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A green industrial policy for Spain in the European framework

EsadeEcPol Insight #55 March 2025

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EXECUTIVE SUMMARY

Decarbonization, inevitable in the current context, presents an opportunity to develop technologies that drive the energy transition. While Spain has experienced a decline in its industrial sector, the shift to a decarbonized economy opens a window to reverse this trend. The goal is not just reindustrialization but doing so in high-value-added sectors that promote quality employment and sustainability.

The European Commission has implemented ambitious policies for decarbonization and industrial autonomy, such as the Fit for 55 program and the Net Zero Industry Act, recently reinforced by the new Clean Industrial Deal introduced in February 2025. These measures partially address previous shortcomings, introducing a new framework specifically for clean industry, simplifying administrative processes, and channeling up to 100 billion euros to support investments. However, uncertainties remain regarding the novelty and actual scale of this initiative, as well as doubts about the overall effectiveness of the regulations.

To overcome these limitations, we propose (building on the progress made in recent weeks, to consolidate efforts) a European-level approach focused on two pillars. **Financing and Innovation.**

On Financing:

- The central component involves promoting private investment across all industrial sectors capable of decarbonization. This approach must be:

  · Homogeneous: It should not depend on each country's budget availability to avoid distortions in the single market.

  · Privately funded at its core: To mobilize the necessary level of investment and bypass existing fiscal constraints.

- Green public procurement (in fact considered in the Clean Industrial Deal), prioritizing products and services with a lower environmental impact, can boost demand for green technologies and large-scale production, reducing costs and increasing accessibility.

- Contracts for difference to secure access to competitive clean energy and ensure stable revenue flows from emission permits would provide effective investment signals without necessarily requiring high disbursements.

- To prevent distortions in the single market, these public procurement and funding systems must be designed uniformly across Europe. Otherwise, countries with greater fiscal capacity could monopolize technologies and value chains.

IIT INSTITUTO DE INVESTIGACIÓN TECNOLÓGICA COMILLAS ICAI economics for energy

Line of research:

Green Transition

Directed by Pedro Linares

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On Public Financing:

- In line with the recommendations outlined in the Clean Industrial Deal, allocate a larger share of resources from the Emissions Trading System (ETS), which currently puts a "price" on carbon, as well as from the recently introduced Carbon Border Adjustment Mechanism (CBAM) for imports from third countries, to investments in emission reduction technologies for energy-intensive industries.
- Incorporate specific clean tech funds with a **single entry point** in the next Multiannual Financial Framework (MFF, following the logic already introduced by the Clean Industrial Deal through the creation of the Industrial Decarbonization Bank.).

On Innovation:

Turning to innovation, this industrial drive needs to be fueled by technologies that are simultaneously functional, efficient and competitive in the environment of a"technology race". To meet this challenge, we propose three key components:

1. Encourage private investment in innovation through:

· Tax incentives for reinvestment, such as deferred payment of capital gains taxes reinvested in innovative startups, prioritizing projects with high expected returns in decarbonization.

· Consolidating the Banking Union and the Capital Markets Union to create a more dynamic and large-scale European investment ecosystem.

· Expanding the mandate of the European Investment Bank (EIB) to act as a co-activator of funds for applied innovation.

2. Create a European Agency for Advanced Research Projects (E-ARPA), inspired by the U.S. DARPA, to promote disruptive innovations in clean, digital, and strategic technologies.

3. Strengthen the European Research Council (ERC) with additional resources and establish direct funding schemes for scientific institutions similar to those available for individual researchers.

National-Level Actions

This European effort must be complemented by in-depth work at the state level across three key components:

1. Improving the institutional environment:

- Establish clearer priorities.
- Promote innovation and entrepreneurship ecosystems with deeper public-private and inter-administrative coordination.
- Ensure stable, broad, long-term financing that is transparent, accountable, flexible, and minimizes bureaucracy.
- Better align energy, industrial, and innovation policies, incorporating incentives for innovation into energy and industrial policies.
- Develop measures to attract, create, and retain talent in innovation connected to industry.

2. Industrial policy to foster adoption and development of decarbonized technologies and products:

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The draft Law on Industry and Strategic Autonomy presented by the Spanish government provides a framework for green reindustrialization. While valuable, it could be enhanced by focusing more on:

- Developing more robust markets.
- Strengthening connections between Energy, Transport, and Science/Universities through more fluid spaces and protocols to combine efforts and minimize silos.
- Consider creating an **independent Industrial Development and Innovation Agency** integrated into the processes and proposals within the European framework

Introduction

The industrial sector has been losing prominence in recent decades. The problem not being the erosion of the industrial sector per se, but rather what it entails: growth that is more labor-intensive—rather than productivity-intensive—due to the allocation of resources to areas characterized by this type of dynamic, and the loss of opportunities to maintain or promote sectors that, in the long run, have proven to be critical or strategic for national and European autonomy of action.

The energy crisis triggered by Russia's invasion of Ukraine marked an additional milestone in this process, leading to a noticeable reduction in activity, particularly in more energy-intensive sectors. However, developments in the Western economic landscape over the past three years have only emphasized the importance of having domestic sectors resilient enough to withstand the shocks of an increasingly fragmented and volatile world.

In response to this decline, Europe's decarbonization objectives, correspondingly translated to the national level, pose a significant challenge: merely accepting them through the disappearance of emissions-intensive industries could deepen the problems described above. In contrast, pursuing these objectives through active decarbonization efforts could represent an opportunity to recover some of the lost ground.

First, current European decarbonization policies may erode industry's external competitiveness and reduce domestic demand. The European Emissions Trading Scheme (EU ETS) has been in place since 2008, and has restricted the amount of available emission permits, in line with the projected emissions trajectory for Europe. This resulted in an increase in the price of emission allowances which are expected to exceed €100 in this decade. In addition, the recently implemented Carbon Border Adjustment Mechanism (CBAM) has not been accompanied by protections for exporting sectors in the international market, and therefore may lead to higher domestic prices[1].

However, the transition to a decarbonized economy also presents an opportunity to develop the technologies necessary for the transition[2], in order to retain the value chains associated with these processes, and with them economic growth and employment. However, being able to produce renewable electricity (or green hydrogen) more competitively than other European countries—or to deploy decarbonized technologies—does not guarantee this retention of value chains if it is not accompanied by a framework that promotes innovation and industrial development around these processes.

The current European scenario presents a clear window of opportunity to capitalize on this moment and undertake the transformation towards a more decarbonized and competitive industry, capable

1 To understand the current European system and its problems see Linares and Collado (2022) The impact of border carbon adjustment on industrial competitiveness. https://www.esade.edu/ecpol/es/publicaciones/el-impacto-del-ajuste-en-frontera-al-carbono-sobre-la-competitividad-industrial/

2 Renewable energies, electric vehicles, sustainable construction, efficient end-use equipment, emission-free industry, etc., are all important factors in the development of a sustainable energy system

of offering quality employment to Spanish society. Harnessing this potential requires ensuring that European development policies are correctly designed, particularly in terms of common financing and equitable distribution, and that national policies accompany and reinforce these initiatives. The EU is, in any case, late: the introduction of the Inflation Reduction Act in the USA was the element that shook up the landscape in the post-invasion context, while China has been pursuing its own strategies of autonomous drive for decarbonization aligned with economic growth and strategic power for nearly a decade. To make up for lost time and achieve sustainable competitiveness, the focus should be on innovation associated with decarbonization and strategic autonomy, as the recently published Draghi Report points out.

The development of a new Clean Industrial Deal, within the framework aimed precisely at building upon Draghi's diagnosis and proposals, seeks to address part of this delay and represents at least an initial step in that direction. A step toward a direction that is also shared by the majority of Member States and ideologies, which should make it possible to achieve the desired coordination and common strategy. In other words, it is the minimum common denominator on which to build consensus. The question is what elements align this need for consensus while being able to provide real firepower to the new European industrial policy.

In this brief, we explore and propose specific levers that Spain could help activate within this window of opportunity opened by the Clean Industrial Deal, while benefiting from them precisely to reverse, at least in part, the trend observed. The ultimate goal is not reindustrialization for its own sake, but to do so in sectors that at the same time provide high added value for our economy, a more sustainable and resilient labor dynamic, and a strategic decision to anchor ourselves in the present and future demand for greater decarbonization.

European industrial policy

In recent years, the European Commission has approved several ambitious packages addressing decarbonization (Fit for 55, including updates to the EU ETS and the CBAM), energy autonomy (RePowerEU), and industrial policy (Net Zero Industry Act). Recently, in March 2025, these efforts have been complemented and expanded through the Clean Industrial Deal (CID), introducing new mechanisms and a specific framework for clean industries. These initiatives, though welcome, still face significant challenges. For instance, while the new framework facilitates permits and reduces administrative burdens, uncertainty remains regarding the scalability of the promised European funding, especially given the resistance from some countries to additional joint debt. Moreover, earlier criticism of the initial lack of concrete incentives within the Net Zero Industry Act remains partially relevant, as the CID still requires further clarity on how it will effectively coordinate and execute its objectives. Thus, although the CID partially addresses previous shortcomings, its effectiveness—like that of the other recently established regulatory measures—will ultimately depend on successful implementation.

The central instrument supporting this Clean Industrial Deal is the channeling of up to 100 billion euros toward European projects of common interest and transnational initiatives. These funds will be allocated through specific mechanisms defined in the upcoming European budget, leveraging the Innovation Fund, additional revenues from the ETS market, and expanded InvestEU guarantees. Their primary goal is to accelerate industrial decarbonization and promote European competitiveness through strategic investments clearly oriented toward the development of clean technologies in Europe.

In parallel, President Von der Leyen has announced an ambitious regulatory agenda aimed at significantly reducing bureaucratic burdens through the new Omnibus Simplification Package, targeting a 25% reduction in overall administrative burdens (35% for SMEs) and accelerating permitting processes for strategic industrial projects. Additionally, the Commission will boost internal demand by reinforcing sustainability and European-origin criteria in public procurement. Finally, to strengthen disruptive innovation, resources allocated to the European Research Council (ERC) and the European Innovation Council (EIC) will be expanded, aligning these instruments with the strategic priorities of the CID.

All these messages have been based in the recently published Draghi Report[4], which aims to restore Europe's lost competitiveness by designing a new industrial strategy that would act on three axes: innovation, competitive decarbonization, and increased external security and strategic autonomy. In Draghi's opinion, this will require a significant increase in the coordination of innovation, industrial, energy and climate change policies, a reform of governance in innovation, training and talent attraction, an alignment of trade policy and, above all, a drastic increase in the financing of these common policies.

3 See Tagliapietra et al (2023) Rebooting the European Union's Net Zero Industry Act. https://www.bruegel.org/policy-brief/rebooting-european-unions-net-zero-industry-act

4 https://commission.europa.eu/topics/strengthening-european-competitiveness/eu-competitiveness-looking-ahead_en

All these proposals are very relevant in themselves, but in addition to the fact that they still need to be developed and implemented,, there are still limitations: the first and fundamental one is the difficulty of finding the necessary financing. Efforts to implement joint debt issuing (as proposed by Draghi) do not seem to have a very positive reception especially in the Northern countries, which will probably limit common financing to pilot projects, as is already the case with the European Innovation Fund (EIF).

Related to this, there are reasonable doubts about:

- the scalability of the solutions insofar as it is not considered as a starting criterion in the launched initiatives: right now, several of these technologies in the process of market deployment are facing certain disincentives for first movers since their implementation is not sufficiently mature to scale at reasonable fixed costs, while the basic technology is;

- the creation of markets, since the development of technological innovations does not in itself ensure either supply or demand;

- the volume of funds and their distribution. The headline figure of €100 billion associated with the Clean Industrial Deal amounts to merely a quarter of what the US already mobilized under the IRA during Joe Biden's presidency. Thus, Europe risks showing up with blank ammunition to a battle fought with live rounds. Additionally, the prospect of member states having greater flexibility to invest carries both advantages and risks: while it may increase overall investment volume, without adequate balance through substantial and finely tuned distribution of European funds, it could incentivize disproportionate spending by countries with greater fiscal space, leading to future inequalities. Germany, with its intention to adjust constitutional debt brake constraints (even if primarily focused on defense), already signals such possibilities. Mobilizing these €100 billion without expanding borrowing capacity seems overly optimistic. Specifically, the Commission proposes reallocating €20 billion from the Innovation Fund, taking €25 billion from future ETS revenues (raising concerns of previously criticized "repackaging" dynamics), securing an additional €25 billion from private investors, and convincing member states to contribute another €30 billion—with the ambitious goal of leveraging an extra €300 billion in private capital (beyond the initial €25 billion).

Lastly, there is a joint fiscal limit that should not be overlooked: given the aforementioned difficulties in raising common borrowing, in order to mobilize the necessary level of investment, it will be essential to attract private investment, creating viable business models and reducing uncertainty about the profitability of decarbonization.

In short: we need foundational measures with firepower that go far beyond recent announcements; ensuring scalability, incentivizing the creation of markets, ensuring efficient distribution of funds, while circumventing existing fiscal limits. Three instruments can play a key role in this:

1. **Green public procurement to generate scale in production.** By green public procurement, we refer to a strategy through which governmental entities prioritize acquiring products, services, and works with lower environmental impacts throughout their lifecycle, always emphasizing environmental performance indicators rather than specific technologies. This approach has been reinforced by the Clean Industrial Deal of 2025, which introduces additional criteria such as supply chain resilience and a preference for products manufactured in Europe ("Made in Europe"). Implementing these new criteria strengthens domestic demand for European clean technologies, driving suppliers to scale up production and reduce costs, thereby improving the affordability and competitiveness of sustainable solutions in the market. For Spain, where public procurement represents a significant share of the economy (approximately 20% of GDP), aligning national policies with this new direction could significantly stimulate local industries. For instance, if renewable energy or public transportation tenders in 2026 prioritize European suppliers, Spanish manufacturers of wind turbines, solar panels, electric buses, or low-carbon materials could gain a competitive advantage both domestically and within the EU.

2. **Contracts for difference (CFDs) to access competitive clean energy[5].** These contracts are financial agreements in which an energy producer and a buyer (usually a government or a company) fix a stable price for electricity over the long term. If the market price is lower than the agreed price, the buyer compensates the producer; if the price is higher, the producer returns the difference to the buyer. This stabilizes the producer's income and provides energy at more competitive prices, encouraging investments in renewable energy by reducing the risk of energy market fluctuations.

3. **Carbon contracts for differences (carbon CFDs).** These are mechanisms designed to guarantee a minimum price for carbon emissions, applicable in emission permit markets. It works in a similar way to energy CFDs: if the carbon price in the market is lower than the price agreed in the contract, the government or an entity will compensate the emitter. If the price is higher than the agreed level, the issuer will pay back the difference. This type of contract provides financial stability for companies investing in low-carbon technologies, incentivizing decarbonization by mitigating the risk of fluctuations in the carbon market, These contracts have gained particular importance in the context of the EU's Clean Industrial Deal, which promotes their adoption to accelerate industrial decarbonization, especially in emission-intensive sectors.

These policies provide effective signals for investment, without necessarily requiring high outlays. In all of this, it is advisable to maintain the focus on the development of clean technologies and decarbonization where the EU still has a leadership opportunity, encouraging the integration of the European private sector. It is crucial to be rigorous in maintaining technological neutrality, since it is not up to legislators to choose the technology, but to the market and the technological solutions that emerge.

5 Ver Neuhoff et al. (2019) Building blocks for a climate-neutral European industrial sector. Climate Strategies, London.

However, the risk remains that countries with greater fiscal capacity—such as Germany, which has already launched its own Contracts for Difference (CfDs) model to support its industry—could gain significant advantages. France is also progressing with similar domestic mechanisms. It is therefore essential for Spain to strongly support a uniform European framework for these mechanisms (including carbon and energy CfDs as well as green public procurement), ensuring high standardization independent of national budget sizes. One proposed option within the Clean Industrial Deal, also suggested in the Draghi report, is the introduction of limited and adaptive local production quotas at the European level, balancing efficiency and mitigating the risk of investment leakage[6].

However, caution is necessary: the European preference must be applied carefully to avoid excessively increasing procurement costs or provoking trade retaliation. Spain, as an open, export-oriented economy, has a strong interest in ensuring that these rules comply with WTO guidelines and secure good value-for-money in public spending. The Commission appears aware of this and intends to base preferences on objective criteria (carbon footprint, resilience) rather than mere percentages of local content. Thus, These quotas should be, as Draghi describes, limited, adaptable to the production growth of our industries, and designed to balance better efficiency solutions (again, maintaining technological neutrality) and lower leakage. Spain should actively engage in designing these "green and European" criteria, contributing its experience—for example, it could propose methods for calculating embedded carbon footprints that highlight Europe's efficient industries.

The creation of private markets should be the focus, but not the only objective: a coordinated public fiscal stimulus will help to coordinate interests between countries and also to unblock "investment traps"—when the initial fixed cost is difficult for a company or sector to assume. To allocate more common public resources aimed at incentivizing decarbonized industry, it would be worth considering:

- → Allocate a larger share of revenues from the European Emissions Trading System (EU ETS), as well as from the Carbon Border Adjustment Mechanism (CBAM), to strategic investments in decarbonization technologies for energy-intensive industries. This proposal has already been partially adopted by the Clean Industrial Deal of 2025, which, as mentioned above, plans to channel part of these additional revenues into the new Industrial Decarbonization Bank. In Spain, clear potential beneficiaries would include sectors such as chemicals, paper, steel, and cement. Complementarily, progress should continue along the path established by the CID by setting stricter European rules on explicit national subsidies for fossil fuels, aiming to avoid contradictory incentives and reinforce technological neutrality..

- → Include within the next Multiannual Financial Framework (MFF) specific funding lines with a single, simplified access point dedicated to clean technology projects, following the approach already introduced by the Clean Industrial Deal through the establishment of the Industrial

6 Regarding the proposed reform of the European electricity market and its harmonization, see Chaves et al (2023). An assessment of the European electricity market reform options and a pragmatic proposal. Working Paper IIT-23-035WP and EPRG Working Paper 2305.

Decarbonization Bank. This measure would simplify access to funding for strategic industrial projects across the EU, thereby accelerating the rapid and coordinated deployment of European clean technologies and avoiding fragmentation of efforts.

Innovation for decarbonization

This industrial drive needs to be fueled by technologies that are at once functional, efficient and competitive in an environment of a "technological race" which is not limited to decarbonization; the digital and defense areas play equally central roles, and may even compete for resources. However, it should include decarbonization as one of its main goals, especially provided that technological advances can continue to find ways to reduce the trade-off between climate impact and economic growth.

Therefore, it is important to strengthen the European innovation ecosystem, which to date has not been able to compete with the USA, China or Japan. Beyond the creation of the innovation council, experts recommend reviewing policies on education, immigration, intellectual property and monopolies[7]. Here, both the Draghi report and the Competitiveness Compass make numerous proposals, mainly for coordination, increased resources and improved governance.

According to the Draghi report based on Commission data, "between 2016 and 2021, Europe produced 30% of all green inventions globally, compared with 19% for the United States and 13% for China." "The EU stands out," Draghi continues," in areas such as green transport, biofuels and wind energy, outperforming both China and the United States in many of these technologies." In all of these, Spain has a ready-made path, especially in the development and expansion of wind energy. Moreover, Draghi adds that "the EU has a strong potential for innovation in nuclear, solar, hydroelectric, geothermal and battery technologies". Spain can play a relevant role in at least two of them (hydro and, at the end of the chain, solar) and is investing heavily in the third. However, Draghi warns of China's accelerated advance on all these sectors due to the increase in patents. If we add to this the fact highlighted by Draghi that most of these innovations are low or average in R&D, we could end up in a sort of "intermediate technology trap".

To analyze the causes of this risk, both the Draghi Report and recent work on green industrial policy by ECFR (2024) and Bruegel (2023) agree on two key diagnostic points:

- Lack of sufficient investment, especially private. Total private spending on research and development (R&D), measured as a percentage of GDP, was 2.4% in the U.S. in 2021, 1.9% in China, and only 1.3% in the EU. Although part of this gap is due to sectoral differences, there is also a pervasive problem that affects all sectors: less investment overall. According to Fuest et al. (2020), approximately 40% of this underinvestment is non-sectoral in nature.

- Coordination and effectiveness in public investment. In this aspect, Europe is on a par with the US and above China in terms of resources allocated: around 0.7%. However, the problem identified by the studies is the lack of coordination, insufficient alignment with clearly defined strategic priorities and the fragmentation of our ecosystem, which reduces the effectiveness of our policies.

7 See Torreblanca y Verdi (2024). Innovate, protect, and influence: The EU's technology trilemma and how to solve it. European Council of Foreign Relations, June 2024..

Spain does not distinguish itself in any of these dimensions: our R&D investment as a percentage of GDP was 1.44% in 2022 according to the INE; of which slightly more than half comes from the private sector (10.9 billion out of a total of 19 billion euros). In other words: less than 0.8% of GDP. The levels of the public sector are more in line with European volumes, but in scientific-technical output achieved by this investment, we tend to punch below our weight. We would therefore be in a position to benefit substantially from a coordinated boost to European innovation (although, as discussed in the next section, this benefit should come with its matching contribution). This drive could begin by focusing on three components.

The first would be, again, to encourage private investment in innovation. If the main bottleneck is in private financing, the first item on the the European agenda outlined in both the Draghi Report and the Competitiveness Compass be to open it up in order to address the innovation gap (highlighted as a core goal of both). To do this, and considering the type of projects for which there is a need to boost funding—high risk, high potential return, but subject to uncertainty of results—the first step could be to establish tax incentives for reinvestment. An example could be delaying the payment of taxes on capital gains if these are reinvested in innovative startups in their early stages. This proposal, found in the Draghi Report, could be implemented by conditioning the tax rate to the nature of the project, prioritizing those with a high expected return in terms of decarbonization.

Yet the private sector needs to gain much more firepower than it would with the aforementioned incentives. In that sense, the consolidation of the Banking and Capital Markets Unions are necessary pieces to achieve a more dynamic European investment ecosystem, with scale, and less dependent on banks (which tend to make lower-risk investment decisions because of their institutional nature). In the meantime, there are at least two pieces that can be incorporated into the ecosystem at the European level that would help mobilize private funds:

1. Reduce solvency requirements for funds, insurance companies and pension plans operating in the EU to redirect investment towards projects that fit with decarbonization objectives.

2. Expand the mandate of the European Investment Bank to enable it to function as a co-activator of funds for applied innovation. The EIB has recently launched programs such as the €5 billion public guarantee scheme for the manufacture of wind power equipment. In the same vein, its focus on projects aligned with the EU's decarbonization objectives could be strengthened.

The advantage of creating and growing private innovation investment markets is that, even if a decarbonizing bias is introduced into them, their rationale is still to make profits through efficiency gains. This will help align the two objectives. However, to the extent that there are others (such as strategic autonomy) that are detached from market logic, and also grassroots innovation with applications or outcomes that are too uncertain for even the least risk-averse investor to decide to enter into them, the public sector will continue to play a role. Ideally, it should play a more powerful role than it presently does. This brings us to the two additional components, which consist of strengthening the independent innovation agencies already operating in the EU.

E-ARPA. The transformation of the current European Innovation Council (EIC) into a European Advanced Research Projects Agency, inspired by the US DARPA but encapsulating 'green' areas and not only related to the defense ecosystem, has become one of the key proposals in the context of the green and digital transition since even before the current debate cycle (Macron, 2017). This new version of the Council-turned-agency with sufficient budget would focus on promoting disruptive innovations, with a focus on clean, digital and strategic technologies, aligning with the priorities of the Competitiveness Compass. Moreover, to the extent that defense-related aspects could be included in it, it would facilitate the alignment of strategic and 'green' interests in directing them towards a single actor (which would then have to distribute priorities internally, but with a higher starting pull on the resources needed to do so).

This agency would coexist with the ERC, but with a more top-down approach, setting strategic priorities among the areas that will produce the greatest simultaneous gains in efficiency and autonomy. Its institutional setup would start with a determination of broad guidelines by the Commission to leave from there all the specification of specific objectives, selection, design and implementation of projects to an autonomous structure that combines high scientific and project implementation profile, following an autonomous approach.

By acting as a catalyst for advanced research, this European Agency could facilitate Spain's participation in high-impact projects, developing sectors such as renewable energy, green hydrogen and energy transition technologies. Spain's capacity to host large-scale research projects would be key to positioning itself as a leader in these emerging areas. Strengthening independent and robust governance is particularly important at a time when the EIC itself is catalyzing new projects. The EIC Work Programme for 2025 has allocated over €1.4 billion, catalyzing new initiatives. It includes a clear focus on strategic sectors through new "EIC STEP-UP Challenges," notably digital technologies, clean tech, and biotechnology, aligning closely with Europe's green and digital transition goals. Additionally, a further €300 million has been designated specifically for the European Innovation Ecosystems (EIE) and Startup Europe, alongside new "EIC Challenges" worth €370 million targeting areas such as generative artificial intelligence, future mobility, and climate-resilient agriculture. Strengthening independent, robust governance is especially crucial at a moment when the EIC itself is accelerating these ambitious projects, ensuring that all actions achieve their intended strategic impact.

Strengthening the ERC and adding an institutional component. Strengthening the European Research Council (ERC) with more resources and the creation of direct funding schemes for scientific institutions is another trend emerging from the cycle initiated by the Draghi Report and the Competitiveness Compass. This measure is especially relevant for Spain, which needs to increase the competitiveness and excellence of its scientific ecosystem (Mas-Colell and Candela, 2023). With more robust funding, specific programs could be created to reward not only researchers but also national research centers that prove competitive, allowing them to compete at the European level in strategic areas such as clean energy, digital technology and the circular economy. In addition, this initiative would help to retain and attract talent in Spain, aligning research objectives with the needs of the energy transition and green industrial transformation.

Additional policies at the national level

Although there is a harmonized framework at the European level to promote innovation or investment in decarbonized industry, we need an industrial environment capable of competing in this setting if we are to take advantage of this opportunity to generate growth and employment at the national level as well as strategic autonomy. In other words, it is essential to have an industry capable of developing the necessary technologies while reducing import requirements from other countries, which in turn requires two components: an institutional environment that promotes significant and disruptive innovation, as well as an industrial policy that encourages the adoption and development of these innovations.

Regarding the institutional landscape, the following fundamental recommendations, already formulated years ago but not yet implemented[8], are worth mentioning:

1. Start with a strategic analysis of innovation priorities, based on the capabilities and potentials of our country[9], which combines the capacity for decarbonization or job creation with strategic autonomy.

2. Improve the institutional design, so as to promote innovation and entrepreneurship ecosystems[10]:

a. The creation of economies of scale, joining research centers or creating networks, such as the Italian Technological Institute, or the Frontier Research Centers in the USA.

b. The effective transfer of knowledge and technology, such as that achieved in Singapore, the Fraunhofer Institute in Germany, or the Energy Innovation Hubs in the USA.

c. Coordination between administrations, research centers and industrial partners, as in the German Hydrogen Plan or the clusters of the Basque Country.

d. The modification of national agencies to make them more oriented to take risks and therefore promote disruptive innovation, fitting in with the E-ARPA project enunciated as a proposal in the previous section.

e. More agile research proposal evaluation systems, less biased towards consolidated researchers, and with less bureaucratic burden.

f. And, of course, ample, stable and long-term funding; transparent and accountable, with flexibility, autonomy, and without unnecessary bureaucracy. In Spain we are below the European average, and our public energy R&D budget per GDP is fourth from the bottom in the OECD. European funding (i.e. the Innovation Fund) is not enough: it is important to generate an additional source of national funding. And, if necessary, to prioritize by strategic sectors.

8 Conchado, Adela, Laura Díaz Anadón, and Pedro Linares, Energy Innovation in Spain: Analysis and Rec- ommendations. Policy Brief based on the 2012 Annual Report by Economics for Energy "Energy innova- tion in Spain: Analysis and recommendations". May 2013

9 One example is the exercise carried out in Suárez-Varela and Linares (2021). How to use European funds to accelerate the ecological transition. https://www.esade.edu/ecpol/es/publicaciones/fondos-europeos-transicion-ecologica/

10 Some of them have also been formulated recently in the context of the Law of Industry, see for example EsadeGeo (2024). Towards a new industrial policy for Spain in the European Union.

3. Coordinate energy, industrial and innovation policies, and incorporate incentives for innovation in energy and industrial policies.

4. Develop measures to attract, create and retain talent in innovation connected to industry.

5. Aligning Spain's industrial strategy with the EU's Clean Industrial Deal is essential to fully unlock all available benefits and resources at the EU level. In practice, this means that Spain must ensure its national initiatives align with CID priorities to access European funding and participate in joint projects. For instance, the recently announced Industrial Decarbonization Bank could finance large-scale initiatives. Similarly, the expanded Innovation Fund and specific Horizon Europe calls in industrial sectors offer opportunities Spain should leverage by submitting strong industrial R&D proposals (building upon elements of the Green Industrial Pact but now with increased funding). A concrete example: the CID includes European auctions and tenders to allocate support for projects (such as the announced €1 billion auction in 2025 for industrial decarbonization). If Spain's strategy is aligned, Spanish companies will be better prepared to submit well-structured projects, increasing their chances of success. Furthermore, strategic alignment enables Spain to influence the design of these instruments; by actively participating in European forums, Spain can advocate for criteria reflecting national strengths (e.g., recognizing the Peninsula's high renewable energy potential for hydrogen projects, potentially favoring allocations to Spain). In short, alignment means speaking the same strategic language as Brussels, opening doors to increased funding and integration into pan-European initiatives (test networks, European industrial consortia, etc.) to benefit the Spanish economy.

All of the above would put Spain in a much better position to take advantage of an eventual boost to European innovation such as the one described in the previous section.

The second component is an **industrial policy that encourages the adoption and development of these innovations** in decarbonized technologies and products. The Spanish government has recently presented the draft bill on Industry and Strategic Autonomy, which should provide answers to this challenge.

The draft bill has valuable ideas, such as the development of a Spanish Strategy for Industry and Strategic Autonomy (which would respond to the need for prioritization mentioned above), or the creation of industrial ecosystems and regulatory testbeds. However, there are also several aspects that could be improved, in particular the following three:

→ The bill continues to focus all support systems on aid, without introducing competitive mechanisms or long-term investment signals. This is particularly worrying given the foreseeable budgetary restrictions. It would therefore be advisable to work on the development of more robust markets.

→ More coordination with other closely related governmental areas (Energy, Transportation, Innovation, etc.) is lacking. One example is the disconnect between the Reindustrialization Roundtables and the Access Competitions promoted by MITERD. Deepening these connections, through more fluid spaces and protocols to join efforts and avoid 'silos' as much as possible, would strengthen the implementation of industrial policies.

- Above all, in its current wording, the draft bill does not substantially modify the institutional framework. Neither does it create an institution to streamline support and management (for example, an Agency for Industrial Development and Innovation), nor does it propose institutions to better connect innovation with industry, such as those mentioned above. It would be worthwhile to consider their development, always within the framework of institutional autonomy and embedded in the processes and proposals that take place in the European framework.

Once again, incorporating all these aspects either in a new regulation with the status of law or (to the extent permitted by our legal system) in initiatives by branches of the Executive would place Spain in a much more valuable position to take advantage of (and contribute to) the industrial drive aligned with the decarbonization that is expected, and in fact is already underway, at the European level.

Conclusions

Throughout this article, we have analyzed the challenges and opportunities that the transition to a green economy represents for Spanish industry. Decarbonization is an unavoidable process in the current context, but it is essential that Europe, and with it Spain, positions itself strategically to take advantage of the opportunities that this can generate. The reindustrialization process should not simply focus on recovering the weight of the industrial sector in the economy, but on promoting sectors with high added value, sustainability and resilience, such as those involved in the energy transition value chain. In this sense, it is crucial that national and European policies coordinate (and eventually converge), generating a favorable environment for investment in clean energy and green technologies.

Taking advantage of the opportunities for reindustrialization, growth, employment and strategic autonomy offered by the ecological transition for Spain requires, first of all, promoting a framework at the European level that encourages private investment in all industrial sectors capable of decarbonization, without creating distortions between member states based on their budgetary availability.

European policies, such as the Fit for 55, the EU ETS, and the recently announced Clean Industrial Deal, lay important foundations, but still present limitations, especially in terms of financing and coordination. The need for a homogeneous European approach, which does not depend exclusively on public resources (instead, with a central private component) or on national interests, and which is technologically neutral, is essential to avoid the concentration of technologies in countries with greater fiscal capacity. At the same time, it is also essential to have a long-term European electricity market that allows industries to have access to competitive renewable energy. So too is the consolidation of a European innovation ecosystem that combines the public and private dimensions in a way that ensures both cutting-edge research and development, focused on efficiency but with public backing available when the market does not dare to enter. The institutions for this purpose should not only be sufficiently funded but designed in such a way that such funding is focused on the highest priority projects.

Finally, it is necessary to create an industrial landscape in Spain capable of competing at European and international level. This fundamentally requires designing an appropriate institutional framework for innovation, as well as an industrial policy that encourages the adoption and development of such innovation. In other words: to take advantage of these changes and also contribute to them, Spain needs to strengthen its innovation ecosystem, both at the public and private levels. Private investment in R&D is one of the weakest areas, and decisive action is required to incentivize this investment through tax reforms and the creation of a more favorable environment for investment. In addition, better coordination between energy, industrial and innovation policies is needed, as well as a more agile institutional framework to promote the adoption of green technologies and the development of decarbonized products.

Finally, the Industry and Strategic Autonomy Law recently presented by the Spanish government represents a step in the right direction, but still requires important adjustments, such as the incorporation of competitive mechanisms and long-term investment signals. These adjustments will help consolidate a framework that allows Spanish industry to actively participate in the decarbonization process and in the creation of sustainable employment and economic growth.