



**TRANSITIONING TOWARDS AN EFFICIENT,
CARBON-NEUTRAL CIRCULAR EUROPEAN
INDUSTRY**

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Industrial decarbonisation in the Basque Country under the Energy Transition and Climate Change Act and the Industry Plan – Euskadi 2030

POLICY BRIEF



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Executive Summary

Industrial decarbonisation in the Basque Country (Spain) is guided by Act 1/2024 on Energy Transition and Climate Change and Industry Plan – Euskadi 2030^{1,2,3}. This makes decarbonisation a legal, economic, and industrial agenda with quantified 2030 targets, clearer obligations for companies, and a public-private mechanism for mobilising investment^{2,3,4}. Act 1/2024 commits the Basque Country to climate neutrality by 2050 at the latest, with an explicit effort to bring this target forward to 2045 while setting intermediate targets for 2030: a 45% reduction in greenhouse gas emissions relative to 2005, at least 12% final energy savings relative to 2021, and a minimum 32% share of renewables in final energy consumption^{2,4}. In parallel, the Industry Plan – Euskadi 2030 serves as a vehicle for a public budget of around EUR 3.9 billion expected to leverage another EUR 12 billion in private investments, to transform the Basque industrial base^{3,5}.

Based on insights from the TRANSIENCE project, this brief proposes five key policy priorities: ensuring that delivered clean energy is affordable for industry; recognising shared infrastructure as a central industrial policy lever; aligning decarbonisation pathways with the specific conditions of each sector; integrating competitiveness, circularity, and social acceptability into technology assessments; and leveraging the Industry Plan's transformative projects as the main mechanism for industrial decarbonisation^{2,3,6}.

BOX 1: Insights from the Basque Case Study

The TRANSIENCE research project utilises regional case studies to ground European industrial transformation pathways in regional socio-economic and technical realities. This approach recognises energy-intensive industries are often geographically concentrated in large clusters, where a critical mass of firms, research institutions, and specialised suppliers create powerful synergies. Historically, such clusters have facilitated the exchange of industrial by-products and incremental innovation. However, high integration within these structures can also create rigid path dependencies inhibiting the disruptive innovation required for deep decarbonisation and circularity.

This industry guide draws on insights from a regional workshop bringing together key stakeholders from sectoral industry clusters, local government agencies, public and private universities, and national-level transmission system operators in the Basque cluster, held in March 2026. Discussions with Basque institutions and stakeholders underlined that the main barriers to transition are not purely technological but relate to aspects such as final electricity prices, declining cogeneration profitability, uncertainty over CO₂ and fuel prices, limited biomass availability, weak infrastructure planning, plant heterogeneity, market resistance to low-carbon products, and social acceptance challenges for some waste-based solutions. A successful transition will depend on differentiated sectoral pathways, improved governance, explicit infrastructure planning, robust treatment of uncertainty, and mechanisms that create markets for low-carbon technologies and products.

¹ Gobierno Vasco. (2015). Climate change strategy of the Basque Country to 2050 (KLIMA 2050).

https://www.euskadi.eus/contenidos/documentacion/klima2050/en_def/adjuntos/KLIMA2050_en.pdf

² Ihobe. (2025). LAW 1/2024 on energy transition and climate change: Frequently asked questions for companies.

https://www.ihobe.eus/sites/default/files/2025-05/PREGUNTAS-FRECUENTES-LeyTECC-EMPRESAS_en.pdf

³ Basque Research and Technology Alliance. (2025). The Basque Government has presented the Industrial Plan – Euskadi 2030.

<https://brta.euskadi.eus/news/2025/the-basque-government-has-presented-the-industrial-plan-euskadi-2030/webbrta00-newsdet/en/>

⁴ Ihobe. (2024). Energy transition and climate change law. <https://www.ihobe.eus/en/energy-transition-and-climate-change-law>

⁵ SPRI Group. (2025). El Gobierno Vasco presenta el “Plan de Industria – Euskadi 2030”. <https://www.spri.eus/es/blog/financiacion/relanzamiento-empresarial/el-gobierno-vasco-presenta-el-plan-de-industria-euskadi-2030>

⁶ SPRI Group. (2024). Net-Zero Basque Industrial SuperCluster. https://www.spri.eus/archivos/2024/01/pdf/202311_nzbisc_en.pdf

Strategic and legal context

A binding climate-energy law

KLIMA 2050 set the long-term direction for climate mitigation and adaptation in the Basque Country, in Spain, and framed the low-carbon transition as a cross-cutting economic and territorial transformation¹. Today, two additional pillars reinforce and operationalise this vision: Act 1/2024 makes climate and energy objectives legally binding, while the Industry Plan – Euskadi 2030 connects these objectives to industrial competitiveness, job creation, innovation, and investment mobilisation^{2,3}.

Act 1/2024 has direct implications for firms. The Act promotes decarbonisation across all socioeconomic sectors, supports energy efficiency, electrification, green hydrogen, alternative energy sources, and circular economy approaches and requires certain industrial facilities to calculate their carbon footprints and design reduction plans². The Act also envisages a register of energy transition and climate change initiatives, the inclusion of carbon footprint criteria in public procurement linked to the contract's subject, and the use of fiscal and other economic tools to support clean technologies and processes^{2,4}.

The Industry Plan – Euskadi 2030 as an implementation platform

The Industry Plan – Euskadi 2030 (*Plan Industria – Euskadi 2030*) provides the industrial implementation arm of this framework. Official communications stress that its priorities include decarbonisation, digitalisation, new energy infrastructures, smart grids and storage, renewable fuels, and stronger R&D&I^{3,5}. The Plan is structured around a portfolio of transformative projects governed via business plans, measurable outputs, and dedicated governance architecture involving the Basque Industry Council, a strategic committee, and a technical management office led by SPRI (the economic development agency), with active participation from industrial clusters, Basque energy providers, and technology centres³. Taken together, these instruments imply that industrial decarbonisation must now be understood as a competitiveness strategy under climate constraints.

Industrial decarbonisation challenges in the Basque Country

On March 18, 2026, a workshop with Basque industry stakeholders was held as part of the TRANSCIENCE project. The workshop revealed a mature understanding of the industrial decarbonisation challenge: participants focused less on whether electrification, CCUS⁷, or alternative fuels are technically possible, and more on the conditions under which these options become investable in the Basque context. Several themes persist: the need to distinguish clearly between wholesale electricity prices and final prices paid by industrial users—once all network charges, levies, and taxes are included—as well as country-specific prices; the importance of including infrastructure costs when comparing technologies and pathways; and the need to address uncertainty and risk explicitly, using robust and “good-enough” solutions rather than relying on a single theoretically optimal pathway.

⁷ Carbon capture, utilisation/storage

This diagnosis is consistent with the Basque Government's own framing. The Industry Plan explicitly recognises that electro-intensive and energy-intensive industries need urgent support to decarbonise, electrify, and cope with high energy costs, unfair global competition, and complex regulation that undermines competitiveness^{3,5}. Therefore, the workshop's conclusions reinforce central elements of existing policy rather than raising marginal concerns.

These conclusions also point to a deeper, instrumental requirement: there is a clear need to address stochasticity, disruptive price scenarios, and infrastructure decisions involving multiple actors, while moving beyond traditional value-chain approaches towards value-ecosystem analysis. This also entails quantifying how energy and technology costs are transmitted to products and ultimately to consumers. In addition, the development of robust quantitative approaches and cost-effective comparisons of technologies, both with and without associated infrastructure, emerges as a key priority. Altogether, these insights indicate that Basque industrial transition planning should integrate advanced technoeconomic modelling, multi-layered infrastructure governance, detailed socioeconomic analysis, and robust risk management.

The Net-Zero Basque Industrial SuperCluster (NZBISC) initiative is particularly relevant in this regard. It identifies pulp and paper, cement, refining, steel, and foundry as priority sectors, due to their concentrated emissions (67% of the Basque Industry's emissions), and combines supply-side decarbonisation with efficiency, electrification, hydrogen, circularity, and CCUS in sectoral roadmaps⁶.

Structural constraints for the transition

Electricity prices and electrification pace

A key concern is the gap between wholesale electricity prices and final prices paid by industry after including levies, network charges, and taxes. This is particularly significant, as both the Act and industrial policy identify electrification as a primary vector of decarbonisation^{2,3}. If electricity remains structurally uncompetitive at the point of use, electrification loses credibility as an industrial investment pathway in internationally exposed sectors.

This issue is not merely conceptual. The Basque Government agencies have explicitly called for a review of distortions in electricity prices affecting industrial competitiveness, while external analysis indicates that large-scale industry in Spain can face significantly higher electricity costs (e.g., than in France), largely due to regulatory and cost-structure differences at the final consumer level^{8,9}. For the Basque Country, this means that a meaningful part of decarbonisation policy must prioritise an energy-price competitiveness agenda. This has a twofold practical implication: first, the Basque Government must continue to advocate for reforms in regulated components of electricity prices that penalise electrified industry; and, second, the Basque Government should design support mechanisms and risk-mitigation instruments for strategic industrial electrification investments, particularly in sectors with long investment cycles, high energy intensity, or strong trade exposure^{2,3}.

⁸ SPRI Group. (2026). The Basque Government proposes that the Spanish Government review distortions in electricity prices. <https://www.spri.eus/en/blog/environmental-sustainability-news/el-gobierno-vasco-propone-al-gobierno-espanol-revisar-las-distorsiones-en-los-precios-de-la-electricidad/>

⁹ Strategic Energy. (2025). Spain: Electricity for large-scale industry is 154% more expensive than in France. <https://strategicenergy.eu/spain-electricity-for-large-scale-industry-is-154-more-expensive-than-in-france/>

Infrastructure as an enabling condition

A second message is that infrastructure cannot be treated as an exogenous assumption. The viability of options such as CCUS depends critically on the availability of CO₂ transport and storage infrastructure. This highlights the importance of explicitly comparing technologies with and without their associated infrastructure, as well as recognising the complexity of infrastructure decisions, which involve multiple actors and require a high degree of coordination.

This aligns with official priorities. The Industry Plan – Euskadi 2030 highlights new energy infrastructures, smart grids and storage among its key domains^{3,5,6}. Act 1/2024 links fiscal and regulatory support to renewables, decentralised networks, self-consumption, more efficient equipment, process changes, waste prevention and valorisation, and circular economy models^{2,4}. In fact, industrial decarbonisation depends not only on plant-level technology choices but on the availability and timing of system-level infrastructure.

For the Basque Country, this implies a shift from generic sectoral roadmaps to coordinated infrastructure planning. Electricity network reinforcement, hydrogen availability where justified, CO₂ transport and storage corridors, waste and biomass logistics, and industrial symbiosis platforms should also be treated as strategic assets whose development schedule shapes credible investment decisions before 2030, accommodating different transition paces^{3,6,10}.

Uncertainty, risk and sequential investment behaviour

Companies invest under volatile gas and electricity prices, uncertain CO₂ prices, uneven technology maturity, regulatory change, and asset replacement cycles that rarely coincide with the ideal timing of climate policy. The glass industry provides a clear example: investment decisions are taken sequentially when a furnace or major asset reaches end of life (e.g. 10-12 years), not when a model suggests it is optimal.

This behaviour calls for different analytical and policy tools. Policy analysis should go beyond identifying a single optimal scenario, focusing instead on developing robust alternatives, phased investments and flexible transition options that remain viable across several plausible futures. The NZBISC initiative is useful at this point because it builds sector-specific roadmaps, prioritises decarbonisation of energy supply and efficiency, and focuses initially on sectors that account for a large share of industrial emissions^{6,10}.

From a policy perspective, the Basque Country has the opportunity to institutionalise robust decision-making tools, including scenario and sensitivity analysis, and real-option approaches. This would help translate legal and strategic objectives into credible investment decisions rather than limited optimisation outcomes.

Sectoral decarbonisation challenges and pathways

Pulp and paper

The pulp and paper industry in the Basque Country faces a complex transition challenge. Domestic biomass availability is limited, and current forest management is not prepared for a major increase in demand. Besides, there are social acceptance concerns around certain waste-based solutions. Historically central to

¹⁰ SPRI Group. (2026). Net-Zero Basque Industrial Super Cluster. <https://www.spri.eus/en/support/net-zero-basque-industrial-super-cluster/>

sector profitability, cogeneration has lost economic attraction under high gas prices and relatively lower electricity prices, which reduce the value of exported electricity.

The appropriate response for the pulp and paper industry is not a single “silver bullet” technology but a hybrid pathway. The starting point should be a combination of process efficiency, heat recovery, process integration, digital optimisation, and increased use of secondary fibres, along with targeted support for adapting cogeneration and thermal systems where they remain valuable^{2,6}. Fuel-flexible burners, as noted in the TRANSCIENCE project’s Basque stakeholder workshop, are strategically valuable because they preserve optionality in the context of fuel-price volatility and policy uncertainty.

In the medium term, selective electrification can play a larger role, provided that grid capacity and final electricity prices make it a credible option. Biomass and waste should be regarded as a scarce strategic resource rather than a universal solution. Finally, public support should prioritise mature, high-impact measures.

Glass

The glass sector shows a clear alignment with a gradual electrification strategy. Companies describe sequential investment decisions conditioned by existing infrastructure and asset replacement cycles. The main challenge lies not in convincing the sector of the overall direction, but rather in aligning investment windows with support schemes, network availability, and reduced technology risk.

In this context, the public sector’s role is mainly temporal and systemic. If a furnace reaches its replacement point before infrastructure or support frameworks are in place, there is a high risk of locking into another generation of carbon-intensive assets. The Basque Country should therefore anticipate grid needs, align support instruments with replacement cycles, and provide targeted assistance for electric or hybrid furnaces, while treating process emissions explicitly where electrification does not address them completely^{2,3,6}.

Cement

Cement emerges as the clearest hard-to-abate sector. Industrial representatives of this sector emphasise that electrification and hydrogen are not the primary solutions for the sector’s decarbonisation and instead highlight alternative fuels, new cement formulations, and—above all—CCUS. This is consistent with the sector’s underlying emissions profile since a large share of cement emissions are process emissions that do not disappear even if energy inputs are decarbonised⁶.

From a policy perspective, this makes cement a critical sector. To reconcile legally binding climate neutrality with continued presence of hard-to-abate industries, the Basque Country should treat cement decarbonisation as a system-level project within the Industry Plan^{3,6}.

In the short term, action should focus on environmentally robust alternative fuels, clinker-to-cement ratio decrease, and capture-ready investments. In the medium term, it will be essential to secure access to CO₂ transport and storage and to create demand for low-carbon cement through public procurement, technical standards, and market signals^{2,11,12}.

¹¹ European Circular Economy Stakeholder Platform. (2025). The Basque Country’s Clean Technologies List: Promoting circular economy. <https://circulareconomy.europa.eu/platform/en/news-and-events/all-news/basque-countrys-clean-technologies-list-promoting-circular-economy>

¹² Ihobe. (2025). Wastes. <https://www.ihobe.eus/en/wastes>

STRATEGIC POLICY PRIORITIES – BASQUE INDUSTRY

- ***Systematically align sectoral roadmaps with quantified legal targets***

Sectoral roadmaps must be aligned with the 2030 targets of Act 1/2024, on emissions and energy savings, and renewables shares^{2,4}. This requires quantifying each sector's potential and defining tailored policy mixes, combining regulatory, fiscal, infrastructural, and market-based instruments—to ensure effective delivery.

- ***Position the Industry Plan – Euskadi 2030 as the main implementation framework***

The Industry Plan should serve as the central policy platform for operationalising industrial decarbonisation. The transformative projects under the Industry Plan provide an appropriate architecture to convert strategies into investment portfolios^{3,5}. Sectors such as pulp and paper, glass, and cement should structure their decarbonisation pathways as transformative project portfolios under the Plan, with shared governance arrangements, verifiable milestones, and strong alignment with industrial clusters and technology centres.

- ***Embed infrastructure planning within industrial policy design***

Infrastructure considerations should be treated as an integral component of industrial policy and technology comparative assessments, explicitly including associated infrastructure requirements. The Basque Country should establish an industrial infrastructure coordination platform to map electricity network reinforcement needs, CO₂ corridors, hydrogen opportunities, waste and biomass logistics, and industrial symbiosis options, and to connect this information to funding calls, permitting priorities, and sectoral agreements^{3,6,10}.

- ***Strengthening the competitiveness of electrification pathways***

Electrification must be supported by policies addressing final electricity costs otherwise hindering industrial investment. A comprehensive approach must include regulatory advocacy, risk-sharing measures, targeted support—e.g., for technologies in sectors where mature options exist and strategic advantage is plausible^{2,8,9}.

- ***Integrate circularity, material flows, and social acceptance***

Act 1/2024 links decarbonisation explicitly to circularity performance and reduced material footprints^{2,4}. The Basque Country's Clean Technologies List and waste policy frameworks reinforce this orientation^{11,12,13}. In practice, technology and investment decisions should be assessed not only based on abatement cost but also considering implications for material use, logistics, environmental impacts, and social acceptance—particularly for waste-based fuels, biomass mobilisation, and by-product valorisation.

- ***Leverage demand-side instruments and green public procurement***

Demand-side policies can play a more active role in supporting industrial transition. Act 1/2024 allows carbon footprint criteria to be integrated into public procurement processes and creates a register of energy/climate initiatives^{2,4}. These can help create lead markets for low-carbon cement, circular materials, and decarbonised industrial products, reducing market uncertainty and supporting commercialisation of innovative solutions.

- ***Evaluate transition impacts from a socioeconomic perspective***

Policy design should incorporate *ex-ante* socioeconomic impact assessments evaluating effects on industrial competitiveness, employment, value chains, and consumers. This aligns with Act 1/2024 and NDC framing, on climate neutrality as a driver of competitiveness, wellbeing, and resilience^{1,2,13}. Distributional, territorial, and industrial value-creation dimensions must be considered to ensure a just, balanced transition.

¹³ Ihobe. (2025). Nationally determined contribution (NDC) of the Basque Country under the Paris Agreement.
<https://www.ihobe.eus/sites/default/files/2025-12/NDC%20of%20the%20Basque%20Country%20under%20the%20Paris.pdf>

Proposed implementation agenda

The period to 2030 is decisive because it coincides both with the first quantified targets of Act 1/2024 and with the main implementation window of the Industry Plan – Euskadi 2030^{2,3,5,14}. The priority should not be to fix a perfect 2050 end-state, but to identify no-regret investments, prepare critical infrastructure, and structure transformative projects that preserve multiple pathways consistent with climate neutrality.

A pragmatic and sequenced implementation approach for the Basque Country would:

1. Identify sector-specific non-regret (investment) measures, especially in efficiency, digitalisation, process integration, and selective electrification.
2. Map infrastructure dependencies and connect them to investment decisions and public instruments.
3. Launch transformative projects for hard-to-abate sectors and for shared industrial energy systems, establishing a robust pipeline.
4. Use public procurement, carbon-footprint requirements, and standards to create demand for low-carbon products.
5. Regularly update sectoral pathways as prices, regulation, technology, and infrastructure evolve.

This implementation approach requires a balance between policy certainty and flexibility. On the one hand, companies need sufficiently stable and credible signals to invest; on the other hand, flexibility and time is needed to adapt to technological and market evolution. Public policy should therefore avoid both technology neutral approaches and excessive technological prioritisation. Instead, its role is to create enabling legal, economic, and infrastructural conditions that allow a competitive mix of solutions (electrification, efficiency, circularity, alternative fuels, carbon management, and industrial innovation) to emerge and scale. In addition, effective implementation will depend on strong multi-level governance, where coordination across sectors and alignment with national and EU policy frameworks are essential.

Conclusions for policymakers

In recent years, the Basque Country has established grounds for industrial decarbonisation as an opportunity to transform its economy and society. Act 1/2024 offers binding direction, clearer corporate expectations, and new instruments while the Industry Plan – Euskadi 2030 offers governance support, identifies investment priorities, and introduces the roll-out of transformative projects. Besides, the Net-Zero Basque Industrial Super Cluster provides a useful initiative towards deeper sectoral and technological coordination, supporting the implementation priorities of the Industry Plan.

The core challenge of industrial decarbonisation in the Basque Country is no longer to define an abstract vision, but to connect that vision to the reality of industrial decision-making: final energy prices, asset-replacement cycles, biophysical limits, infrastructure availability, social acceptance, markets for low-carbon products, and the ability to pass through costs or capture value. If the Basque Country can align these elements, industrial decarbonisation would no longer constitute a climate obligation but become a robust and effective strategy for resilience, technological leadership, and long-term competitiveness^{3,5,8,9,14,15}.

¹⁴ Consejo Económico y Social Vasco. (2025). Dictamen 7/25, de 21 de julio, sobre el Plan de Industria – Euskadi 2030. https://www.cesegab.com/Portals/0/Libros/Dictamen%207_25.pdf

¹⁵ Aclima. (2025). Plan de Industria – Euskadi 2030, una apuesta ambiciosa para convertir al sector industrial en el eje del crecimiento económico de Euskadi. <https://aclima.eus/plan-de-industria-euskadi-2030-una-apuesta-ambiciosa-para-convertir-al-sector-industrial-en-el-eje-del-crecimiento-economico-de-euskadi/>

Policy Brief

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