIPS and Science Act, 2022, § 10318).

Looking deep into this legislation we can find evidence of LCR policies. Examples of this policy can be found in section 103 for semiconductor incentives, more particularly on subtopic (e) for "additional assistance for mature technology nodes", defining that for an entity being eligible need to have certain requirements:

> "In order for an entity to qualify to receive federal financial assistance under this subsection, the covered entity shall agree to (…) (i) provide equipment or materials for the fabrication, assembly, testing, or packaging of semiconductors at mature technology nodes in the United States; or (ii) fabricate, assemble using packaging, or test semiconductors at mature technology nodes in the United States". (CHIPS and Science Act, 2022, § 103)

In this section is also clear that the funds need to be exclusively used in the US soil as "no funds made available under this section may be used to construct, modify, or improve a facility outside of the United States", restricting their use to the production on US (CHIPS and Science Act, 2022, § 103).
Also in section 103, dedicated to the semiconductor incentives, there was a clause that restricted the expansion of the entity that would use the funds concerning this legislation to other countries:

> "On or before the date on which the Secretary awards Federal financial assistance to a covered entity under this section, the covered entity shall enter into an agreement with the Secretary specifying that, during the 10-year period beginning on the date of the award, subject to clause (ii), the covered entity may not engage in any significant transaction, as defined in the agreement, involving the material expansion of semiconductor manufacturing capacity in the People's Republic of China or any other foreign country of concern". (CHIPS and Science Act, 2022, § 103)

This legislation also included government procurement policies, that can be found on section 10263, the goal being to promote the domestic production of technologies developed under

the manufacturing USA program, or when one of the policies established to promote the domestic production of technologies developed on US consisted on "measures to prioritize Federal procurement of goods, services or technologies developed by the Manufacturing USA Network activities from domestic sources, as appropriate" (CHIPS and Science Act, 2022, § 10263). Other example of this policy is presented on section 103, when it states that:

> "In awarding Federal financial assistance to covered entities under this subsection, the Secretary shall (i) give priority to ensuring that a covered entity receiving financial assistance will (I) manufacture semiconductors necessary to address gaps and vulnerabilities in the domestic supply chain across a diverse range of technology and process nodes; and (II) provide a secure supply of semiconductors necessary for the national security, manufacturing, critical infrastructure, and technology leadership of the United States and other essential elements of the economy of the United States; and (ii) ensure that the assistance is awarded to covered entities for both advanced and mature technology nodes to meet the priorities described in clause (i)". (CHIPS and Science Act, 2022, § 103)

As a reaction to the US CHIPS and Science Act of 2022, the EU launched on 21 of September of 2023 the European Chips Act to "bolster Europe's competitiveness and resilience in semiconductor technologies and applications, and help achieve both the digital and green transition". With this Act "the EU will address semiconductor shortages and strengthen Europe's technological leadership" mobilising "more than € 43 billion of public and private investments and set measures to prepare, anticipate and swiftly respond to any future supply chain disruptions" (European Commission, 2025b).

Additionally, the EU intensified the cooperation with the US through the EU-US Trade and Technology Council (TTC). The "cooperation in the TTC has been pivotal for the prompt and coordinated deployment of export controls on advanced technologies against Russia", and in order to improve the cooperation, both the EU and the US "agreed to launch a pilot exchange of information on specific EU exports to the US and vice versa" with the goal of "simplify transatlantic trade with regard to exports and re-exports of dual-use items and technologies while ensuring appropriate safeguards against misuse" (Szczepański, 2023).

The US also used the cooperation of the EU trough the TTC to boost their economic security, through the diversification of their "strategic supply chains, including solar panels,

semiconductors, and critical raw materials, and to reduce vulnerabilities, including those caused by other countries' non-market policies and practices" (Office of the USTR, 2024).

After these reactions and with the end of negotiations between the President of the European Commission and President Trump around the questions of tariffs, the EU agreed to buy "at least $40 billion worth of US AI chips for its computing centres" European Commission (2025c).

In table 2, a comparison of these three legislations is presented, focusing on their goals, instruments used, on LCR and government procurement policies and when was the case, the EU response to the legislation.

Table 2 - Resume of prior US legislations and EU reactions (own elaboration)

Legislation	Objectives	Instruments	Government Procurement	Local Content Requirement	EU reaction
Energy Policy Act (2005)	Energy security, affordability, reliability and diversification	Tax credits; subsidies, loan guarantees, regulations, standards, grants	Mandates for renewable energy, efficient products, alternative fuel fleets, and petroleum reserve expansion	Incentives favored domestic producers	- No direct response from EU to this legislation
American Recovery and Reinvestment Act (2009)	Stimulate the economy, create jobs, support states, and invest in infrastructure/energy	Tax incentives, grants, and loans guarantees	The rules to apply the funds ensure stimulus spending favors U.S. goods	Explicit Buy American requirement for steel, iron, and manufactured goods	- EU strongly opposed, calling WTO violations - Opened diplomatic consultations with the US - Pushed at the GPA-WTO for waivers and access
CHIPS and Science Act (2022)	Boost domestic manufacturing, R&D, worforce, and supply chain resilience	Grants, subsidies, tax incentives, R&D fundings, workforcce progrmas	Government preference for domestically produced chips in federal procuremeent and defense supply chains	Subsidies conditioned on US manufacturing; restrictions on expanding capacity in "adversary" countries	- Adopted its own European Chips Act (2023) - Intensified cooperation through the EU-US Trade and Technology Council

4.6. Could the NZIA be more comprehensive?

Following the work of Kleiman et al. (2023), there are some things that should be done to improve the climate policy of EU. On the one hand, the authors affirm that the EU needs to start to work on the development of a broader EU strategy for green industrial policy, moving beyond the NZIA scope. On the other hand, they defend the need of rebooting NZIA, making it more efficient and minimizing the risk of unintended consequences. When rebooting the NZIA, the EU should refocus the objectives, sharp the instruments used, improve its governance and add financial incentives to ensure implementation.

In the refocusing of the objectives, according to Kleiman et al. (2023), EU should forget the

40% domestic manufacturing target replacing it with other KPI[10] that is able to capture the trend and resilience effects of cleantech investments, measuring the success of this legislation with the premise of whether these makes Europe both more resilient and competitive.

To Tagliapietra et al. (2023, p. 8) yet in the objectives, the EU legislation should "adopt a technology-neutral approach instead of cherry-picking specific technologies" with the intention of include the technologies of today and of the future that could contribute to reach the EU climate, resilience and competitiveness goals.

Regarding the sharpening of instruments, EU would need to make sure that the legislation can deliver on the goals of streamlining permitting, since even though it might not be the biggest barrier to the development of cleantech manufacturing, it is still a useful instrument. Alongside of this, both Kleiman et al. (2023, p. 3429) and Tagliapietra et al. (2023, p. 9), defend that the NZIA needs to be bolder on strategic public procurement, since "the 10 percent cost-gap safeguard included in the proposal (allowing the procuring authority to choose the cheaper bid, even if it has a lower sustainability score, if the cost gap exceeds 10 percent) will likely make this step irrelevant". Some ways of doing are linking the sill of the cost-gap safeguard to the sustainability and resilience score of a bid to a new maximum and partially subsidise the difference between the cost of the chosen bid and the bid with less cost.

To make the new version of this policy more effective, the new NZIA would also require a stronger governance and the right financial incentives. The first point is linked with a key challenge when we speak about de development of an EU green industrial policy, which is coordination. This vision is shared by Veugelers et al. (2024, p. 16) when they consider that one point of improvement on NZIA is to create "a highly competent and empowered governance body" like President Biden did when appointed John Podesta "with a mandate to oversee the implementation of the Inflation Reduction Act's clean energy and climate provisions". This would be made with the aim of ensuring a "top-level coordination and steering of the overall process" which is considered as "vital for the longer-term socio-economic and political sustainability of the European Green Deal and its core aim of being Europe's new "growth strategy"". Alongside this, the strong governance is necessary "to monitor and evaluate which NZIA policy interventions work and which do not, measured against the KPI of growing private cleantech investment" (Kleiman et al., 2023, p. 3429).

[10] KPI - Key Performance Indicator

Beyond the need of a stronger EU green industrial policy governance, Veugelers et al. (2024) defend that is necessary to renew at the level of EU the support for public-private clean-tech ecosystems at the EU scale; new support programs for green innovation at the level of EU; leverage private investments; and leverage the single market as a critical EU policy tool.
The need of new support programs for green innovation to make a better European Green Industrial Policy is defended by Veugelers et al. (2024, p. 17) when they refer that even though the portfolio to funding instrument is already sizable, there "are still gaps in public funding at EU level to be filled". Following this, "the green part of the EU Sovereignty Fund (NZIA-Fund) should be a cornerstone of a rebooted green industrial policy" being designed to:

> "(i) Focus on supporting the development and scaling of pan-European public private ecosystems; (ii) support the whole innovation cycle of clean tech, from disruptive innovation to deployment at scale; (iii) prioritize areas where market, network, and transition failures are most likely and government selection failures least, ensuring additionality and leveraging other public and private funding; (iv) provide support in a relatively non-bureaucratic way to unleash high risk/high return ideas; (v) fit within a portfolio of funding instruments, which is well balanced between top down and bottom-up solicited projects; (vi) compatible with the subsidiarity principle, fit with member states initiatives" Veugelers et al. (2024, p. 17).

Finally, EU "needs to preserve the power of its competition policy toolbox to avoid incumbency, protectionist, and rent-seeking traps, if it wants to have reasonable chances to leverage private investments in the EU to reach its green ambitions" (Veugelers et al., 2024, p. 21).

5. Conclusions

The IRA was by far the most significant US legislation that tried to combat the effects of climate change, having enormous amounts of incentives to try to put US on the right path to achieve the carbon neutrality by 2050. Included in such incentives, there were instruments that, as referred by several authors, had a big protectionist vision, namely LCR (present on the production of EV batteries for example).

As expected, the EU has reacted to this legislation, having simultaneously motives to congratulate and to be worried about. On the one hand, the fact that the US have enacted into law such legislations, made some European leaders enthusiastic, since they saw the US taking a more climate friendly approach. On the other hand, Europe feared the impact of the protectionist instruments included in such legislation.

The acceleration of the implementation of the GDIP by the EU may be seen as a response to the passing of the IRA. With this action, the EU, while trying to strengthen the EU strategic autonomy and build domestic value chains in green tech and critical raw materials, used public procurement with less discrimination against imports, making their position closer to the WTO rules.

These differences make the US legislation more protectionist, leading to a situation somehow close to the risk of a trade war, being a direct confrontation to the WTO. Despite the fact that with Donald Trump, the legislations suffered a major setback, the risk of a trade war is still present, but mainly linked to other reasons, as the US president decided to impose high unilateral tariffs to several countries (EU included).

The study of the three prior US legislations has also brought some value to the discussion. Starting with the analysis of the Energy Policy Act of 2005, this legislation ended up showing that, while being historic, the IRA was not the first US legislations that touched climate maters, having mandates for renewable energy. Despite having a certain environmental focus, this legislation differentiates from the IRA on the instruments that used, especially the LCR. On the Energy Policy Act of 2005, there was not a classic LCR policy (despite the policy presented could bring the same results that a classic LCR), making the instruments on this legislation less discriminatory. This may be one of the reasons explaining why there has been a direct reaction by the EU to such legislation.

In contrast, the American Recovery and Reinvestment Act of 2009 included a major "Buy American" clause, applied to steel, iron, and manufactured goods, constituting a clear LCR).

Looking to this, the EU have responded, opposing this "Buy American" clause and claiming it as a clear violation of WTO rules. Despite this, no case was presented to the WTO, being a probable reason the fact that the US relieved the clause, allowing for some exceptions.
Finally, the CHIPS and Science Act of 2022, that aimed (among other things) to boost the American production of semiconductors and to boost the resilience of the supply chain, had both LCR and government procurement policies. These policies that tried to bring manufacturing back to the US, made the EU adopted its own Chips Act in 2023, while trying to intensify the cooperation with the US trough the TTC.
Looking to the EU reaction to these legislations, it was clear that in a certain way the reaction did not vary too much from the reactions that occurred to one or other of them. For example, the claiming on the violation of WTO rules that occurred as a reaction to the IRA also happened in the enactment of the American Recovery and Reinvestment Act.
While at the time, the exceptions that were presented on the American Recovery and Reinvestment Act may have led the EU not to present a complain with the WTO, the non-presentation of a claim with the WTO upon the IRA enactment may have other reasons. On the one hand, the negotiations took a long way and did not present any conclusions. On the other hand, the non-operation of the dispute settlement in the WTO, together with a lack of provision for the operation of this body, may have led the EU to abandon such idea. Indeed, the EU could in fact present a complaint in the WTO, but the possible resolution of this "trade conflict" could never happen, especially now with the modifications on the IRA dictated by President Trump.
Other example is the reaction to the IRA with a European program (the GDIP, that have the NZIA and the CRMA as central pieces of it). The response to an American program with a European program has also happened as a reaction to the CHIPS and Science Act of 2022 (with the European Chips Act of 2023).
Going further on the analysis and linking it some major elements from the literature, the protectionist vision present on the IRA may in some sense be justified by some of the arguments in favour of protectionism. The policies present on the IRA, like stated before, has positioned the US on the right path to achieve the carbon neutrality by 2050, which would bring to both US citizens and the rest of the world, externalities through the reduction of emissions, combating climate change. This view is directly linked to the arguments of market failures and national security, since as result of the actions taken in the IRA, the US may be combating negative externalities (such as pollution) through incentives to use renewable

energy and electric vehicles, which in certain way ends up protecting their citizens.

Additionally, and following the fact that the US is a big economy, the incentives to dislocate production to US soil would help to develop the US industry in those sectors. At first side, this could be seen as a loss of efficiency. However, if the dislocation comes from a region that does not respect climate commitments and moves to one where such efforts are respected, there would be a net gain through positive externalities. This vision would be supported by both market failures and (in some way) infant industry arguments.

However, the EU reaction to the IRA shows that is possible to produce a climate law with instruments that are less discriminatory, being less protective than the American legislation. Alongside this, the US Energy Policy Act of 2005 demonstrated that to make a climate legislation, it may not be necessary to use a more protectionist vision, or at least, that the existing protectionism does not have to be highly discriminatory. These two cases would make the point that is possible to combat climate change without following a protectionist path.

Despite these relevant conclusions, this study has some limitations, that could also open the door for future research.

First, the changes that were included on the IRA may not be concluded, as President Trump can at any moment revoke any policy presented on the legislation (despite the possibles lawsuit that may occur to try to prevent them, and the fact that the EU would probably never change the programs that has already set in motion).

Secondly, the analysis of prior legislations did not bring a huge light to this study: however, a study that focused mainly on the EU reactions to US legislations could bring more results.

Thirdly, the fact that the IRA has only three years, made a quantitative analysis almost impossible. However, in a few years, a quantitative assessment of the impacts resulting from the IRA and the European reactions will be possible, allowing to conclude which of the two would have produced more positive net structural effects.

Lastly, like other authors refer, when we speak about environmental innovations and climate actions, we also refer to market failures, which could lead us to the question that if we want to have a more environmentally friendly policy (to combat climate change, to either help companies to become more eco-friendly and dislocate the global value chains to other countries that comply with the rules, it may neither be necessary nor efficient to adopt a more protectionist vision.

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