

What's Net-Zero? Strategic Green Technology Identification in the European Net-Zero Industry Act

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Abstract

How do policymakers decide which technologies merit strategic support in the European Union's (EU) emerging green industrial strategy? Despite a growing literature on the EU's turn towards green market interventionism, the processes through which green technologies are selected for support remain insufficiently understood. Building on the concepts of state capacity and politicization, this article examines the European Commission's capacity to strategically steer the formulation of green industrial priorities through a case study of the Net-Zero Industry Act, the EU's flagship initiative adopted in June 2024 in response to the United States' Inflation Reduction Act. Using process tracing based on document analysis and 10 semi-structured interviews with EU policymakers and stakeholders, the article investigates how the list of technologies defining the scope of the Net-Zero Industry Act was constructed and negotiated. It shows that the Commission's attempt to focus the legislation on a narrow set of mature clean energy technologies eventually failed, as interest mobilization and political engagement from the Council and the Parliament led to an expansion of the list. The article thus argues that under conditions of highly politicized policymaking, internal state capacity becomes less decisive for shaping strategic technology identification, as decision-making tends to shift away from analytical and methodological considerations towards coalition-building and compromise. These findings contribute to academic and policy debates on the political economy of state intervention for the green transition by highlighting how political factors shape the EU's ability to define green technological priorities and shedding light on the role of the Commission in this context.

Keywords

European Union; green industrial policy; net-zero transition; strategic autonomy; technology support

1. Introduction

The adoption of the Inflation Reduction Act (IRA) by the United States (US) in August 2022 led to a wave of panic and existential questioning in the European Union (EU). By introducing industrial policy provisions of local content requirements for electric vehicle components and final products, the IRA threatened to divert strategic investments away from Europe, as well as exposed the contrast between the US and EU approaches to decarbonization (Bown, 2023; Kleimann et al., 2023). In early 2023, the European Commission presented the Green Deal Industrial Plan as the common European response to the IRA, with at its core the Net-Zero Industry Act (NZIA; European Commission, 2023a, 2023d). The NZIA, adopted in June 2024, marked a significant shift in the EU's green industrial policy trajectory. For the first time, the EU explicitly sought to increase its domestic production of a predefined set of "net-zero technologies," signaling a break from long-standing commitments to technology neutrality and horizontal industrial policy instruments (Veugelers et al., 2024).

This development raises a fundamental question: How are strategic technologies identified for support in the EU's green industrial policy? Existing research has actively engaged with Europe's shift towards a more interventionist role, conceptualized as the rise of a derisking state (Gabor, 2023), investment state (Lepont & Thiemann, 2024), or emerging developmental state (Di Carlo & Schmitz, 2023). Within this broader shift, scholars have shown that the European Commission has expanded its role from regulator to market shaper, leveraging industrial policy instruments to steer investment towards strategic priorities and to coordinate industrial ecosystems (Bosticco & Herranz-Surrallés, 2024; Bulfone et al., 2026; Di Carlo & Schmitz, 2023; McNamara, 2024). However, less attention has been devoted to the processes through which sectors are selected for strategic support (Lepont & Thiemann, 2024). Exploring the mechanisms shaping these decisions is crucial, as the very definition of what counts as "strategic" or "green" constitutes a key arena of political contestation (Altenburg & Rodrik, 2017; Leach, 2015; Lepont & Thiemann, 2024).

This article builds on scholarship on state capacity and politicization to investigate the conditions under which strategic green priorities are formed, contested, and negotiated within the EU multi-level polity, with particular focus on the ability of the Commission to steer these processes. This ability is conceptualized as dependent on two dimensions of state capacity for strategic identification (Seidl & Wuttke, 2026): an "internal" capacity to generate, interpret, and validate technical and economic knowledge about technologies, and an "external" capacity to build consensus and cooperation around strategic priorities. However, the balance between internal and external state capacity is unlikely to remain constant once strategic identification becomes highly politicized. In the EU, politicization manifests along two main dimensions: interest mobilization, through intensified pressures from competing advocacy coalitions that raise controversy over technology choices, and political engagement, with the growing involvement of more explicitly political actors and bodies in processes of strategic identification (De Wilde, 2011). Under such conditions, decision-making tends to shift away from analytical and methodological considerations towards coalition-building, compromise, and the management of distributive conflict. Accordingly, internal state capacity plays a decisive role in strategic identification primarily under conditions of low to moderate politicization. Building on these insights, the article theorizes that the Commission's ability to steer the identification of green industrial priorities is dependent on both internal and external state capacity, with variations under conditions of politicization. When either interest mobilization or political engagement from the Council and the Parliament is high, the Commission shifts from a steering role towards a

brokering mode—when both are high, its capacity to shape strategic identification outcomes becomes strongly constrained.

Drafted under time pressure in response to global industrial competition, and negotiated during strong political momentum, the NZIA offers a particularly well-suited case to investigate these dynamics. Through a process tracing analysis informed by institutional documents and 10 semi-structured interviews with EU policymakers and stakeholders, this article reconstructs and analyzes how the list of net-zero technologies in the NZIA evolved from the Commission’s targeted proposal of eight strategic technologies in March 2023 to a total of 19 net-zero technologies in the regulation adopted in June 2024. The analysis shows that the Commission’s capacity to steer the scope of the strategic identification of green technologies was eventually circumscribed by intense industry mobilization around the benefits of being included in the NZIA scope, coupled with high engagement from the Council and Parliament, both of whom expanded the NZIA scope to reflect national energy preferences, political majority-building, and broader industry demands. The final outcome is a single, far-reaching list of 19 technologies, which neutralized the Commission’s initial prioritization and blurred the strategic focus of the Act. Eventually, the limited analytical basis for the Commission’s initial list had little influence on the outcome, as debates over the legislation’s scope were primarily shaped by political considerations rather than by data or technical discussions.

These findings contribute to a deeper understanding of the political economy of European green industrial policy in a “geo-tech” world, marked by both new constraints and strategic opportunities (Bora et al., in press). First, by theorizing the interaction between internal and external state capacity for strategic identification under conditions of politicization, this article contributes to the emerging literature on how political factors shape new patterns of economic interventionism (Di Carlo et al., 2025; McNamara, 2024). Moreover, the article sheds light on whose terms the European green transition is unfolding by illuminating the political contestation surrounding green technology selection. This contestation reflects broader tensions in the EU’s green transition trajectory, particularly between the Green Deal’s initial just transition objective and the recent turn towards derisking, supply chain securitization, and competitiveness-oriented industrial strategies (Adler & Wargan, 2022; Crespy & Menz, 2015; Gabor, 2023; Laurent, 2021; Vezzoni, 2023; Wigger, 2024).

The article proceeds as follows. Section 2 situates the NZIA within the broader shift from technology neutrality to a more targeted form of EU green industrial policy and elaborates the theoretical framework for explaining strategic green technology identification processes in the EU. Section 3 outlines the empirical approach and data. Section 4 presents the case study analysis of the construction and negotiation of the NZIA list of technologies. Section 5 concludes by discussing the implications of the findings for the challenges and opportunities facing EU industrial policy.

2. The Strategic Identification of Green Technologies in EU Industrial Policymaking: Evolution and Theoretical Framework

European green industrial policy has traditionally emphasized horizontal coordination instruments and limited vertical interventions to cases of clear market failures or early-stage supply chain needs, while avoiding privileging particular technologies. This section briefly documents the EU’s evolution from this model towards a more interventionist, technology-specific approach with the NZIA, before outlining the theoretical framework used to explain the recent rise of strategic technology identification in the EU.

2.1. From Technology Neutrality to the Strategic Identification of Green Technologies

For decades, the EU's market-making strategy centered on principles of competition and openness, relying mostly on market mechanisms to allocate resources, credit, and production (McNamara, 2024; Moschella & Quaglia, 2025). In green industrial policy, this materialized into a reliance on horizontal policy instruments, with only limited vertical interventions aimed at correcting environmental market failures. Such interventions were guided by the principle of technology neutrality, under which regulation is designed to avoid privileging or discriminating against specific technologies, instead focusing on their functions and outcomes (Ojanen, 2025). From the late 2000s onwards, the Commission gradually complemented this horizontalism with a more targeted and interventionist approach, particularly in areas linked to the green transition, such as renewable energy or decarbonization projects (Bulfone et al., 2026). The Commission's 2012 industrial policy strategy, for example, underscored the importance of clean production and green manufacturing technologies but largely confined itself to coordination and horizontal measures to foster the functioning of the internal market (see European Commission, 2012). The European Fund for Strategic Investments (EFSI) was launched shortly after under the 2014 Juncker Plan, with the idea that investment needed to be mobilized in "strategic" sectors. Still, the EFSI effectively supported projects across a wide range of domains, including energy and research, without any sectoral pre-allocation (Council of the EU, 2015; European Commission, 2014). Its successor, the InvestEU initiative introduced in 2020, similarly prioritizes projects which explicitly address demonstrated market failures or suboptimal investment situations (Regulation (EU) 2021/523 of the European Parliament and of the Council of 24 March 2021, 2021; Wigger & Lavery, 2026).

By contrast, the EU's energy research and innovation strategy has historically been more interventionist. It deviated from technology neutrality to support specific low-carbon technologies based on energy priorities, justified within a logic of market failure correction and a focus on early stages of the supply chain. The Innovation Fund, established in 2003, for instance finances "highly innovative technologies and flagship projects within Europe that can bring about significant emission reductions" (European Commission, n.d.-b). Without pre-identifying eligible technologies, the Fund relies on five selection criteria: emissions avoidance, innovation, maturity, replicability, and cost efficiency. The 2008 EU Strategic Energy Technology Plan (SET Plan) went further by identifying technology-specific innovation systems for low-carbon energy (Prontera & Quitzow, 2022), though this shift remained largely confined to research, development, and demonstration activities, and was justified by the presence of high market barriers (Eikeland & Skjærseth, 2020).

In recent years, however, geopolitical competition and supply-chain concerns have pushed EU industrial policy further towards the direct promotion of domestic production of low-carbon technologies (Bora et al., in press; McNamara, 2024). The 2020 New Industrial Strategy for Europe (and its 2021 update) called for strengthening Europe's industrial capacities in strategic sectors, including green and digital technologies (Veugelers et al., 2024). It laid out the policy framework to domestically produce "strategic" technologies, including clean technologies, and announced the launch of several technology-specific strategies and alliances (European Commission, 2020). These initiatives have coincided with a broader discursive reframing of decarbonization as not only a climate necessity, but also an economic opportunity and strategic priority in an increasingly competitive geoeconomic environment (Tagliapietra & Veugelers, 2023; Terzi, 2023; Vakulchuk et al., 2020). This narrative is well illustrated in the Draghi report, which describes clean technologies as "the new oil" (Draghi, 2024, p. 116).

In reaction to the US IRA adopted in August 2022, the European Commission's proposal for the NZIA in early 2023 took the promotion of domestic production of clean energy technologies several steps further (Veugeliers et al., 2024). The NZIA departs from the EU's traditional focus on technology neutrality and market failures by explicitly aiming to expand the EU's manufacturing capacity for a selected set of low-carbon technologies and products. Notably, it sets a target for the EU to domestically produce at least 40% of annual deployment needs for net-zero technologies by 2030 (European Commission, 2023d). Adopted in June 2024, the NZIA identifies a list of 19 "net-zero technologies" eligible for "enabling conditions" for manufacturing (Regulation (EU) 2024/1735 of the European Parliament and of the Council of 13 June 2024, 2024). These include faster and simplified permit-granting processes, facilitated access to finance with dedicated online services, and inclusion in mechanisms to stimulate public demand. In practice, a manufacturing project for a technology listed under the NZIA can benefit from priority status for administrative procedures to retrieve a permit as well as for further regulatory and judicial processes at the national level, including environmental assessments and dispute resolution.

Given the lack of precedent for such explicit technology prioritization for domestic production in the EU, the central question of this legislation becomes its scope: Who decides which technologies qualify as "net-zero" to benefit from increased administrative and financial support for large-scale production, and through which processes?

2.2. Formulating Green Industrial Policy: State Capacity for Strategic Identification Under Conditions of Politicization

While scholars have actively debated how to conceptualize emerging forms of green state intervention in Europe, far less attention has been devoted to the processes through which sectors are selected for strategic support (Lepont & Thiemann, 2024; Seidl & Wuttke, 2026). Ergen and Schmitz (2025) identify three main interpretations of the EU's shift from a regulatory state towards a more interventionist role: the derisking state (Gabor, 2023; Gabor & Braun, 2025), the investment or catalytic state (Lepont & Thiemann, 2024; Prontera & Quitzow, 2022), and the developmental state (Di Carlo & Schmitz, 2023). These perspectives emphasize different mechanisms through which state-market relations are being reconfigured in these new EU industrial initiatives, each highlighting new forms in which the EU mobilizes and coordinates public and private resources to pursue green transition objectives. Yet, this literature remains largely silent on how the EU determines which sectors and technologies warrant support, from public-private networks to intelligence-gathering exercises. As Lepont and Thiemann (2024, p. 385) point out, "the political process by which the borders of what is deemed worthy of investment are drawn constitutes in itself a research agenda."

In the tradition of scholarship on the role of the state in economic transformation, the concept of state capacity offers a useful lens for theorizing how sectors come to be prioritized in European green industrial policy. Defined broadly as the government's ability to design, finance, and implement policy, state capacity has long been viewed as a prerequisite for effective state intervention in economic development (Rueschemeyer & Evans, 1985). While its sources vary across contexts, classic accounts emphasize the importance of the state's internal organizational structure and its relative autonomy from societal actors (Evans, 1995; Rueschemeyer & Evans, 1985; Skocpol & Finegold, 1982; Weiss, 1995). Regarding autonomy, both connectedness and insulation are necessary components of state-business relationships: Governments must have access to information from industry without encouraging rent-seeking behavior (Weiss, 1995).

This echoes more recent arguments in modern industrial policy literature, highlighting how industrial policy is being shaped by the interactions between state actors and large corporations (Bulfone, 2023) and how successful industrial policy requires a balance of embeddedness and autonomy with the business sector (Mazzucato, 2015; Rodrik, 2014).

Building on this tradition, Seidl and Wuttke (2026) conceptualize “strategic identification” as resting on two dimensions of state capacity. The first one, termed internal state capacity, relates to the capacity to assess a sector’s or technology’s contribution to a public goal. In other terms, states need the capacity to collect, interpret, and validate technical and economic knowledge about different technologies. This requires methodological and analytical skills to identify and justify the prioritization of strategic technologies, as well as a balance of embeddedness and autonomy with the private sector to tap into industry knowledge while being able to independently validate this information (Edler et al., 2023; Seidl & Wuttke, 2026). The second, “external” dimension of state capacity for strategic identification relates to the necessity to construct broad coalitions for successful industrial policy. It consists in the state’s ability to build consensus and cooperation around strategic priorities and manage relationships with interest groups and external stakeholders in ways that advance policy goals (Meckling & Nahm, 2022; Seidl & Wuttke, 2026). This also requires a balance of embeddedness and autonomy, to create support among private actors while being able to independently decide when and whom to follow (Seidl & Wuttke, 2026). Taken together, the internal and external dimensions of state capacity underline that strategic identification requires a competent, embedded, yet autonomous bureaucracy.

This conceptual framework of state capacity for strategic identification, however, does not explicitly theorize the distributive implications of these processes. While both dimensions of state capacity emphasize the importance of embedded autonomy, the framework is less well equipped to account for situations in which strategic identification becomes highly politicized. Politicization is understood as a multi-dimensional process of political contestation involving increasing salience, polarization of opinion, and the expansion of actors and audiences involved (De Wilde et al., 2016). This is particularly likely in the strategic identification of green technologies, as decisions about what counts as “strategic” or “green” constitute a key arena of political-economic struggle (Altenburg & Rodrik, 2017; Leach, 2015; Lepont & Thiemann, 2024). On the one hand, the anticipated costs and benefits prompt industries facing transition risks or identifying transition opportunities to mobilize intensively through political and administrative channels (Eikeland & Skjærseth, 2020; Fontan, 2025). On the other hand, different technologies embody trade-offs between economic, climate, environmental, and social objectives, and are associated with distinct energy mixes and transition pathways, leading to broader political contestation (Altenburg & Rodrik, 2017; Sovacool, 2021). Politicization among the mass public is not considered here under the assumption that the strategic identification of technologies for EU-level policies does not necessarily lead to demands directly voiced by citizens.

Under such conditions of politicization, the balance between internal and external state capacity in processes of strategic identification is unlikely to remain constant. Internal state capacity, or the ability to generate, interpret, and validate technical and economic knowledge, is expected to play a decisive role in strategic identification primarily under conditions of low to moderate politicization. As strategic identification becomes highly politicized, decision-making shifts away from analytical and methodological considerations towards political compromises and the management of distributive and normative conflicts. In such situations, external state capacity, understood as the ability to manage contestation and construct

coalitions, becomes more decisive for shaping strategic priorities. Technical expertise continues to matter and can be deployed to justify and legitimate politically negotiated outcomes, but it becomes less influential in determining their substantive content.

2.3. The European Commission's Ability to Steer the Identification of Green Industrial Priorities

In the multi-level EU polity, the strategic identification of green industrial priorities unfolds across multiple governance levels (Seidl & Wuttke, 2026). The Commission has notably played a central role in the formulation of green strategic priorities, including through the adjustment of state aid rules aimed at encouraging decarbonization (Bulfone et al., 2026; McNamara, 2024). While limits to the Commission's ability to shape industrial policy have been identified, from resource shortages to dispersed authority (Bosticco & Herranz-Surrallés, 2024; Bulfone, Di Carlo, & Seidl, 2026; McNamara, 2024; Seidl & Wuttke, 2026), the modalities of this steering capacity and the conditions enabling or constraining it remain underexplored (Bulfone et al., in press). Building on the previous section, this article proposes a theoretical account of the Commission's ability to steer the formulation of green industrial priorities based on state capacity and politicization (see Figure 1). Importantly, the Commission is not understood here as a monolithic state actor, but rather as a constellation of Directorates-General (DGs), implying variation in steering capacity across policy domains and initiatives.

The Commission's capacity for identifying strategic technologies for green industrial policy depends on the interaction between its internal and external state capacity. This interaction is itself shaped by the degree of politicization of strategic identification processes, which is operationalized along two dimensions: interest mobilization and political engagement (De Wilde, 2011). Interest mobilization refers to the intensity with which industry and civil society actors, organized in competing advocacy coalitions, seek to influence strategic identification, thereby increasing contestation over technology choices. Political engagement captures the extent to which explicitly political actors and bodies, notably the Council's political formation, the European Parliament, and potentially national parliaments, become directly involved in contesting and shaping strategic priorities. These dimensions are not fully independent, as increasing interest mobilization often triggers political engagement and political engagement can in turn amplify interest mobilization, but they are distinguished analytically in order to capture different mechanisms through which politicization constrains strategic identification.

Different degrees of interest mobilization and political engagement are expected to lead to different outcomes (see Figure 1). In a situation of low interest mobilization and low political engagement, the Commission can mobilize both its internal and external dimensions of state capacity to steer the analytical work underpinning technology selection and the construction of support coalitions (scenario 1 in Figure 1). As interest mobilization and political engagement increase, the balance between internal and external state capacity shifts accordingly. When either interest mobilization or political engagement is high, the Commission increasingly shifts from a steering role towards a brokering mode, in which external state capacity becomes more decisive for mediating competing claims, managing conflict, and assembling coalitions capable of sustaining agreement (scenario 2). This can materialize through the anticipation of conflict when preparing legislative proposals (Blom-Hansen & Senninger, 2021; Eikeland & Skjærseth, 2020) or through brokerage during negotiations between the co-legislators (Nugent & Rhinard, 2016). Internal state capacity continues to matter, but primarily as a resource for justifying emerging compromises rather

than for structuring strategic choices. Finally, when both interest mobilization and political engagement are high, strategic identification becomes highly politicized, and the Commission's steering capacity is strongly constrained even in its brokering role (scenario 3). Intense contestation narrows the Commission's room for maneuver and shifts decision-making towards political compromises.

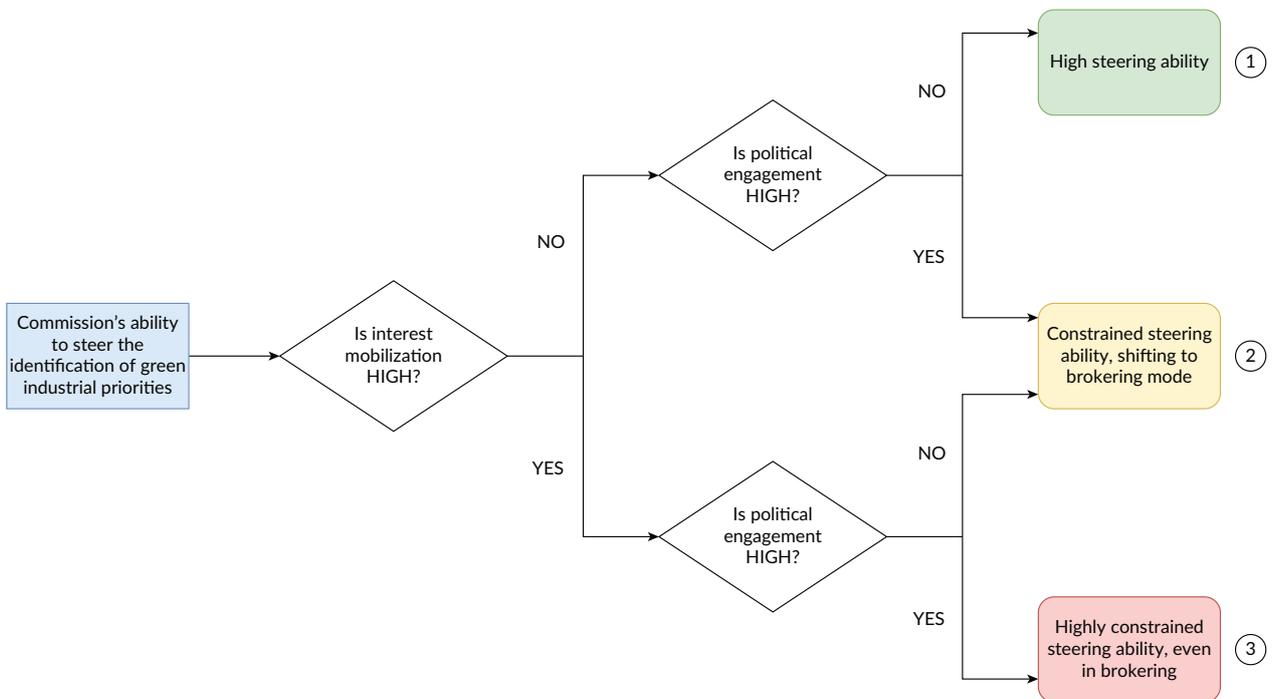


Figure 1. Theoretical expectations: the Commission's ability to steer the identification of green industrial priorities.

This theoretical framework allows for a better understanding of the Commission's role in the EU's turn towards green market interventionism by linking its internal analytical capacity and external brokering role to politicization dynamics in EU policymaking and highlighting how it navigates constraints in the complex coalitional politics of EU green industrial policy. In turn, this provides insight into how contemporary forms of green state intervention in Europe operate in practice.

3. Data and Empirical Strategy

To study the strategic identification of green technologies in EU industrial policy, this article uses a case study of the NZIA as the EU's flagship initiative to scale up the manufacturing of low-carbon technologies in response to global production shifts. Given the high political salience of the NZIA, the case also acts as a strategically useful setting to assess the modalities of Commission agency under conditions of institutional and political complexity.

The empirical strategy is based on a process tracing analysis of the NZIA policymaking process. Process tracing is used as a within-case method to analyze the process and the decision-making sequence that led to the outcome of interest, the NZIA list of technologies (Palier & Trampusch, 2018; Reykers & Beach, 2017). The analysis focuses on causal process observations that uncover the mechanisms through which interest

mobilization and political engagement shape the Commission's steering capacity for the identification of strategic technologies. In doing so, a process tracing analysis emphasizes the importance of context, as well as engages in counterfactual analysis to rule out alternative explanations (Palier & Trampusch, 2018).

Causal process observations were derived from qualitative data gathered through analysis of NZIA-related official documents and semi-structured interviews. The dataset comprises the publicly available institutional documents produced during the EU policymaking process, retrieved online, with attention given to issues of completeness and balance (Bowen, 2009). It includes Commission communications and staff working documents, public consultation responses from stakeholders, minutes and reports from the Committee on Industry, Research and Energy (ITRE) and plenary meetings of the European Parliament, Council press releases, and member states' political opinions. A Factiva (<https://global.factiva.com>) search over the timeline of interest was also conducted for background research, to enhance knowledge about context and retrieve additional information about the co-legislative process (with keywords "Net-Zero Industry Act," "Council," "Parliament," and "trilogues").

To complement the document analysis and retrieve details about the policymaking process and actors' interpretations (Richards, 1996), 10 semi-structured interviews were conducted with key actors involved in the NZIA process. These include five European Commission staff, two Members of the European Parliament (MEPs), two representatives of environmental civil society, and one representative of the Cleantech for Europe initiative (see Table 1 for an overview). Interviewees were selected based on their documented involvement in the policymaking process and subsequently identified through snowball sampling (Tansey, 2007). The anonymity of some interviewees was guaranteed to facilitate the sharing of valuable information, particularly given the timeliness and sensitivity of the NZIA. Interviews are referenced using an alphanumeric system (e.g., EC3, S2), where the letters note whether the interviewee works in the Commission (EC), the European Parliament (EP), or is a stakeholder (S).

Table 1. List of interviewees.

Code	Position	Date
S1	Representative of T&E (European Federation for Transport and Environment)	01/07/2025
S2	Representative of Cleantech for Europe	14/07/2025
EC1	Head of Unit, DG GROW, European Commission	30/07/2025
EC2	Policy Officer, DG GROW, European Commission	24/09/2025
S3	Representative of the European Environmental Bureau	26/09/2025
EC3	Policy Officer, DG ENER, European Commission	07/10/2025
EC4	Policy Officer, DG GROW, European Commission	07/10/2025
EC5	Policy Officer, DG ENER, European Commission	16/10/2025
EP1	Christophe Grudler, French MEP, Renew Group	21/10/2025
EP2	Damien Carême, French MEP, Greens/AFE (previously The Left during the NZIA timeline)	04/11/2025

The analysis covers the period from the adoption of the US IRA on 16 August 2022 to the entry into force of the NZIA on 29 June 2024, corresponding to the term of the von der Leyen I Commission (see Figure 2). Two distinct phases can be identified. Phase I spans the formulation of the Commission's proposal, from August 2022 to March 2023. Phase II encompasses the decision-making phase, with the ordinary legislative procedure

involving the European Parliament and the Council spanning from March 2023 until the adoption of the Act in June 2024. Developments related to the implementation of the NZIA after June 2024 fall outside the scope of this analysis.

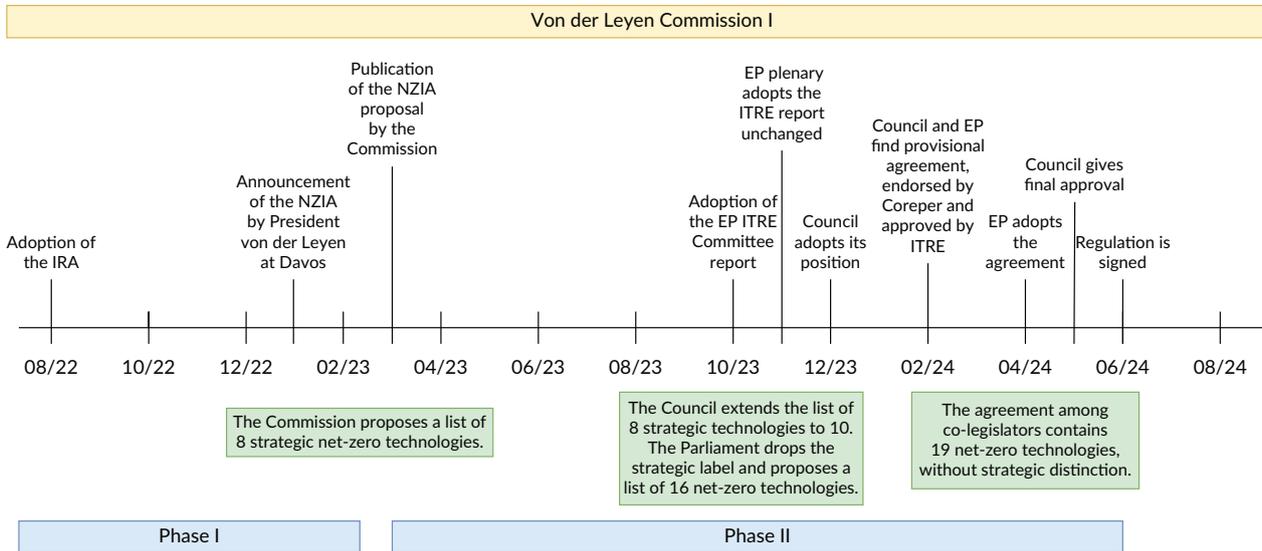


Figure 2. Timeline of the NZIA policymaking process. Note: EP = European Parliament.

4. Case Study of the Construction and Negotiation of the List of Technologies in the NZIA

4.1. A Preliminary Identification of Sectors

The adoption of the IRA by the US in August 2022 triggered a wake-up call about the state of the European clean tech industry (S1). Policymakers feared that by choosing a transition path focused on subsidizing energy, in contrast to the EU’s approach of taxing carbon, the US would attract investments, strengthen its long-term economic competitiveness, and leave the EU behind in the green tech race (Bown, 2023; EC3). In parallel, industries from a wide array of sectors mobilized, notably threatening to leave for the US unless Europe provided them with subsidies of its own (Bown, 2023; EC4). The CEO of Green Power Denmark, representing Danish companies across the green energy value chain, for instance stated that “of course, there is a risk of reallocation of investments to the US, there’s no doubt that the fear is real, and especially if we don’t act then the investments will flow to the US” (Liboreiro, 2023). The Wall Street Journal also reported plans from Tesla to put battery cells factory plans on hold, potentially shifting more EV production to the US (Elliott & Colias, 2022).

Before a legislative answer to the IRA was even discussed, the topic of which sectors should be a priority for Europe to support already made its way into the policy debate. Until early 2023, member states were not arguing for supporting any specific technology but rather discussing which type of support the EU should put forward. The conclusions of the European Council of 15 December 2022, for instance, broadly underline the importance of “an ambitious European industrial policy to make Europe’s economy fit for the green and digital transitions and reduce strategic dependencies” (General Secretariat of the Council, 2022), asking the Commission for an analysis and proposal by the end of January 2023 without already mentioning specific sectors. From the Commission’s side, the focus was put on a restricted set of clean energy technologies.

On 30 November 2022, Commissioner for the Internal Market Thierry Breton launched a cooperation platform “Clean Tech Europe” focused on five key technologies to achieve a “decarbonised and largely electrified continent by 2050”: solar, wind, heat pumps, electrolysers, and electricity grids (Kurmayer, 2022). The platform was left aside after the Commission started working on a more comprehensive legislation and funding scheme, but the signaled focus on clean energy remained consistent with the approach subsequently adopted. On 17 January 2023, Commission President Ursula von der Leyen officially announced the NZIA at the World Economic Forum, mentioning wind, heat pumps, solar, clean hydrogen, and storage as examples of “sectors crucial to reaching net-zero” (von der Leyen, 2023).

4.2. The Commission’s Preparation of the Legislative Proposal

Two months later, on 16 March 2023, the Commission officially published its proposal for the NZIA. The political momentum around the NZIA was very high, which meant that there was a lot of pressure on the Commission to deliver (EC2). The proposed legislation centered around net-zero technologies, defined in the form of a fixed list of 10 sets of technologies in Article 3(1a) of the legislation (see left table in Figure 3) that must have reached a technology readiness level of at least 8. Most importantly, a restricted set of eight more specific *strategic* technologies is identified in the Annex (see middle table in Figure 3) to benefit from additional support. Such additional measures included, among other things, priority status for reduced

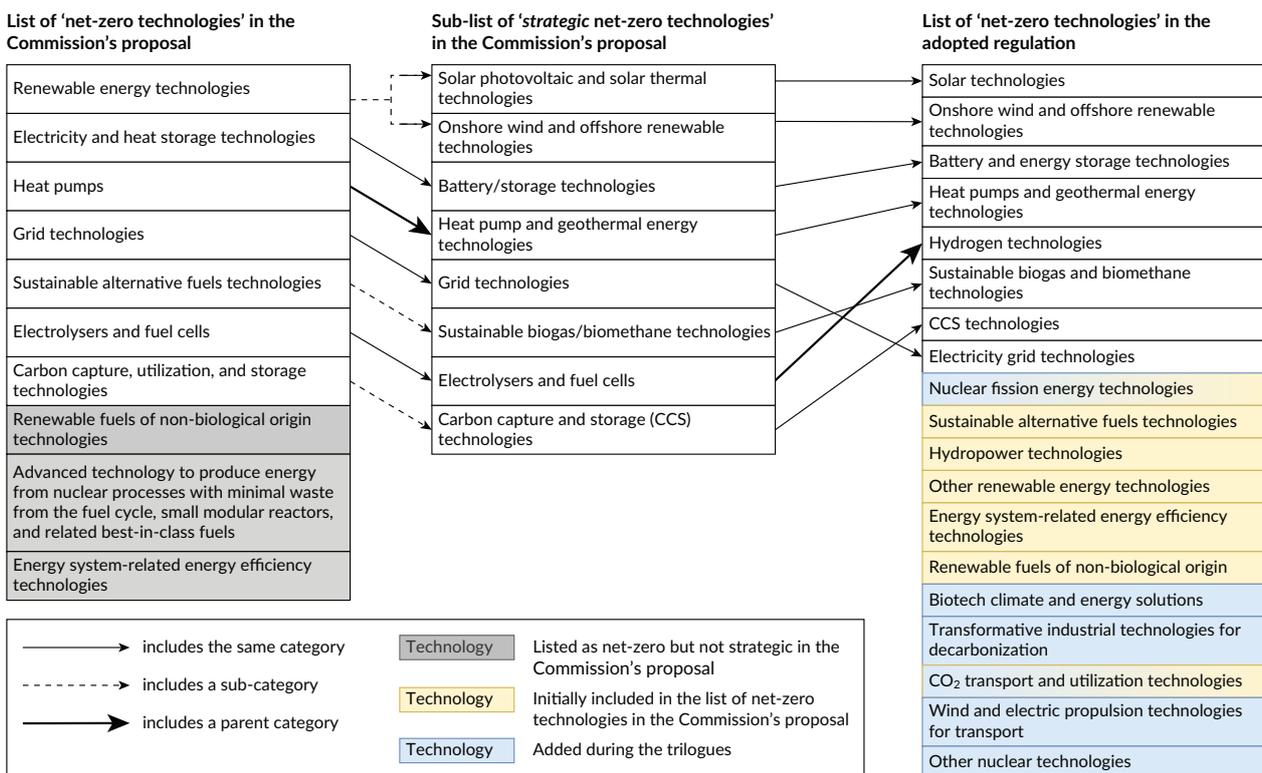


Figure 3. Lists of technologies included in the Commission’s proposal and the adopted regulation. Notes: The figure illustrates the evolution of the list of net-zero technologies in the NZIA from the Commission’s proposal to the adopted regulation; arrows indicate relationships between parent, sub-, or similar categories across the three lists; color coding highlights which technologies from the Commission’s proposal were deemed strategic or not, and were ultimately included in the adopted regulation or not; nuclear fission energy technologies and CO₂ transport and utilization technologies are coded with both colors because the initial list included a more restricted definition.

permitting waiting time and the special status of “overriding public interest”—meaning that environmental considerations would not be sufficient to reject a project. The eight technologies included in this Annex are the same ones that were already mentioned in Autumn 2022 by high-level Commission officials, focused on clean energy, with the addition of two new ones that are more controversial: carbon capture and storage (CCS) technologies, and sustainable biogas/biomethane technologies. CCS technologies are indeed part of most decarbonization strategies, but are rejected by some because of their inherent risk of large-scale contamination and their potential to further lock in combustion-based processes, whereas biofuels are objectively desirable substitutes for fossil fuels but raise some concerns about land use and biodiversity (Altenburg & Rodrik, 2017; “The EU will not become,” 2023). At first sight, the inclusion of these technologies in the NZIA list reflects a weakening of state capacity, considering these technologies’ dubious green status, contrasting with the NZIA’s climate objectives.

An array of stakeholders expressed critical views about the targeted scope proposed by the Commission. Commentators from think-tanks and civil society denounced the overly selective technology scope and lack of strategic focus, calling instead for a technology-neutral approach which would not prioritize one technology over another (Jones, 2023; Kleimann et al., 2023; Tagliapietra et al., 2023). Environmental civil society organizations complained that the list included “not-so-clean” technologies without additional safeguards, which could have included the limitation of CCS for unavoidable uses, where no other option is available to reduce emissions, or the adherence to the “do no significant harm” principle (Climate Action Network Europe et al., 2023; “The EU will not become,” 2023; S3). Reactions from industry were diverse given the variety of interests involved, yet a dominant pattern consisted of pressure from a vast range of firms seeking inclusion in the list. The Commission’s summary of the stakeholder consultation opened for feedback between 20 March 2023 and 27 June 2023 highlights that among the main feedback points were that the scope of the NZIA needed to be expanded to include, among other things, semiconductors, innovative biofuels, nuclear energy, utilization and transport of CO₂, and that the Commission should conduct an impact assessment to specifically address why some technologies were included and not others (European Commission, 2023b).

One key aspect of complaint emerging from both member states’ political opinions and stakeholders’ feedback was indeed the lack of a thorough impact assessment underpinning the Commission’s proposal. DG GROW, joined by DG ENER as co-lead one month later, was asked to draft the NZIA proposal in only two months, notably because of Breton’s proactiveness and insistence on the need for a rapid answer to the IRA (EC1; EC4). This reduced timeline, contrasting with other legislative files which can take up to years to be drafted, led to the foregoing of the Better Regulation Guidelines (EC1). These require an impact assessment to be conducted in the drafting of legislative proposals, in order to evaluate whether EU action is justified and how it should be designed based on potential environmental, social, and economic effects (European Commission, 2021). These assessments typically involve stakeholder consultations during the preparation of the proposal, and are reviewed by the independent Regulatory Scrutiny Board before being shared with the co-legislators to inform the debate on the proposed law (European Commission, n.d.-a). In the case of the NZIA, however, the Commission skipped the process of conducting an impact assessment “given the urgent need to act” (European Commission, 2023d, p. 9). Instead, it published two staff working documents—one together with the proposed regulation in March 2023 and the other in June 2023—that contextualize the choice of technologies (European Commission, 2023b, 2023c).

These staff working documents explain that the Commission's selection of strategic net-zero technologies was based on three criteria: (a) technology readiness level; (b) contribution to decarbonization and competitiveness; and (c) security of supply risks in terms of strategic import dependencies (European Commission, 2023b). These criteria align with the broad objectives of the NZIA, to scale up the production of technologies essential for the EU's decarbonization path in the context of geoeconomic competition, but their selection over others lacks objective justification (EC5). The second and third criteria, in particular, were not measured and analyzed systematically across technologies, but rather qualitatively applied case by case.

To come up with these criteria and the subsequent list, drafting teams compensated for the lack of formal analytical procedures by relying on creative research processes and exchanges with industry associations, reflecting a lack of human, financial, and time resources for evidence-based analysis (EC2; EC4; S2). Staff members undertook literature reviews of existing reports, notably using the International Energy Agency's *Energy Technology Perspectives* report, which focused on a sample of five mature clean technologies: solar photovoltaic, wind, batteries, electrolysers, and heat pumps (EC4; International Energy Agency, 2023). Data were also retrieved from commercial providers such as Bloomberg, as well as from industry associations, reflecting a structural problem of underinvestment in evidence-based analysis for industrial policy (EC2; EC4; S2). The Commission's teams also met with industry representatives, who massively mobilized to make their demands heard; some of whom had produced and shared their own reports about the state of the industry, investment needs, or manufacturing capabilities (EC1; EC4). The Commission's proposal mentions being based on "long-standing and regular contacts with industry stakeholders, Member States and trade associations and user associations" as well as "a targeted additional survey with a short deadline...with a selection of industrial stakeholder organizations from the wind, solar, battery, heat pump and hydrogen/electrolyser industries" (European Commission, 2023d, pp. 9–10). No mention is made of encounters with stakeholders from the CCS or sustainable biogas/biomethane technologies, though these sectors are also included in the strategic list. Finally, civil society was minimally included in this fast-tracked consultation process. Interviews conducted with both policymakers and civil society representatives indicate that this reflects two faces of the same coin: On the one hand, policymakers working in industrial policy do not necessarily see the value of civil society input for such initiatives, and, on the other, civil society organizations themselves are less accustomed to organizing and acting on industrial policy files (EC1; EC3; S1; S3).

While these fragmented processes laid bare the limited analytical capacity of the Commission for industrial policy generally, the scope of the legislation was eventually largely based on political choices. Several interviewees acknowledged that even in a situation where there would have been more robust analytical capacity and time to undertake a comprehensive impact assessment, the set of technologies put forward would probably not have been different—even though some other aspects of the legislation might have differed (EC2; EC3; EC5). First, selecting these eight technologies as strategic reflected a political decision by the Commission to support energy technologies that are seen as crucial for a future-proof European energy policy (EC5). This is reflected by the fact that the inclusion of nuclear power in the list of technologies was settled during last-minute discussions in the last College of Commissioners meeting before the publication of the NZIA proposal ("European Commission reduces," 2023). Moreover, one interviewee explained that the Commission operates within a densely institutionalized framework, in which the positions of member states and stakeholders on such a political file are already largely known. Given this, the Commission does not primarily need to look for additional information but rather work on making the list acceptable for all parties

(EC3). Finally, several interviewees highlighted that even with a stronger analytical basis and a more thorough impact assessment, the decision-making process would remain the same, and the list of technologies would still have ended up being debated and decided upon by the co-legislators (EC4; EC5).

4.3. *Negotiations on the List Among Co-Legislators*

While the Council and the Parliament were overall supportive of the NZIA, both co-legislators extended the scope of the legislation to technologies that the Commission had explicitly identified as not meeting its three criteria (European Commission, 2023b). In the Council, the addition of two new technologies to the strategic list reflected the accommodation of member states' different energy mixes, and—in particular—debates regarding the role of nuclear energy. In the Parliament, political entrepreneurship from the file's rapporteur, together with the need to find a majority, led to the proposal to adopt a single list, extended to no fewer than 16 technologies. In both cases, political engagement was very high, and the main determining factors in decision-making were political: While the lack of data and analytical evidence did constrain the Commission's justification of some parts of the NZIA, with regard to the scope of the list this issue was not decisive (EC1; EC4).

The list of technologies in the NZIA was quickly interpreted by some member states as an opportunity to define the energies relevant for future European energy policy. Nuclear energy was the main friction point, and positions around the table reflected the different energy mixes and industrial capacities of member states (EC2; EC5). The pro-nuclear group was led by France, and also included Slovenia, Hungary, Croatia, Bulgaria, Romania, and the Czech Republic, while Austria, Luxembourg, and Germany led the coalition fighting for a focus on 100% renewable technologies ("Inclusion of nuclear power," 2023). The fight to include nuclear centered on two main arguments: that nuclear is a low-carbon energy contributing to European decarbonization, and that member states have the right to choose their own energy mix (EC1; "Inclusion of nuclear power," 2023). This second argument also appeared in the national assemblies' responses to the NZIA, with the French Senate for instance underlining Article 194 of the Treaty on the Functioning of the European Union on member states' right to choose their energy mix to argue for an extension of the strategic list (Sénat – Commission des Affaires européennes, 2023). Notably, only the Czech Republic published a "reasoned opinion" in reaction to the NZIA, declaring a breach of subsidiarity and proportionality of the proposed regulation and arguing for the need to include nuclear energy in the list. Without success in changing the Council's overall approach, the Commission interacted on many occasions with the technical and political formations of the Council, justifying its focus on a smaller set of technologies with the argument that these were the ones that were going to contribute most to 2030 objectives as well as ones at risk of outsourcing from external suppliers (General Secretariat of the Council, 2023b; "Inclusion of nuclear power," 2023; EC4; EC5).

However, the stakes of a technology being included or not in the NZIA list were amplified by expectations from member states that such a list could be used for other EU initiatives, including ones related to funding (EC1; EC5). This was notably raised by member states in the context of the parallel negotiation for the Strategic Technologies for Europe Platform (STEP)—which was meant to provide funding for NZIA—but also for hypothetical future initiatives (EC5). These considerations led to a dynamic where not being on the list meant being potentially left out of future funding opportunities, and resulted in demands to extend the list to ensure that every member state benefited from the regulation (EC1; EC3). Even though it was not

explicitly anticipated by the Commission, the NZIA list was indeed later used as a reference for future files: The Clean Industrial Deal State Aid Framework and the Commission's proposal for a Competitiveness Fund, both adopted in July 2025, make a reference to the NZIA list of technologies for eligibility for funding (European Commission, 2025a, 2025b). Some, such as MEP Christophe Grudler (FR/Renew), are now even arguing for the NZIA list to be considered for further initiatives such as the revision of the EU Taxonomy (EP1).

The Council adopted its position on 7 December 2023, eventually adding two technologies to the Commission's list of strategic net-zero technologies: nuclear fission energy technologies and sustainable alternative fuels technologies (General Secretariat of the Council, 2023a). The inclusion of these technologies is nuanced by the following statement in the Council's general approach, reflecting the compromise found among member states:

The list of strategic net-zero technologies also includes technologies that not all Member States accept as a source of clean and secure energy. This is in line with their right to determine their choice between different energy sources and the general structure of their energy supply as well as their industrial policy. (General Secretariat of the Council, 2023a)

The Council's position also extends the definition of net-zero technologies to biotech climate and energy solutions, other nuclear technologies, and transformative industrial technologies for energy-intensive industries, and includes an Annex with a non-exhaustive list of products and components primarily used for the manufacturing of net-zero technologies, reflecting a supply chain approach. Finally, contrasting with the Commission's initial proposal, the Council's mandate includes a clause—similar to one added by the Parliament and kept in the final compromise—that asks the Commission to annually review “whether all the net-zero technologies necessary to achieve the objectives [of the regulation] are covered” (General Secretariat of the Council, 2023a, p. 95), opening the door to include other relevant technologies in the future.

In parallel, the Parliament's negotiations significantly broadened the scope of the legislation to include a unique list of 16 net-zero technologies and their components, materials, and machinery, dropping the strategic distinction (European Parliament, 2023b). Added technologies include nuclear fission and fusion energy technologies, carbon dioxide, methane, and nitrous oxide removal, capture, transport, and injection technologies, recycling technologies, as well as technologies for the decarbonization of the industry (see European Parliament, 2023b, for the full list). Two main factors drove this extension of the list by the ITRE committee in charge of the file: the entrepreneurship of the ITRE rapporteurs, and the need to find a majority during the plenary vote.

The rapporteur of the NZIA, MEP Christian Ehler (DE/EPP), pushed to scrap the “strategic” label categorizing net-zero technologies to include only one, extended list of technologies. This approach, supported as well by Renew shadow rapporteur MEP Grudler, aimed to include all technologies contributing to EU decarbonization, and to allow countries to then pick from the list the one they wanted (EP1). The “strategic” label was perceived as an arbitrary criterion from the Commission, given that its meaning would change from one country to another (EP1). As another way to define what gets in the list, MEP Ehler proposed in his draft report to use the EU Taxonomy for the scope of the NZIA (European Parliament, 2023a). By contrast, MEP Grudler favored

a more technology-neutral approach, because the Taxonomy did not include technologies he perceived as important such as sustainable aviation fuels, nuclear energy, and CCS (Taylor, 2023; EP1).

Arguments for an extended list centered on the inability of the EU to pick specific industries or energy technologies for support. Proponents of including additional technologies argued for the need to support the competitiveness of a broader range of industries in the face of intensifying global economic competition. This is reflected in interventions in the European Parliament plenary debate congratulating the reduction of bureaucratic burden, alongside MEP Ehler underscoring the necessity to deregulate permitting processes (European Parliament, 2023d):

We must deregulate. This is not a conflict with social or environmental obligations. But we must also accept and resolve conflicting objectives. We must expedite approvals. We must give net-zero technologies the opportunity to find an attractive environment in Europe. (European Parliament, 2023c, author's translation from the original German)

Moreover, arguments pushing for the extension of the list centered around the need not to dictate to member states which energies are low-carbon or not. This was underlying Grudler's fight to get nuclear included in the list, as well as similar efforts by others: A large part of the debate in the European Parliament plenary indeed focused on whether nuclear is an energy of the future or not (European Parliament, 2023c; EP1).

On the other hand, a minority of proponents of keeping a restricted list denounced the lack of priority and vision that, in their view, would lead to reduced policy impact ("Net-Zero Industry Act," 2023; EP2). Alongside the Commission emphasizing the need for a restricted list to allow prioritization (Taylor, 2023), the Greens and The Left were the main actors opposing the Parliament's extension of the list (European Parliament, 2023c, 2023d). The Left lamented the absence of strong social conditionalities, while the Greens denounced the inclusion of less mature and insufficiently proven technologies. MEP Damien Carême, shadow rapporteur for the Greens, for instance denounced the deviation from a focus on actually clean and safe technologies towards what he described as a "business as usual and techno-solutionist approach" promoting immature and unreliable technologies such as CCS (European Parliament, 2023c; EP2).

The extension of the list was eventually supported by a larger proportion of the ITRE committee: In the end, the reference to the Taxonomy was scrapped from the final European Parliament report, and a longer list of technologies were included within the NZIA's scope. This reflected the political composition of the ITRE committee, but also that of the Parliament. The need to win a sufficiently broad majority during the Parliament plenary vote was indeed put forward as an explanation for the longer list by MEP Pascal Canfin (FR/Renew; Messad, 2023). During the negotiations, MEP Grudler himself warned that there were enough pro-nuclear lawmakers in the Parliament to block the law's adoption if necessary (Taylor, 2023).

Two additional factors were mentioned during the interviews, though it remains unclear to which extent or how they ultimately influenced the legislative outcome. First, several officials noted that the Commission had significantly less access to the Parliament's internal negotiations than to those in the Council (EC2; EC5). While this asymmetry in access did not necessarily affect the co-legislators' positions, it did shape the Commission's ability to follow and potentially inform the evolving parliamentary compromises. Second, while lobbying at the level of the European Parliament falls outside of the scope of this study, such dynamics might have influenced

the Parliament's position during this pre-election period. Interest mobilization was very high, and it is ultimately up to MEPs to separate the wheat from the chaff, as noted by MEP Grudler (EP1). Taken together, these observations suggest that even in a situation where the Commission possesses embedded autonomy in its internal and external state capacity, industry pressures may still emerge and influence the process at the co-legislative stage, beyond the Commission's control.

The compromise agreement between the co-legislators, adopted on 26 May 2024, eventually included a single list of 19 technologies (see Figure 3), dropping any distinction related to technology readiness and strategic status. This compromise arguably represents a mix of the two legislators' mandates (Messad, 2024) and was decided at the political, not technical level (EC5). It nonetheless includes two nuances (EC5): first, that delegated acts will later be published by the Commission to specify which components fall under each technology; and second, that Articles 25 and 26 on public procurement procedures and auctions only apply to a sub-set of technologies.

The adoption of this extended list of 19 technologies eventually illustrates the weight of politicization in the NZIA policymaking process. While the Commission rapidly framed the scope of intervention around a core set of energy technologies, the list quickly became a central object of industry mobilization and political contestation among member states and parliamentary groups. This led to a broadening of the list of technologies to reflect national energy preferences, political majority-building, and broader industry demands, where the capacity of the Commission for identifying and validating technologies was eventually not a determining factor in the politically negotiated outcome.

5. Conclusion

The NZIA policymaking process provides an illustrative case of the political mechanisms through which green technologies are selected for support in the EU. On the one hand, it underscores the ambition of European policymakers to advance the EU's green industrial policy beyond technological neutrality, responding rapidly to a changing geoeconomic context by promoting targeted measures to scale up domestic manufacturing of a limited set of clean energy technologies. On the other hand, it highlights the constraints shaping the EU's green industrial policy design, such as the need to accommodate diverse industrial interests and national priorities. These findings contribute to broader discussions on the political foundations of European green industrial policy.

First, the analysis sheds light on the role of the European Commission in the emerging European green industrial strategy. When it came to identifying technologies for support, the Commission's proposed selection criteria were largely disregarded by the co-legislators as broader political interests reshaped the discussion. These findings contribute to better understanding the Commission's regulatory capacity for green industrial policy (Bosticco & Herranz-Surrallés, 2024; Bulfone et al., in press), and, more broadly, how political factors shape new patterns of economic interventionism (Di Carlo et al., 2025; McNamara, 2024). As politicization increases, conflict management and coalition-building become more decisive than analytical capacity for structuring strategic priorities. However, this does not suggest that the Commission's analytical capacity for industrial policy is irrelevant. Rather, it shows that political dynamics can outweigh technical considerations for setting industrial policy priorities in the current EU institutional context. Even so, the Commission should continue investing in strengthening its analytical capacities—an effort already underway

according to several interviewees (EC1; EC3; EC4). In this sense, the Commission's inability to secure its preferred outcome still generated pressure to reinforce and institutionalize its internal state capacity (Seidl & Wuttke, 2026).

These findings also speak to wider institutional trade-offs in European green industrial policymaking. The NZIA negotiations involved a large number of stakeholders and a high degree of political engagement, where every actor had incentives to add technologies to the scope list and few incentives to remove others. First, this process calls into question the realization of the objective of strategic autonomy in the EU and its interaction with the goals of economic competitiveness and decarbonization, highlighting broader tensions in the EU green transition trajectory. Moreover, while this could be seen as an encouraging sign of broad stakeholder engagement, in practice the outcome reflected a system geared more towards interest representation than collective problem-solving, leaving little room for the type of prioritization that strategic industrial policy often requires. This raises questions about how to address the trade-offs between efficiency, inclusiveness, and democratic legitimacy in the design of future European green industrial policy.

This article's focus on the NZIA as a single case, however, limits the generalizability of its findings. Future research should explore whether the limited analytical capacity of the Commission in other industrial policy files or areas has similarly limited its ability to steer purposeful action. Moreover, this study concentrates on policy formulation rather than implementation—analyzing how the NZIA's broad technology list is operationalized on the ground, such as through streamlined permitting procedures or funding schemes, would shed light on whether political dynamics in EU industrial policy actually dilute policy impact or generate new forms of prioritization in practice. Finally, while interviews and document analysis provide valuable insights into institutional preferences and strategic behavior, additional evidence—such as systematic mapping of lobbying networks, member state coordination, or bureaucratic workflows—could further illuminate the mechanisms through which priorities are formed in the EU's evolving green industrial strategy.

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