Orkestra
BASQUE INSTITUTE
OF COMPETITIVENESS
DEUSTO FOUNDATION

# 2023 BASQUE COUNTRY COMPETITIVENESS REPORT

## TRANSITION TO ENVIRONMENTALLY SUSTAINABLE COMPETITIVENESS

Deusto

The activities of Orkestra-Basque Institute of Competitiveness, under the Deusto Foundation, University of Deusto, are made possible by the support and contributions of:

Basque Government; SPRI Group; Provincial Council of Álava; Provincial Council of Bizkaia; Provincial Council of Gipuzkoa; Bilbao Council; Basque Energy Agency; BBK Foundation; Iberdrola; Repsol-Petronor.

Basque Country Competitiveness Report
ISSN: 2990-2614
https://doi.org/10.18543/MGEA5029

2023 Basque Country Competitiveness Report. Transition to environmentally sustainable competitiveness
ISBN: 978-84-1325-209-4
https://doi.org/10.18543/YJLS9838



Translated from Spanish by: Calamo y Cran.


Orkestra
INSTITUTO VASCO DE COMPETITIVIDAD
FUNDACIÓN DEUSTO

Mundaiz 50, E-20012, Donostia-San Sebastián
Tel.: 943 297 327. Fax: 943 279 323
comunicacion@orkestra.deusto.es
www.orkestra.deusto.es

© Publicaciones de la Universidad de Deusto
Apartado 1 - E48080 Bilbao
Correo electrónico: publicaciones@deusto.es

# 2023 Basque Country Competitiveness Report

## Transition to environmentally sustainable competitiveness

Jorge Fernández, Susana Franco, Macarena Larrea
and James R. Wilson
(Editors)

Imanol Aizpuru, Mikel Albizu, Maddalen Alkorta, Mari José Aranguren, Ainhoa Arrona, Arkaitz Badajoz, Naia Begiristain, Patricia Canto, Pablo Costamagna, Samuel Delbon, Ibone Eguia, Aitziber Elola, Miren Estensoro, Jorge Fernández, Susana Franco, Andrea Fuentetaja, Juan P. Gamboa, Antonio García, Itziar García, Mikel Gaztañaga, Claudia Icaran, Ane Izulain, Macarena Larrea, Miren Larrea, Usue Lorenz, Edurne Magro, Jaime Menéndez, Stephania Mosquera, Asier Murciego, Romina Rebola, Jabier Retegui, Eva Sánchez, Eduardo Sisti and James R. Wilson
(Authors)

2023
Orkestra - Basque Institute of Competitiveness
Deusto Foundation

# 2023 Basque Country Competitiveness Report

## Access the Report Online

The Basque Country Competitiveness Report 2023 is available in PDF format in three languages (Spanish, Basque, English) on the Orkestra website:

https://www.orkestra.deusto.es/en/

## Access the Regional Competitiveness Observatory Online

You can check real-time updates for various indicators presented in this competitiveness report at:

https://www.orkestra.deusto.es/competitiveness-observatory/en

# Contents

# Foreword

Advancing the sustainability transition in a just and orderly manner to preserve the planet is probably the greatest challenge facing humanity. The transition to sustainability is a priority to reduce greenhouse gas emissions and adapt to achieve resilience and avoid impacts on the territory. We can no longer wait to solve at a global level the serious interrelated problems that seriously threaten current and future generations, such as the consequences of climate change, the depletion of natural resources, universal access to energy, or poverty and inequality, all of which destroy social cohesion.

The context of uncertainty facing the planet, especially since 2020, adds layers of complexity to the challenge. Developing ambitious but realistic roadmaps to cover the essential needs to ensure the well-being of citizens and maintain the competitiveness of our companies, while reducing our environmental footprint and respecting the limits of the planet, is the only viable formula to avoid the collapse of ecosystems.

Embarking on this new path means going beyond what is known and implementing new ways of thinking and doing in order to advance the process of sustainability transition and thus answer a multitude of complex questions. This report does not propose an optimal solution to the process of economic transformation, as there are no single recipes or simple answers. On the contrary, this report seeks to provide reflections and data that will allow all the actors in the Basque Country to address the most complex issues, with the aim of increasing the competitiveness of the territory and, ultimately, strengthening the well-being of Basque society and its natural environment, to the benefit of all. For this purpose, the report uses the framework for analysing competitiveness for well-being developed by Orkestra, a framework that allows the analysis of the determinants of competitiveness with a holistic view of the process.

This transition is a long-distance race, where it will be necessary to combine short-term decisions with other long-term decisions, where it will be necessary to prioritize the common good over the individual, and where there will be winners and losers, as sustainability and competitiveness do not always go hand in hand. At Orkestra, we are committed to promoting formulas that strengthen the synergies between the two in the Basque Country, and to this end it is essential to understand the relationship between sustainability transition and competitiveness for well-being, and how

both can be made compatible and strengthened in a synergistic way. A well-managed transition will allow us to take advantage of the great opportunities that arise to develop our economy, while avoiding undesirable social and economic consequences.

To this end, this report begins with a diagnosis of the results of competitiveness and well-being, in order to ascertain the bases on which the Basque Country is able to address the transition. It then identifies the six main levers that can be used to influence the results of competitiveness and well-being, and thus bring about the structural changes necessary in the medium to long term to achieve a society with a small environmental footprint. The report concludes with a series of conclusions and recommendations to support decision making.

This report has been made possible thanks to the excellent work, commitment and dedication of all the people who are part of and work with Orkestra, as well as the sponsoring institutions that accompany us and without whose support Orkestra would not be a reality, nor an international benchmark in research-action in competitiveness for well-being.

**Iván Martén Uliarte**
Chairman, Orkestra-Basque Institute of Competitiveness
Deusto Foundation

# Acknowledgements

The Basque Country Competitiveness Report 2023 was prepared with funding from SPRI, the Basque Business Development Agency, which is accountable to the Basque Government.

The report has been prepared by a group of people coordinated by Jorge Fernández, Susana Franco, Macarena Larrea, and James Wilson. The entire Orkestra team was also involved in a variety of ways, and we thank them for their collaboration throughout the entire process. We appreciate the contributions of Aclima and BRTA, who have drafted boxes for the report. We would also like to extend our thanks for the feedback received from members of the Board of Directors and the Advisory Board, as well as Orkestra's sponsor institutions.

Calculation of various of the indicators on which this report is based was possible thanks to data provided by Eustat by means of purposeful and impartial utilisation of its databases at Orkestra's request. Our sincere thanks to Eustat for all the assistance provided. We also thank Sabi-Informa for its collaboration in providing data for other analyses in the report and the Basque Finance Institute for its support in the use of financial analysis methodologies.

In addition, we would like to extend our thanks for the involvement of all the stakeholders who have participated and contributed to generating knowledge as part of the various projects carried out by Orkestra in recent years.

Orkestra assumes full responsibility for any errors or omissions in the content of this report.

# Executive Summary

Climate change and its environmental, social and economic consequences present us as a society with a major challenge, undoubtedly one of the most complex faced by humankind. The process of reducing greenhouse gas (GHG) emissions to net zero must be undertaken as quickly as possible to limit the increase in the global average temperature and to ensure that the impacts of climate change are manageable and the costs bearable.

The advantages of moving towards an economy with a low environmental footprint of human and economic activities include not only avoiding highly adverse socio-economic scenarios, but also taking advantage of the multiple economic and social benefits that arise. However, the required transformation can also have negative economic and social consequences, depending on how it is managed.

Above all, this is a highly complex process due to the very nature of the climate crisis, which affects the entire planet, the entire value chain of the economy (production, distribution, consumption), all sectors (energy, residential, industrial, transportation, commercial, etc.), and other dimensions of society (culture, behaviours, relationships, knowledge, etc.). Furthermore, the context in which the planet has found itself since 2020 adds additional layers of complexity to the challenge. The pandemic and the resulting economic crisis, current geopolitical crises, the energy crisis in Europe and the complex macroeconomic scenario all have a significant effect on defining not only the response to the challenge of climate change, but also the pace of adaptation and transformation.

In short, we are facing a multidimensional, global and comprehensive problem that requires urgent changes, many at regional and local level, and for which there is no set formula to solve the challenges faced by each society and each economy.

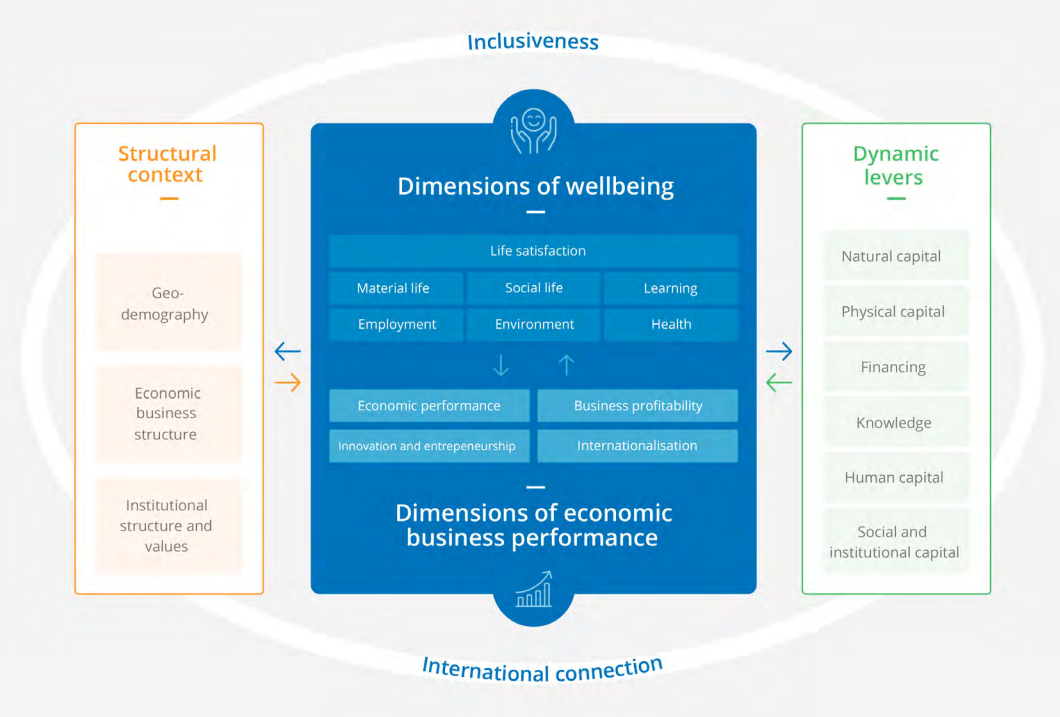
It is not surprising, then, that the challenge of environmental sustainability has been a common element in the conclusions of the last three Orkestra Competitiveness Reports. In 2020, in the context of recovery from the pandemic, the report emphasised the need to promote a green transition to strengthen the resilience of the economy and society. In 2021, the introduction of our new 'competitiveness for wellbeing' framework highlighted the need to accelerate this transition to improve performance in terms of the environmental dimension of wellbeing. And in 2022, 'fostering the leadership of a new sustainable industrial competitiveness' was among five priority

cross-cutting actions identified in analysis of the foundations of Basque competitiveness.

Orkestra's competitiveness for wellbeing framework is a holistic framework, designed to understand and strengthen the determining factors of a territory's competitiveness and wellbeing. In this sense, it is well-suited to understanding the complexity of the transition towards sustainable competitiveness. In this Report we apply the framework to:

- Identify the current **results of competitiveness and wellbeing** in the Basque Country, as a starting point for sustainability transition in the coming years.
- Understand the **relationship between sustainability transition and competitiveness for wellbeing**, and how the two concepts can be made compatible and reinforced.
- Explore some of the key dimensions of the six **dynamic levers of competitiveness and wellbeing** in the Basque Country to advance the sustainability transition.

**TERRITORIAL COMPETITIVENESS FOR WELLBEING FRAMEWORK**




## Current competitiveness and wellbeing in the Basque Country

In terms of economic-business and wellbeing results, the Basque Country is in a generally positive situation, consolidating the picture of previous years' reports, but with some areas to which we should pay attention.

| Economic and business outcomes | |
|---|---|
| Economic performance | The Basque Country grew slightly more than the UE-27 average in 2022, reaching GDP per capita of 109.5 % of the EU-27 value. In productivity, the Basque Country is ahead of Spain and the EU-27 average and has slightly narrowed the gap with Germany. In the manufacturing sector, however, the level of productivity is quite similar to that of the EU-27. |
| Business profitability | All indicators of corporate profitability have improved. Unit labour costs decreased in 2021 to be lower than those of Germany, Spain and the EU-27 for the economy as a whole, and equal to those of Germany (and higher than those of Spain and the EU-27) in the manufacturing sector. Gross operating surplus increased in the Basque Country between 2020 and 2022, and both return on assets (ROA) and return on equity (ROE) increased in 2022. |
| Innovation and entrepreneurship | The good health of the Basque innovation system is reflected in the rise in the Regional Innovation Scoreboard. However, the challenge of innovation in SMEs remains, since despite the slight increase in the percentage of SMEs with innovative activity, this figure is still below the pre-pandemic level and the gap with the EU-27 and Germany remains considerable. On the other hand, the rate of entrepreneurial activity in the Basque Country has remained relatively stable over the last few years and is slightly below that of Spain and well below that of Germany. |
| Internationalisation | Exports from the Basque Country increased in 2022, mainly due to the strong evolution of exports of energy products. However, the increase in energy prices has also had an impact on imports, which have increased to a greater extent, causing the positive balance of international trade to shrink. Likewise, if exchanges with the rest of the State are taken into account, the total balance for goods and services is in deficit and this deficit increased in 2022. |

| Wellbeing outcomes | |
|---|---|
| Life satisfaction | Life satisfaction fell across the board in the first year of the pandemic, with no major differences in the level of satisfaction between men and women. |
| Material life | The average disposable income of Basque households remains above the European average, but has deteriorated to a greater extent than in other territories during the pandemic. The level of inequality has increased slightly, as has fuel poverty, but the proportion of people at risk of poverty or exclusion has decreased slightly in 2022 and remains one of the lowest among the territories analysed. |
| Employment | Following the rise in unemployment due to the crisis that began with the pandemic, unemployment fell in 2022 to below the 2019 level. Job satisfaction has remained stable in recent years and the gender wage gap continues its downward trend. |
| Social life | Levels of satisfaction with leisure time have increased in recent years, but confidence in people fell in the first year of the pandemic. The rate of property crime is similar in the Basque Country and Spain and lower than in the other territories analysed. |
| Learning | The evolution of the learning indicators has been positive, contributing to the continued reduction of the gap with other territories in terms of population with higher than compulsory qualifications and to the fact that the Basque Country continues to be very well positioned in terms of lifelong learning. |

| Wellbeing outcomes | |
|---|---|
| Health | The Basque Country is very well positioned, both in terms of life expectancy and self-perceived state of health. It is also one of the territories analysed with the fewest premature deaths due to air pollution. |
| Environment | Levels of GHG emissions and air pollutants are improving, but GHG emissions are still far from reaching international targets. Although the recycling rate is higher than in Spain, there is still a long way to go in terms of circularity and reuse of waste. |

## Levers to strengthen the relationship between competitiveness and environmental sustainability in the Basque Country

The challenges that the Basque economy will face in the sustainability transition are multiple and will generate dilemmas and trade-offs to which different institutions and public entities, companies and other private entities and the public in general will have to respond. These dilemmas range from the allocation and prioritisation of available resources between different purposes to the acceptance that in the process of change there will be winners and losers (and therefore measures needed to compensate the losers) or that some strategies, policies and measures will generate a certain degree of social rejection.

In any case, to guarantee an effective and efficient transformation process (with the minimum socio-economic cost) and to materialise the multiple opportunities expected, the policies, strategies, action plans and regulatory and normative frameworks applied in the Basque Country must be stable and adapted, as far as possible, to the Basque economic reality. In this sense, the Basque Government is proposing a sustainability transition strategy based on consolidating and increasing the strong technological and industrial capacities generated in the Basque Country over the years in order to: (i) respond to global challenges; and (ii) create a local supply of clean technologies, services and innovative solutions that support the decarbonisation of industrial sectors and the Basque economy as a whole.

One of the main conclusions of this report is that the success of the sustainability transition in the Basque Country will depend on the capacity to advance in changes, transformations and adaptations that simultaneously allow Basque companies to compete in international markets, increase the attractiveness of the territory and generate positive economic and wellbeing outcomes. The concepts of environmentally sustainable transition and competitiveness for wellbeing are therefore inseparable.

Orkestra's framework identifies six dynamic levers through which different actors in the territory can act to positively influence competitiveness and wellbeing outcomes, promote structural change in the medium to long term, and achieve an economy and society with a low or zero environmental footprint. We have focused the analysis of these multidimensional levers on some of their most important dimensions in the context of sustainability transition.

| Dynamic levers for environmentally sustainable competitiveness | |
|---|---|
| Natural capital | During the last decades, the Basque Country has advanced in energies and technologies, environmental protection and biodiversity, soil recovery and the circular economy, among others. There are numerous challenges ahead, including:<br>• Increasing renewable energy resources.<br>• Showcasing the value of available natural resources.<br>• Achieving a more stable and sustainable supply of raw materials by moving towards circularity.<br>• Having legislation that supports the separation, classification, reuse and disposal of waste.<br>• Achieving proper management of water resources, which will also have a positive impact on biodiversity.<br>• Making progress in reducing emissions of air and water pollutants, as well as in soil remediation.<br>• Developing tools and technologies for monitoring, forecasting and data analysis to manage resource and waste flows. |
| Physical capital | The Basque Country has a set of infrastructures that provides an adequate basis for driving the sustainability transition, although it also faces challenges to avoid bottlenecks that jeopardize the materialisation of business and technological opportunities:<br>• Ensuring social support and acceptance of the necessary energy, transport and communication infrastructures.<br>• Strengthening and updating holistic and integrated infrastructure planning.<br>• Promoting the complementarity of the different energy sectors in order to increase efficiency and realize synergies between them.<br>• Increasing the resilience of critical infrastructure to disruptive climate events.<br>• Facilitating the financing of infrastructure investments. |
| Financing | Financing is an integral part of the sustainability transition, not just a resource. It is therefore important to have a financial ecosystem made up of all the relevant actors that facilitates the orientation of financial resources towards the challenges of sustainability transition. In this sense, the current initiative to promote a finance and investment cluster in the Basque Country is a key opportunity to increase the collective capacity for innovation and knowledge around the development of new financial instruments aimed at sustainable projects and infrastructures. The main challenge is to strengthen and guide the financial ecosystem to increase its capacity to:<br>• Generate financing flows that give continuity to the ambitious energy-environmental policy and facilitate the decarbonisation and diversification initiatives of Basque companies.<br>• Maintain the pace of investment in infrastructure and R&D.<br>• Provide incentives for the business fabric to advance in the transformation of its production processes. |
| Knowledge | The Basque Country has a base of institutions, policies and knowledge with great potential to effectively advance in the sustainability transition. This is supported by analysis of different indicators related to R&D expenditure and funding, scientific excellence and sustainability-related patent performance. In the coming years it will be important to reinforce the directionality of policies and the efforts of the Basque Science, Technology and Innovation Network (RVCTI), channelling them towards knowledge, technologies and collaboration mechanisms that lead to tangible sustainability and competitiveness results. The main challenges are to:<br>• Consolidate good positioning in knowledge on sustainability, as a critical lever to take advantage of the opportunities of the transition.<br>• Strengthen knowledge transfer mechanisms to ensure that the results of patents and publications are converted into applications and innovations that simultaneously advance competitiveness and sustainability. |

| Dynamic levers for environmentally sustainable competitiveness | |
|---|---|
| Human Capital | The transition to environmental sustainability involves the creation of new jobs, as well as the redefinition and replacement of others. To this end, it is critical to foster the green skills that the new 'green jobs' would require. We have identified 26 occupations with high green potential, and, in 2022, 9.2 % of the employed population in the Basque Country had this employment profile. Among the training courses that currently graduate more people who end up in these occupations are university degrees in mechanical and civil engineering, as well as biology. Vocational training includes degrees in occupational risk prevention and analysis and quality control, among others. In this context, the main challenge is twofold:<br>• Making progress in the development of green competencies and skills, through the identified key qualifications and through training modules that move towards a skills-based approach.<br>• Ensuring that there are continuous training mechanisms for people employed in sectors and value chains negatively affected by the sustainability transition, in order to recycle and update their skills and abilities. |
| Social and institutional capital | The Basque Country has a wide range of knowledge and experiences related to collaboration between very diverse actors, which constitutes an asset for the development of collaborative governance, necessary to reach solutions to specific problems related to sustainability transition. There are several experimental collaborative initiatives between actors in the field of sustainability transition in the Basque Country that allow us to discover and understand the leading role that collaborative governance processes can play in the future. During the last decade Orkestra has collaborated in several action research projects with different agents of the territory, which show the importance of:<br>• Defining the problem and designing spaces to address it.<br>• Defining roles based on reciprocity and trust.<br>• Constructing shared visions and agendas for action.<br>• Managing the conflicts generated by non-aligned positions, interests or visions. |

## Six general recommendations

The main message of this report is that, despite the complexity of the process, there is great potential in the Basque Country to promote, coordinate and align the drivers of territorial and business competitiveness with environmental sustainability in order to achieve desired economic, environmental and social results. It is essential to continue generating economic value and wellbeing through greater specialisation in sustainable technologies and activities, and a greater capacity for innovation in sustainability that places Basque companies and the Basque Country at the forefront of the transition.

But this cannot be done without taking decisions now. The sustainability transition has its risks and will involve costs and sacrifices, as well as facing dilemmas and unpopular or uncomfortable choices. However, moving forward with the transformation under a clear vision and strategy will make it possible to materialize the economic, industrial and business opportunities linked to the changes underway, giving rise to a net positive effect on the wellbeing of Basque citizens in the medium and long term. In this regard, our analysis suggests six general recommendations:

1. **Implement an intelligent sustainability transition process based on a clear, shared and long-term strategic vision.** This implies making decisive progress in decarbonisation, based on energy and technology pillars on which there is consensus, and establishing roadmaps that are ambitious but at the same time pragmatic and coherent with the Basque business and economic reality. This is achieved, for example, by moving forward in the short term in areas where emissions can be reduced without jeopardizing economic activity or creating new opportunities that do not compromise economic and social wellbeing, while simultaneously promoting profound transformations in sectors that still depend on fossil fuels. It will be important to use existing technological and industrial capabilities to develop new capacities, clean technologies and an innovative and competitive business fabric in areas such as decarbonisation or advanced environmental services. It will also be important to promote legal and regulatory frameworks for a sustainability transition that are simple, stable and transparent. These need to be smart, result-oriented, but with the flexibility and agility necessary for our companies to compete with companies in other parts of the world (e.g. China or the US).

2. **Focus R&D and innovation policies on achieving results that imply greater environmental sustainability, seeking synergies with economic competitiveness and advances in wellbeing**. Knowledge and innovation are key resources in identifying and taking advantage of the opportunities that sustainability transition opens up in multiple economic sectors and areas of life. Both policy experimentation, e.g. through pilot experiences, and policy learning, e.g. through the development of sophisticated evaluation mechanisms and processes to ensure the most effective use of available resources, will be important during the transition.

3. **Strengthen cross-cutting areas that facilitate a better alignment of the drivers of competitiveness and wellbeing with environmental sustainability**. Four key cross-cutting areas stand out:

   - The **ecosystem of innovation and knowledge generation and transfer** in the field of sustainability and especially in areas that are critical for the Basque economy (e.g. critical materials for industry).
   - The **skills, training and talent ecosystem**, which must increase its responsiveness in order to dynamically match the human capital of the territory with the skills required for the sustainability transition and demanded by businesses.
   - The **finance ecosystem**, critical to ensure the most appropriate tools and mechanisms for financing investments in infrastructure, projects and sustainable activities.
   - **Intermediary organisations**, such as Local Development Agencies and Cluster Development Organisations, have a key role to play, especially in supporting SMEs in addressing technological, process, regulatory and market changes so that they can take advantage of the opportunities of the transition and increase their competitiveness.

4. **Reinforce the central role of Basque citizens in the process of sustainability transition**. On the one hand, through greater knowledge and empowerment to make informed decisions about consumption, investment and participation in dif-

ferent initiatives (e.g. energy communities, self-consumption systems, etc.). On the other hand, through greater social support for sustainability transition and greater understanding, awareness and acceptance of its implications. This implies not only increasing available information and education, but also designing and implementing systems and mechanisms to compensate and protect the most vulnerable segments of society.

5. **Continue to innovate in cooperation and collaborative governance schemes.** We must value the knowledge and experience accumulated in recent decades in the Basque Country on how to build shared visions and agendas among different actors in a collaborative manner, and how to manage the inevitable conflicts due to different visions and interests. In this regard, it will be important to incorporate collaborative governance mechanisms based on co-responsibility and reciprocity among agents in the future Basque Law on Energy Transition and Climate Change and the associated Roadmap.
6. **Consolidate a leading role in the global sustainability transition**. The Basque Country must continue to play a leading role in international initiatives in energy, technological innovation, sustainable industry and other areas where it can lead the way towards solutions for the reduction of the environmental footprint of economies across the planet and the implementation of the Sustainable Development Goals (SDGs) (e.g., the location in Bilbao of the permanent headquarters of the Secretariat of the United Nations Local Coalition 2030). One way to combine competitiveness and sustainability is the export (also to countries of the Global South) of knowledge, technologies and solutions based on digitalisation and clean technologies, through the leadership of Basque companies in international markets.

# Introduction

The scientific community's advances in terms of knowledge about climate change, its causes, its impacts, and its probable evolution have given rise to calls for a profound transformation in the global economy in the coming years. The aim of this transformation is to contain increases in the planet's average temperature and to reduce the risks and effects associated with adverse climate events. The latest Synthesis Report on Climate Change from the IPCC (Intergovernmental Panel on Climate Change) of the United Nations highlighted the difficulty of limiting said temperature increase to 1.5ºC given the current path of greenhouse gas (GHG) emissions. The IPCC also emphasised the need to categorically advance climate change mitigation and adaptation efforts and to promote comprehensive climate strategies over the short term (IPCC, 2023).

The advantages of moving towards an environmentally sustainable economy (i.e., one with a low environmental footprint from human and business activities) not only include avoiding very adverse socioeconomic scenarios but also taking advantage of the multiple economic and social benefits that arise. However, the required transformation can also have negative economic and social consequences, depending on how it is managed. Above all, this is a highly complex process due to the very nature of the climate crisis, which affects the entire planet, the entire value chain of the economy (production, distribution, consumption), all sectors (energy, residential, industrial, transportation, commercial, etc.), and other dimensions of society (culture, behaviours, relationships, knowledge, etc.).

Moving towards an environmentally sustainable economy has advantages but can also have negative economic and social consequences

Furthermore, the context in which the planet has found itself since 2020 adds additional layers of complexity to the challenge. The pandemic and the resulting financial crisis, the war in Ukraine, the energy crisis in Europe, the complex macroeconomic scenario, and the new geopolitical pillars (focused on critical materials, the 'tech war', the new economic/energy blocks, etc.) are all relevant pieces of the puzzle when defining not only the response to the climate change challenge but also the pace of adaptation and transformation.

Acting in this highly complex context requires extremely sophisticated forms of collaboration and coordination to find solutions to the multiple dilemmas that governments at all levels and in all geographic environments —as well as companies, organisations, and people— will have to face. For example, policies, strategies, action plans and regulatory frameworks that are appropriate for the reality of each region must

be defined, giving rise to an effective and efficient transformation process that will allow economic and social opportunities to materialise. This implies seeking a balance between short- and long-term changes, between incremental reforms and structural changes, and between rapid changes and periods of adaptation.

This report explores the relationship between the 'sustainable transition' and 'competitiveness for wellbeing' and identifies the main challenges and opportunities facing the Basque Country

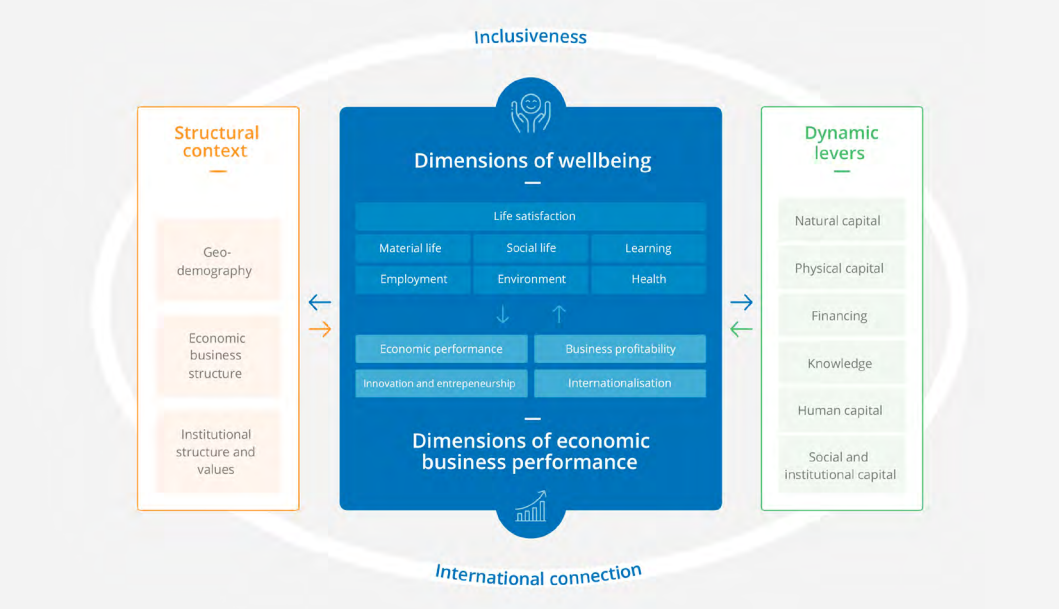
The success of the sustainability transition will crucially depend, therefore, on our ability to advance with significant changes which simultaneously strengthen the pillars of regional economic competitiveness and the different dimensions of wellbeing. In this context, this report explores the relationship between the 'sustainability transition' and 'competitiveness for wellbeing' and it identifies the main challenges and opportunities that the Basque Country faces in this process.

In fact, the challenge of environmental sustainability has been a common factor in the conclusions of the last three Competitiveness Reports. In 2020, in the context of recovery from the pandemic, the report emphasised the need to promote a green transition to strengthen the resilience of the economy and society. The introduction of our new competitiveness for wellbeing framework in 2021 highlighted the need to accelerate this transition to improve performance in terms of the environmental dimension of wellbeing. And in 2022, based on an analysis of the foundations of Basque competitiveness, among the five priority cross-disciplinary actions identified was 'promoting the leadership of a new sustainable industrial competitiveness' (Orkestra, 2020, 2021, 2022a).

Orkestra's framework can help better understand the complexity of the transition towards sustainable competitiveness

Orkestra's competitiveness for wellbeing framework is a holistic framework, designed to understand and strengthen the determining factors of a territory's competitiveness and wellbeing (see Figure 0-1). It recognises the importance of the structural context and a series of six dynamic drivers that can be acted upon to simultaneously influence the economic/business performance of the region and the wellbeing of the population. In this sense, the framework it is well-suited to understanding the complexity of the transition towards sustainable competitiveness.

**FIGURE 0-1** Territorial competitiveness for wellbeing framework




*Source:* Orkestra (2021).

The aim of this report is to apply this framework from the perspective of environmental sustainability in order to:

- Have a more sophisticated sense of competitiveness and wellbeing outcomes consistent with sustainable competitiveness (the blue part of Figure 0-1).
- Explore how we can advance the transition towards sustainable competitiveness through the different dynamic drivers: natural capital, physical capital, financing, knowledge, human capital, and social capital (the green part).

The first chapter of the report provides an analysis of the Basque Country's performance in terms of competitiveness and wellbeing, with commentary on the most recent evolution of some 36 indicators and a special focus on environmental performance. In Chapter 2, we present the international, European, and Basque context regarding the transition towards sustainable competitiveness and identify the drivers to accelerate this transition. Some of the key dimensions of these drivers in the Basque Country are analysed in detail in Chapter 3, leading to a series of final conclusions and recommendations.

# 1
# Competitiveness and wellbeing in the Basque Country

In this chapter, we focus on the central part of the competitiveness framework for wellbeing in order to obtain an updated analysis of the Autonomous Community of the Basque Country's recent performance, both in terms of the four dimensions of economic/business performance and the seven dimensions of wellbeing.

Indicators have been selected based on their suitability and availability

The analysis is based on indicators that have been selected bearing in mind, firstly, their relevance for understanding the dimension in question (the suitability of the indicator) and secondly, the availability of recent comparable data (the feasibility of the indicator). Like in previous editions of the competitiveness report, we have attempted to select indicators that allow us to make a comparison with other relevant European regions. However, to expand the possibility of including more suitable indicators, there are cases in which the only comparison is with countries, the Spanish average, or the other autonomous communities. For ease of analysis, we have selected the following territories: (i) two European regions (Baden-Württemberg and Upper Austria) due to their similar characteristics to the Basque Country and positive economic and social performance (Orkestra, 2020); (ii) Germany as a European benchmark country; (iii) the EU with 27 members (EU-27), for the purpose of comparison with the average European reality; and (iv) Spain, to learn how the Basque Country compares with the national average. We present the data for these territories whenever they are available.

Furthermore, the assessment combines the most recent snapshot (based on the most recent data available) with an eye on trends which makes it possible to analyse how the situation has evolved in recent years, specifically since 2013, the year the previous economic crisis hit rock bottom and we began to see a recovery.

## 1.1 Dimensions of economic-business performance

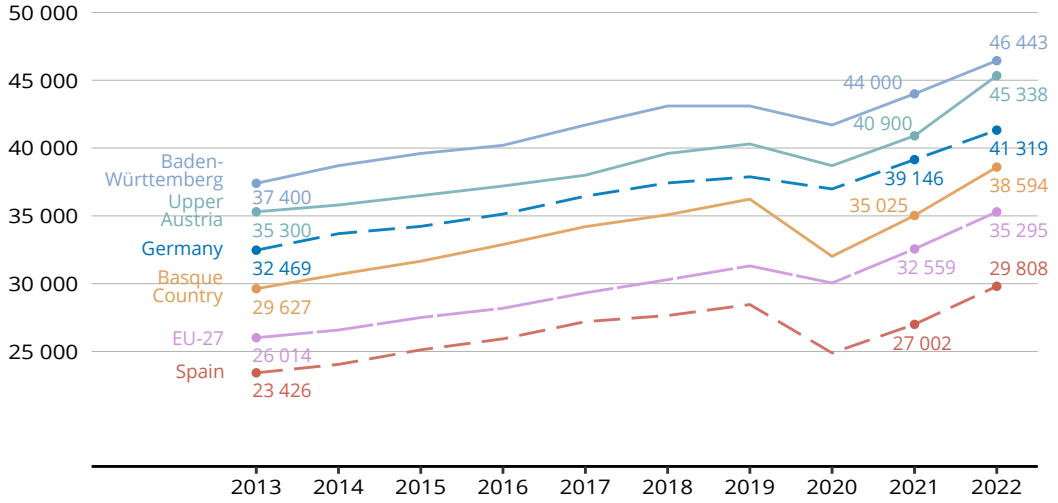
### *1.1.1. Economic performance*

GDP per capita in the Basque Country in 2022 was 109.5 % of that of the EU-27, still below the average of 115 % in the 2013-2019 period

In this section we discuss the capacity of an economic-business system to generate wealth and added value, in the understanding that this is an intermediate objective with the aim of increasing wellbeing among the population. The most common indicator to compare the level of wealth and trends in competitive performance be-

tween territories is **GDP per capita**, measured in terms of purchasing power parity (PPP). As seen in Graph 1-1, the economies considered in the comparison made significant growth recoveries after the sharp general decline due to the crisis caused by COVID-19. In 2022, the level of GDP per capita of the Basque Country represented 109.5 % of the value of the EU-27; although it was still below the average of 115 % in the 2013-2019 period.[1]

**GRAPH 1-1** GDP per capita (PPP)




*Source:* Eurostat and Eustat. Compiled by authors.

*Note:* For Baden-Württemberg and Upper Austria, their GDP in 2022 was estimated considering national growth, respectively. For the Basque Country, the PPP adjustment was applied to the difference between the Basque Country and the Spanish average, calculated by Costa *et al.* (2015).

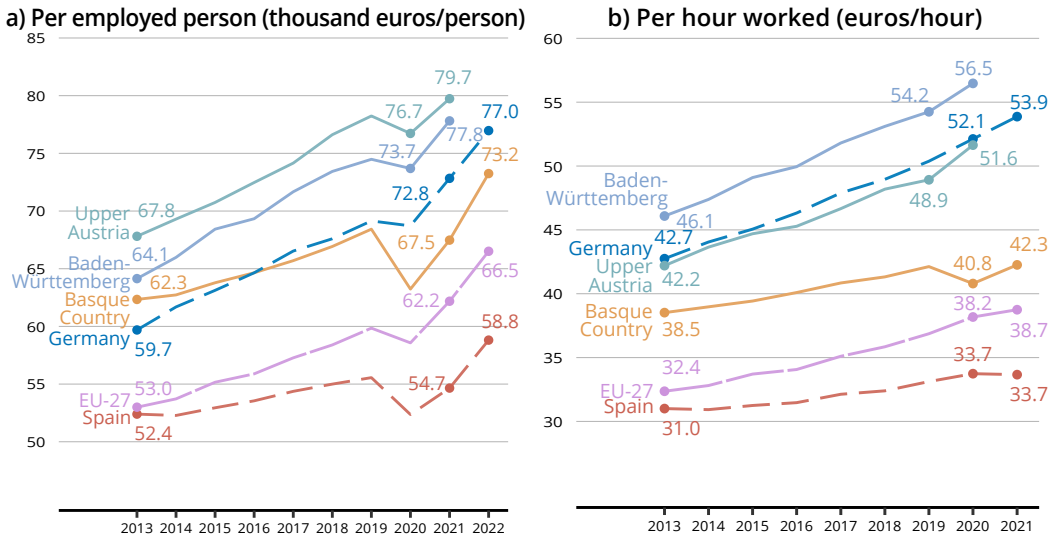
Both employment rate and productivity have an impact on the level and variation of the per capita income indicator. Whereas there are physical, legal, and social limits to growth of the employment rate, productivity is a sustainable source of progress. There are various methods of measuring productivity. Here, we will use **apparent labour productivity**, which is the ratio of a measure of output (gross added value in euros) and the resources used (the number of employed people or hours worked).

Post-pandemic productivity recovery in the Basque Country has been significant, and the gap with Germany decreased in 2022

As seen in Graph 1-2, the apparent labour productivity level for the overall economy positions the Basque Country below the two European benchmark regions and Germany and above the EU-27 and Spanish average. Regarding evolution, no significant differences are seen between the territories. Post-pandemic recovery in the Basque Country is significant, and the gap with Germany decreased in 2022.

[1] It should be noted that this indicator does not measure performance in real terms; that is, inflation is not accounted for, although it does reflect inflation differences with respect to the EU-27 average.

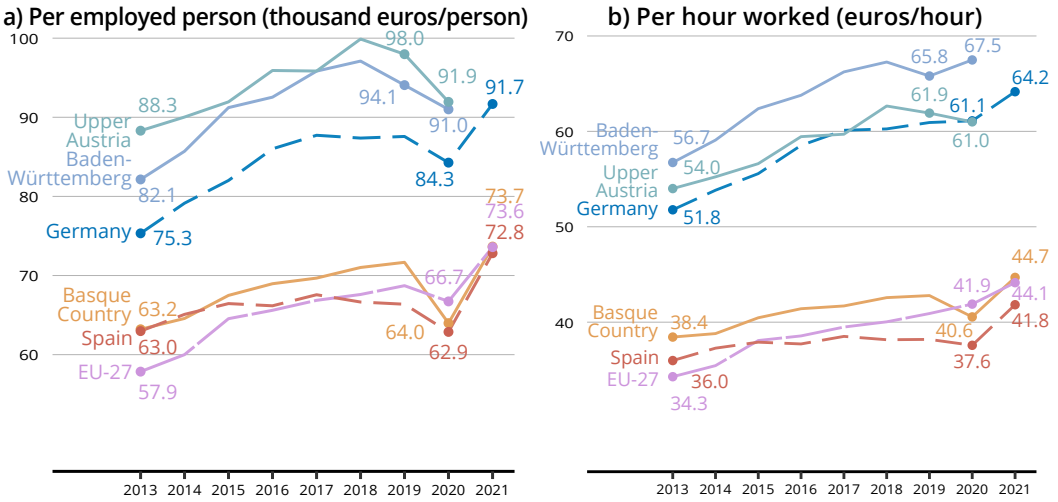
**GRAPH 1-2** Apparent labour productivity - Overall economy




*Source:* Eurostat and Eustat. Compiled by authors.

A major determining factor of a region's productivity is its sectoral composition. For this reason, in Graph 1-3 we analyse labour productivity for the manufacturing sector, due to its relevance for the Basque economy and because it is a sector more open to foreign competition. Germany continued to be superior to the rest of the territories for which data existed in 2021. In the case of the Basque Country, the sharp fall in 2020 was brought on by a smaller relative reduction in employment than in other territories (effect of the temporary redundancy plan) and a greater relative decrease in gross value added. In 2021, as expected, productivity per employed person recovered, to slightly exceed that of the EU-27. Considering productivity per hours worked, the estimated indicator for the Basque Country in 2021 was above the figure from prior to the pandemic (2019), slightly above the EU-27, and well above Spain.

**GRAPH 1-3** Apparent labour productivity – Manufacturing sector




*Source:* Eurostat and Eustat. Compiled by authors.

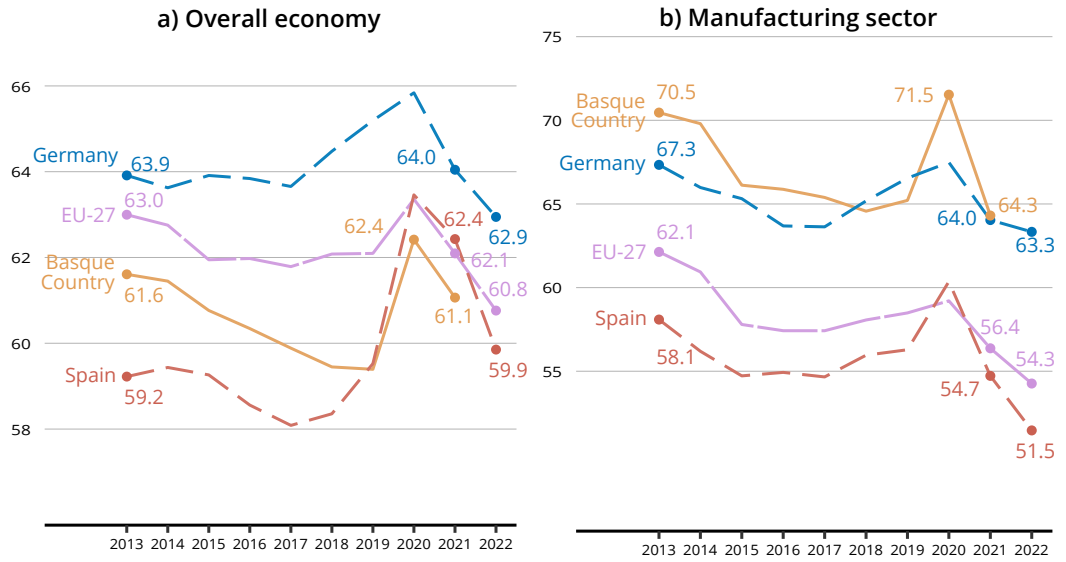
### *1.1.2. Business profitability*

Having analysed what is happening in terms of economic performance in the economy as a whole, this section focuses on studying the ability of the economic-business system to generate profitability in its activities. The section begins by analysing **unit labour costs (ULC)**, which captures the underlying relationship between labour compensation (which influences the company's bottom line) and productivity (which is a measure of efficiency and innovation).

Unit labour costs in the manufacturing sector improved notably in 2021 and are at a level similar to that of Germany

In Graph 1-4, we observe that in the Basque economy as a whole ULC (calculated per worker) decreased until 2019, and in 2020 the consequences of the pandemic were noted. In 2021, ULC in the Basque Country decreased significantly and were below the figure for Spain and the EU-27 (all well below Germany). From the end of the prior economic crisis and until 2019, the evolution of ULC in the manufacturing sector was similar to that of the economy as a whole, showing a slight downward trend. In 2020, the effects of the pandemic were noted, especially through their impact on gross value added and, in turn, productivity (which is the denominator of the ULC indicator). In 2021, a notable decrease in ULC was recorded, arriving at a level similar to that of Germany.

**GRAPH 1-4** Unit labour cost (ULC) (%)

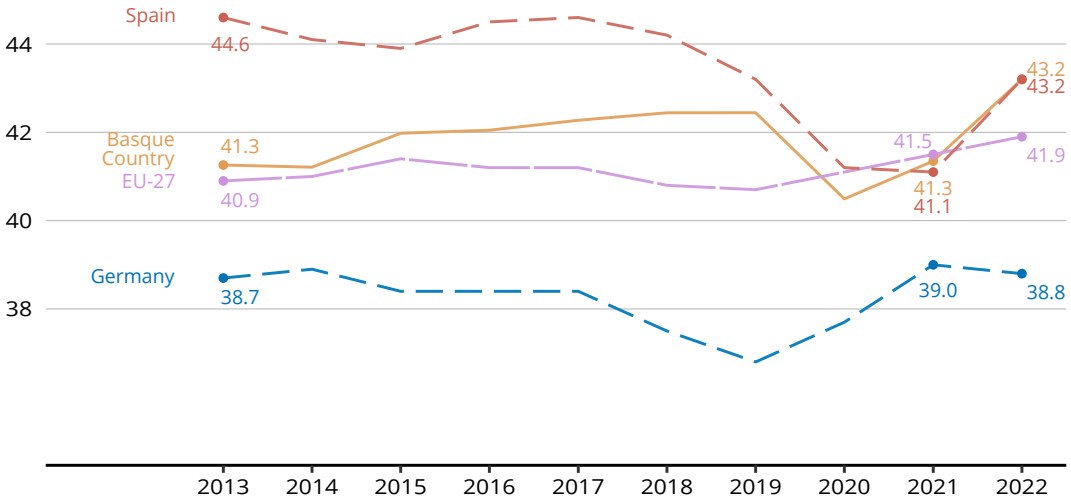



*Source:* Eurostat and Eustat. Compiled by authors.

The portion of the total income of the economy earned by capital increased in 2022

In addition to labour costs, we also analyse **gross operating surplus**, defined as the surplus generated by operating activities after deducting labour (specifically, employees). Therefore, this indicator reflects the portion of the total income of the economy that is earned by capital. However, it should be clarified that this includes income from self-employed workers and consumption of fixed capital (or depreciation and amortisation). In Graph 1-5, we can see a greater share of capital income in the Basque Country and Spain compared to the EU-27 average (with the exception of the pandemic years). Germany remains quite a bit lower than the other territories.

**GRAPH 1-5** Gross operating surplus (% GDP)




*Source:* Eurostat and Eustat. Compiled by authors.

Lastly, we present trends in the two indicators representing business profitability: **return on assets (ROA)** and **return on equity (ROE)**. In both cases, Basque companies show a recovery in 2022 and remain at a level similar to that of Spain.[2]

**TABLE 1-1** Business profitability indicators

| | Basque Country (a) | | | Spain (a) | | | Europe (b) | |
|---|---|---|---|---|---|---|---|---|
| | 2013 | 2020 | 2022 (p) | 2013 | 2020 | 2022 (p) | 2013 | 2021 |
| **ROA** | 2.3 | 2.3 | 5.2 | 1.6 | 3.2 | 5.4 | 3.5 | 4.3 |
| **ROE** | 1.8 | 3.5 | 8.7 | 1.1 | 5.3 | 8.6 | 6.7 | 9.7 |

*Source:* (a) SABI-Informa and (b) BACH. Compiled by authors

*Notes:* SABI data for 2022 are provisional. The sample contains data from approximately 2.4 million Spanish companies that are active and excludes companies in the financial sector (NACE 64-66) and holdings (NACE 7010), of which 14,635 are from the Basque Country.

### *1.1.3. Innovation and entrepreneurship*

In July 2023, the European Commission *et al.* (2023) published the latest edition of the Regional Innovation Scoreboard (RIS), which compares the ability to bring about innovation in 239 European regions for 21 of the 32 indicators from the European Innovation Scoreboard 2023. The European regions are classified into four categories according to the value they achieve in the RIS: innovation leaders (36 regions), strong innovators (70 regions), moderate innovators (69 regions), and emerging innovators (64 regions).

[2] The analysis of Basque companies compared to those in Europe used two sources: balance sheet and income statement data at company level from the Bureau Van Dijk SABI-Informa Database and data from the BACH Project (Bank for the Accounts of Companies Harmonised). This latter source of information contains data from companies in the following European countries: Austria, Belgium, Czech Republic, France, Germany, Italy, Poland, Portugal, Slovakia and Spain. Despite the fact that accounting systems and practices are not entirely homogeneous among countries, and that there are differences between BACH (EU-10) and SABI (Basque Country and Spain), we feel that for the indicators selected, the degree of homogeneity is sufficient for the comparison to provide valid results.

The Basque Country is a strong innovator in the 2023 Regional Innovation Scoreboard, rising from 93rd to 72nd in the ranking of 239 European regions

Reaching 109.8 relative points compared to the EU-27 average (103.6 points in 2021), the Basque Country is among the strong innovators, rising from position 93 to position 72 in the ranking of European regions. Like in the previous edition, the Basque Country has obtained the 'pocket of excellence' designation as it is a region classified as a strong innovator inside a country that is a moderate innovator.

In the context of this good overall innovation system performance, we analyse four indicators in this section to measure the innovative activity of Basque companies: **percentage of innovative companies, percentage of product innovative companies, percentage of process innovative companies,** and **sale of new products** (total sales percentage). In order to make a comparison with other territories, we have followed the Eurostat methodology, including in our analysis only companies with 10 or more workers from the so-called 'core' sectors, which are more prone to innovate (industry —excluding construction— and commercial services with an innovative profile).[3]

Table 1-2 includes the performance for the four indicators in SMEs. We focus our analysis on said performance, as the SME group is the group in which companies face greater barriers to innovate and generally have worse results. All performance data —broken down by sector (industry and services) and by business size— are included in Annex I.

**TABLE 1-2** Percentage of SMEs (between 10 and 249 employees) that innovate

| | Basque Country | | | Spain | | Germany | | EU-27 | |
|---|---|---|---|---|---|---|---|---|---|
| | 2018 | 2020 | 2021 | 2018 | 2020 | 2018 | 2020 | 2018 | 2020 |
| **Innovators (% of total SMEs)** | 39.9 | 38.8 | 39.6 | 30.0 | 32.3 | 66.6 | 67.5 | 49.2 | 51.5 |
| **Product innovators (% total SMEs)** | 23.9 | 25.3 | 24.5 | 13.8 | 17.9 | 38.7 | 34.1 | 28.7 | 27.3 |
| **Process innovators (% of total SMEs)** | 33.6 | 30.2 | 30.7 | 22.9 | 26.1 | 54.2 | 54.8 | 40.0 | 42.5 |
| **Sales of new products (% of total sales)** | 12.7 | 13.2 | 12.0 | 7.2 | 11.7 | 6.9 | 6.2 | 7.8 | 8.2 |

*Source:* Eurostat and Eustat. Compiled by authors.

The percentage of SMEs with innovative activities rose in 2021, but it remains slightly below the where it was prior to the pandemic and far from the EU-27 average

In 2021, the percentage of Basque SMEs with **innovative activities** rose when compared to the previous year, reaching 39.6 % (compared to 38.8 % in 2020). However, this percentage was still slightly below the levels that existed prior to the COVID-19 crisis. For comparison with other territories, in the case of Spain and the EU-27, data are available until 2020. In the absence of more recent data for these territories, tak-

[3] In the case of the Basque Country, the data refer to establishments. The NACE classifications included in the so-called 'core' sectors are B: Mining and quarrying, C: Manufacturing industry, D: Electricity, gas, steam, and air conditioning supply, E: Water supply, sewerage, waste management, and remediation activities, 46: Wholesale trade, except motor vehicles and motorcycles, H: Transportation and storage, J: Information and communication, K: Financial and insurance activities, 71: Architectural and engineering activities; technical testing and analysis, 72: Scientific research and development, and 73: Advertising and market research. Due to the methodological change introduced in 2018, data from that year on are presented, but not from the previous years because they are not completely comparable.

ing into account all the years included in the analysis, it can be observed that the percentage of innovative SMEs in the Basque Country is higher than that of Spain, but lower than that of the EU-27 and especially Germany, with differences being more notable in small companies (10-49 workers) than in medium-sized companies (50-249 workers).[4]

By innovation type, the percentage of SMEs with **product innovation** is also higher in the Basque Country than in Spain, but lower than in the EU-27 and Germany. Regarding the indicator's evolution within the territory, a slight decrease can be observed between 2020 and 2021, brought on by a reduction in the percentage of medium-sized product innovators.

As in the rest of the territories, the percentage of SMEs in the Basque Country that have **process innovation** is higher than that of SMEs with product innovation. In process innovation the Basque Country also holds an intermediate position, with levels higher than Spain but lower than those of the EU-27 and Germany. If we go into detail about this type of innovation, we can see that the Basque Country is especially well positioned in terms of one innovation type related to production processes: innovation in manufacturing methods. In this innovation type, the proportion of innovative SMEs (close to 20 %) is similar in the Basque Country, Germany, and the EU-27. However, the Basque Country is far from Germany in innovations with information processing and communications (20 % in the Basque Country compared to 34 % in Germany). Likewise, the Basque Country is quite behind compared to the EU-27 and Germany in all categories related to organisational innovation (especially in the category of organisation and human resources, where the EU-27 and Germany reach values of 21 % and 29 % respectively, compared to 11 % in the Basque Country) and marketing innovation (where the percentages are 13 % in the Basque Country, compared to 17 % in the EU-27 and 22 % in the SMEs of Germany). Upon analysing evolution over time, one can observe that the percentage of SMEs with process innovation decreased between 2018 and 2020, but it recovered slightly between 2020 and 2021.

The percentage of **sales of new or improved products**, considering all sales made by SMEs in the Basque Country during all the years analysed, is higher than that of the rest of the territories, mainly due to the higher percentage of sales of new or improved products in medium-sized companies in the territory when compared to companies of the same size in other territories. However, a decline can be observed in the indicator in 2021, placing the percentage of sales of new products at lower levels than in 2018.

[4] Both the CIS (Community Innovation Survey) and the Spanish National Statistics Institute Business Innovation Survey are biennial. The Spanish National Statistics Institute survey was an annual survey until 2019, but it has been biennial since 2020.

## BOX 1 Green innovation in SMEs

From 2020 onwards, both the Eustat Innovation Survey and the Eurostat Community Innovation Survey (CIS) include a series of questions on innovations with environmental benefits. On the one hand, the survey questions aim to understand the environmental benefits obtained within the company, as well as those obtained during the consumption or use of the goods or services by the end user. On the other hand, they try to measure the importance of different factors in decisions to introduce innovations with environmental benefits.

80 % of companies with innovative activities obtained environmental benefits from innovation

Table 1-3 shows the percentage of companies that feel as though they have introduced innovations with significant environmental benefits out of the total number of companies overall and out of the total number of companies with innovative activities. It can be observed that in 2021, 32.2 % of all establishments and 80 % of establishments with innovative activities obtained environmental benefits from innovation, figures higher than the previous year (27 % and 68.4 % respectively).

During the two years analysed, the percentage of establishments with environmental benefits obtained during the consumption or use of the goods or services by the end user was greater than the percentage of establishments with environmental benefits obtained within the establishment itself. In terms of the evolution between 2020 and 2021, a greater increase is also observed in the percentage of establishments that feel as if environmental benefits are obtained during use (5.6 percentage points) when compared with the percentage of establishments that feel as if benefits are obtained within the establishment itself (3.6 percentage points).

Basque companies feel that their innovation impacts especially on reducing energy use/carbon footprint and recycling waste, water, and/or materials

In the breakdown of the types of benefits that companies obtain within the establishment in the Basque Country, a reduction in energy use and/or in the $CO_2$ footprint (12.9 %) and the recycling of waste, water, and/or materials for the establishment's own use or sale (12.2 %) are where the greatest percentage of establishments feels that their innovations have an impact. Regarding the environmental benefits obtained during consumption or use, noteworthy is the recycling of products after use (19.8 % of establishments), followed by a reduction in energy use and/or the carbon footprint (13.8 %).

In comparison with other territories, the 2020 data from the Basque Country show that the percentage of Basque companies with significant environmental benefits of different types is higher than in Spain for all the categories included in the survey. In comparison with Germany and the EU-27, especially noteworthy is the higher percentage of Basque companies which feel they get a positive impact from their innovations by facilitating product recycling after use. Furthermore, if the percentage of innovative companies with environmental benefits is considered, higher figures are observed in the Basque Country than in Germany and the EU-27 in all the categories studied.

There has been a notable increase in the percentage of establishments that cite the high costs of energy, materials, and water as a motive for innovation

Table 1-4 shows the percentage of companies that assign a medium or high degree of importance to different factors in their decisions to introduce innovations with environmental benefits. In 2021, the main motivations for the introduction of innovations with environmental benefits in the Basque Country included: the high cost of energy, materials, and water (32 %), improvement of the company's reputation (31.7 %), voluntary actions or initiatives related with good environmental practices in the sector (31.1 %), and environmental regulations (31.2 %). As far as evolution over time goes, the increase in the percentage of establishments that assigned a medium or high degree of importance to the high cost of energy, materials, and water between 2020 and 2021 stands out (8.6 percentage points). In comparison with other territories, companies in the Basque Country generally assign a greater degree of importance to the different factors considered.

**TABLE 1-3** Percentages of companies with 10 or more employees that innovate with environmental benefits

| | % of total companies | | | | | % of innovative companies | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Basque | | Spain | Germany | EU-27 | Basque | | Spain | Germany | EU-27 |
| | 2020 | 2021 | 2020 | 2020 | 2020 | 2020 | 2021 | 2020 | 2020 | 2020 |
| **Innovations with environmental benefits** | 27.0 | 32.2 | N/A | N/A | N/A | 68.4 | 80.1 | N/A | N/A | N/A |
| **Environmental benefits obtained within the establishment** | 20.1 | 23.7 | N/A | N/A | N/A | 51.0 | 58.9 | N/A | N/A | N/A |
| **Reduced material or water usage per unit produced** | 4.2 | 5.6 | 2.1 | 4.3 | 4.6 | 10.7 | 14.0 | 6.3 | 6.3 | 8.8 |
| **Reduced energy use or $CO_2$ footprint (i.e. total reduction of $CO_2$ emissions)** | 9.6 | 12.9 | 3.1 | 10.3 | 7.7 | 24.4 | 32.0 | 9.2 | 15.0 | 14.9 |
| **Reduced soil, noise, water or air contamination** | 5.3 | 7.4 | 2.2 | 6.9 | 5.5 | 13.5 | 18.4 | 6.7 | 10.0 | 10.7 |
| **Replaced part of the materials with less polluting or hazardous materials** | 5.4 | 7.0 | 2.9 | 2.9 | 4.6 | 13.7 | 17.3 | 8.6 | 4.2 | 8.9 |
| **Replaced a portion of fossil energy with renewable energy sources** | 6.8 | 7.8 | 1.6 | 6.2 | 3.9 | 17.2 | 19.4 | 4.7 | 9.0 | 7.6 |
| **Recycled waste, water or materials for own use or sale** | 9.5 | 12.2 | 3.7 | 5.7 | 5.7 | 24.0 | 30.2 | 11.2 | 8.2 | 11.1 |
| **Environmental benefits obtained during the consumption or use of the goods or services by the end user** | 21.5 | 27.1 | N/A | N/A | N/A | 54.5 | 67.3 | N/A | N/A | N/A |
| **Reduction in energy use and/or the carbon footprint** | 9.0 | 13.8 | 2.4 | 9.1 | 6.8 | 22.9 | 34.4 | 7.2 | 13.2 | 13.2 |
| **Reduced air, water, soil or noise pollution** | 6.1 | 9.0 | 2.1 | 6.1 | 5.1 | 15.4 | 22.4 | 6.3 | 8.9 | 9.8 |
| **Facilitated recycling of products after use** | 15.6 | 19.8 | 4.7 | 5.2 | 5.2 | 39.4 | 49.2 | 14.1 | 7.5 | 10.1 |
| **Extended the useful life of its products through longer-lasting** | 8.6 | 10.1 | 2.5 | 5.9 | 5.0 | 21.8 | 25.1 | 7.6 | 8.6 | 9.7 |

*Source:* Eurostat and Eustat. Compiled by authors.

*Note:* The EU-27 data do not include Belgium, Greece, Ireland and the Netherlands.

**TABLE 1-4** Percentage of companies that assign a medium or high degree of importance to different factors in their decisions to introduce innovations with environmental benefits

| | % of total companies | | | | | % of innovative companies | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Basque Country | | Spain | Germany | EU-27 | Basque Country | | Spain | Germany | EU-27 |
| | 2020 | 2021 | 2020 | 2020 | 2020 | 2020 | 2021 | 2020 | 2020 | 2020 |
| **Environmental regulations** | 27.6 | 31.2 | 7.4 | 23.5 | 14.9 | 69.9 | 77.6 | 22.1 | 34.1 | 29.9 |
| **Existing environmental taxes, fees or charges** | 18.1 | 21.1 | 5.6 | 14.5 | 10.4 | 45.7 | 52.4 | 16.8 | 21.1 | 20.8 |
| **Expected future environmental regulations or fees** | 19.3 | 22.2 | 5.9 | 19.4 | 12.5 | 48.9 | 55.3 | 17.6 | 28.3 | 25.2 |
| **Government grants, subsidies or other financial incentives for environmental innovations** | 15.3 | 18.8 | 3.8 | 12.4 | 8.3 | 38.8 | 46.7 | 11.4 | 18.0 | 16.7 |
| **Existing or anticipated market demand for environmental innovations** | 22.0 | 25.0 | 6.4 | 14.8 | 11.3 | 55.7 | 62.2 | 19.1 | 21.5 | 22.7 |
| **Improvement of the company's reputation** | 29.7 | 31.7 | 8.8 | 21.7 | 16.2 | 75.3 | 78.9 | 26.3 | 31.5 | 32.4 |
| **Voluntary actions or initiatives related with good environmental practices in the sector** | 27.7 | 31.3 | 8.1 | 17.4 | 13.4 | 70.1 | 77.9 | 24.2 | 25.2 | 26.9 |
| **High cost of energy, materials or water** | 23.4 | 32.0 | 7.3 | 27.5 | 16.2 | 59.1 | 79.6 | 21.7 | 39.9 | 32.4 |
| **Need to comply with the requirements of public** | 16.8 | 18.4 | 3.9 | 7.2 | 6.6 | 42.6 | 45.7 | 11.8 | 10.4 | 13.1 |

*Source:* Eurostat and Eustat. Compiled by authors.

*Note:* The EU-27 data have been calculated based on the data available for 19 countries: Bulgaria, Cyprus, Croatia, Denmark, Germany, Estonia, France, Hungary, Latvia, Lithuania, Luxembourg, Slovakia, Slovenia, Spain, Malta, Poland, Portugal, Romania, and Sweden.

To analyse the level of entrepreneurship, we begin by looking at the **Total Entrepreneurial Activity (TEA)** rate calculated by the GEM project and which, according to the 2022-2023 GEM Report on the Basque Country, quantifies the percentage of the population aged 18-64 in one of these two phases of initial entrepreneurship:[5]

- Entrepreneurs in the beginning phase who are carrying out serious actions to start a business in which they will participate as owners and managers, but which has not paid salaries for more than three months.

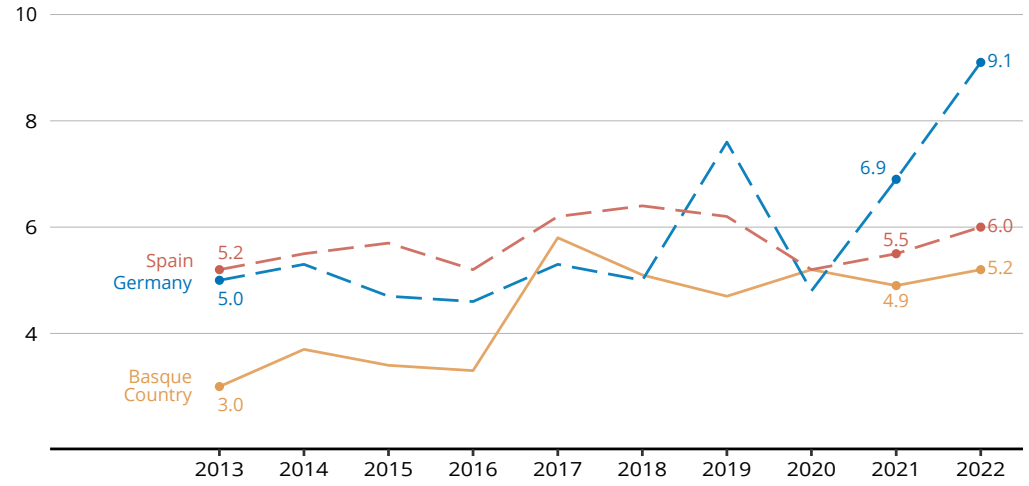
[5] In addition to the TEA, the GEM Report on the Basque Country (Saiz-Santos *et al.*, 2023) offers a broad overview of the Basque entrepreneurial ecosystem.

- Entrepreneurs in the new phase who own and manage a business that has paid salaries for more than 3 months but less than 42 months and, therefore, is not consolidated.

In Graph 1-6, it can be seen that in the Basque Country the TEA is generally below the level of Spain and Germany, although in 2020 the TEA rates were similar, due to the slight growth that occurred in the Basque Country and the decrease in the other two territories. In the last two years, entrepreneurship rates have increased in Spain and Germany (in the latter case exceeding pre-pandemic levels). In the Basque Country, the rate fell slightly in 2021 and increased slightly again in 2022, but it is still below the levels of Spain and Germany.

The Total Entrepreneurial Activity rate fell slightly in 2021 and increased slightly in 2022, and remains below the levels of Spain and Germany

**GRAPH 1-6** Total entrepreneurial activity (TEA) (% population 18-64 years old)




*Source:* 2022-2023 Basque Country GEM Report and GEM Project. Compiled by authors.

*Note:* Data for the EU-27 are not included because the number of countries participating in the project varies each year.

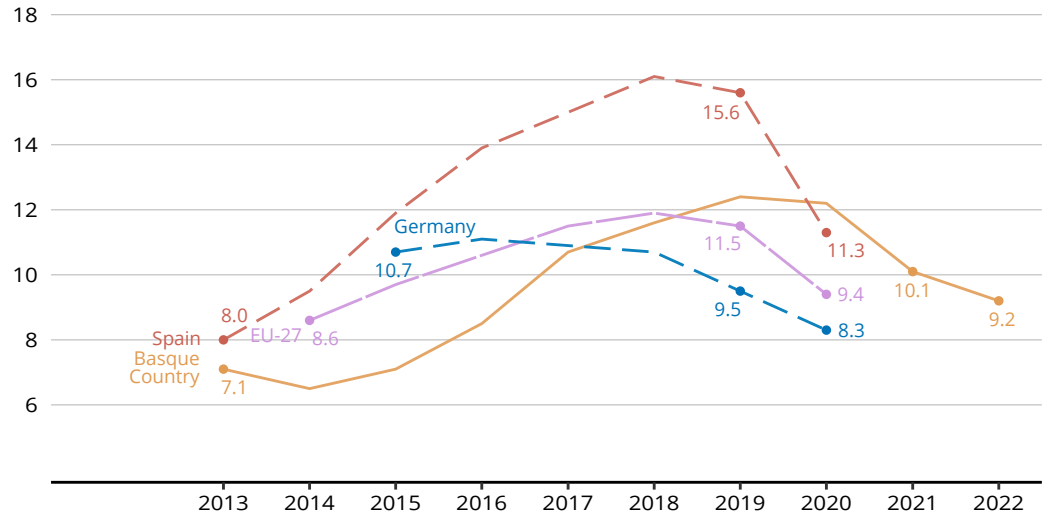
As the TEA measures the level of entrepreneurship, it can occur in any economic sector and under different circumstances, and not all of them will have the same chances of success or a similar impact on the territory. The potential of these new entrepreneurial activities to generate employment, which would be one of the desirable objectives, can be measured first and foremost through the growth expectations of the entrepreneurs themselves. Thus, the 2021-2022 GEM Report on the Basque Country indicates that in the Basque Country, the percentage of entrepreneurs in the initial phase with expectations of having 20 or more people employed in 5 years was 5.3 %, similar to that of Spain (5.6 %) and lower than in Germany (8.7 %). This suggests that not only is the level of entrepreneurship lower but also the expectations that entrepreneurship will generate a significant amount of employment (Saiz-Santos *et al*., 2022). As this piece of data relates to expectations that may or may not be met, we complement our analysis with an indicator that allows us to assess the presence of **high-growth companies** in the region, defined based on the following criteria:

- They belong to sectors of the business economy (excluding holding activities).
- Their average annual growth in number of employees is more than 10 % per year for a period of three years, and they had at least ten employees when they began to grow.

The percentage of high-growth companies increased in the Basque Country until 2019, but decreased in 2021 and 2022

As seen in Graph 1-7, the percentage of high-growth companies increased in the Basque Country from 2014 to 2019, stabilised in 2020 (the last year for which there is comparable data) and fell in 2021 and 2022. The percentages were higher in Spain than in the rest of the territories, and in the EU-27 a drop in this indicator already occurred slightly in 2019 and more noticeably in 2020. In Germany the decline began even earlier, starting in 2017. As this is a very cyclical indicator (companies grow more during bullish phases), the good figures that Spain had until 2019 and that the Basque Country had until 2020 can be partly explained because the Spanish and Basque cycles, characterised by a certain lag and by a greater degree of oscillation than in Europe, were at the end of the bullish phase. Likewise, when interpreting the performance from recent years, it must be taken into account that, as the indicator requires growth in three consecutive years and despite the recovery that began in 2021, the 2020 results have a drag-down effect.

**GRAPH 1-7** High-growth companies (% of companies with more than 10 employees)




*Source:* Eurostat and Eustat. Compiled by authors.

### *1.1.4. Internationalisation*

This section analyses the evolution of external trade (exports and balance of trade) for the Basque Country. The analysis begins by considering the evolution of international trade in goods, for which precise data are available through customs records. Below, we report performance in international trade in goods and services, calculated using the demand-driven approach. As out-of-region trade includes not only international trade but also trade with the rest of the regions of the State, when addressing the exchange of goods and services our analysis includes also the evolution of trade between the Basque Country and the rest of the Spanish regions, so as to have a complete view of external trade.

After the drop in 2020, exports of goods from the Basque Country recovered in 2021 and continued to increase in 2022, partly linked to the increase in energy prices

Regarding only the **international exports of goods** (Graph 1-8), after the pronounced drop in 2020 that occurred in all territories, exports recovered in 2021 and continued to increase in 2022. The proportion of goods exported from the Basque Country is below the European and German average, but above the Spanish average. However, rather than this being an indication of a greater export effort being made by Basque companies producing goods compared to their Spanish counterparts, this is more a reflection of differences in production structures in the two economies. If

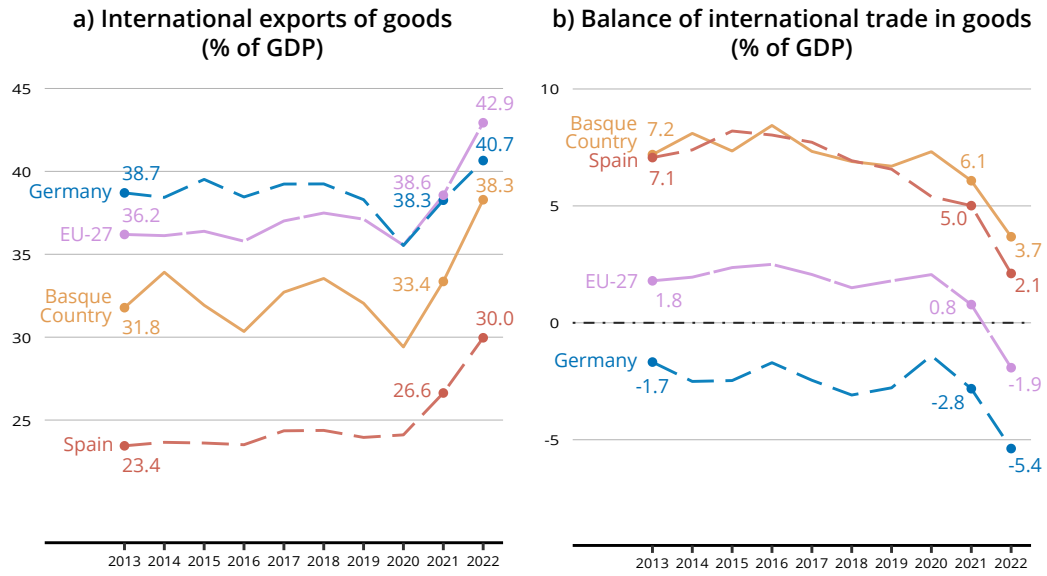
exports are qualified with respect to agroindustrial GVA —that is, the sectors that generate goods— the values of Spain and the Basque Country are very similar (163 and 166 respectively in 2022), compared to the higher values of Germany (180) and the EU-27 (212).

If Basque exports are observed in detail, distinguishing exports of energy and non-energy products, growth is seen in both cases, but it is much more pronounced in the case of the energy exports (which grew by 44 % in 2021 and 109 % in 2022) than in the case of non-energy products (which grew by 22 % each year). If we also take into account the considerable increase in the price of energy products over the last two years, it can be concluded that the growth observed in exports is partly linked to the increase in the price of energy.

Imports of goods have grown proportionally more than exports

Regarding the **balance of international trade in goods as a proportion of GDP**, it should be noted that, although the Basque Country remains the highest of the four territories considered (3.7 %), values decreased in 2021 and 2022, something that also happened in the rest of the territories. This indicates that imports of goods have grown proportionally more than exports. Also in the case of the balance of trade, a difference in behaviour is observed between energy and non-energy products. For non-energy products the surplus is around 10 % of GDP in both years. However, the deficit of energy products increased from 4.1 % to 6.7 %. This indicates that, although exports of these products increased considerably, imports increased to an even greater extent.

**GRAPH 1-8** Exports and balance of international trade in goods




*Source:* Eurostat and Eustat. Compiled by authors.

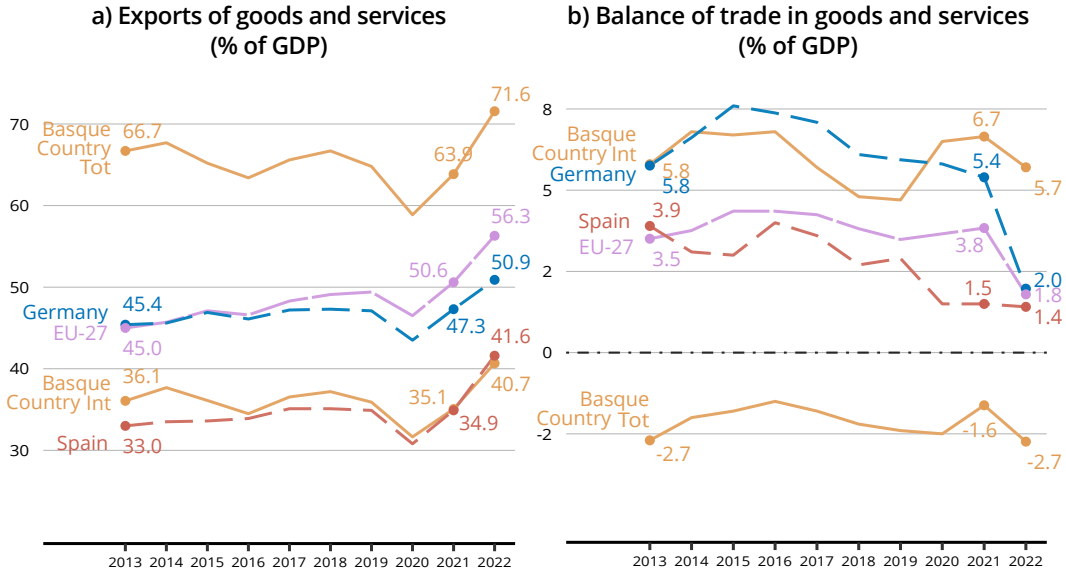
Graph 1-9 shows that before the pandemic **international exports of goods and services** from the Basque Country were around 36 % of GDP, similar to Spain but far from Germany and the EU-27 average. The pandemic shrunk exports for all territories in 2020, but they began to grow again in 2021 and 2022, greatly exceeding pre-pandemic values and reaching 40.7 % of GDP in the case of the Basque Country. It should also be noted that the EU-27 average is beginning to diverge from Germany. This indicates that there are other countries with higher export percentages, espe-

cially smaller countries that tend to be less self-sufficient and more open to the outside. If exchanges with the rest of the State are added to international exports, **total exports** reach 71.6 % of GDP in the Basque Country.

The Basque Country's balance of international trade in goods and services is positive and greater than that of other territories analysed, but the total balance of trade (which includes the rest of Spain) is negative and increased in 2022

The **balance of international trade in goods and services** is positive and improved considerably in the Basque Country in 2020, indicating that the reduction in imports during the pandemic was even greater than the shrink in exports. Something similar (although to a lesser extent) occurred in the EU-27, but not in Germany (where the balance remained almost constant) nor in Spain (where it worsened considerably). In 2021, the balance of international trade for the Basque Country remained at a similar level to that of the previous year, and in 2022 there was a drop, but to a lesser extent than in other territories. Therefore, the Basque Country remains above the other territories considered. However, if the balance of trade with the rest of the State is considered it is observed that the **total balance of trade** for the Basque Country is in deficit. Moreover, after an improvement in 2021, this deficit worsened in 2022 as a result of both the decline in the foreign-trade surplus and the increase in the deficit in exchanges with the rest of the State.

**GRAPH 1-9** Exports and balance of trade in goods and services




*Source:* Eurostat and Eustat. Compiled by authors.

*Note:* In the case of the Basque Country, 'Int' refers to exports and balances of trade abroad, while 'Tot' also includes exchanges with the rest of the state.

Considering the above, we can conclude that the international exports of the Basque Country, which are high due to our productive structure, increased in 2022, particularly due to the favourable evolution of energy exports and an increase in price of these products. However, the increase in energy prices has also had its impact on imports, which have increased to a greater extent, causing the international balance of trade to decline, although remaining positive. If exchanges with the rest of the State are taken into account, despite the increase in sales to other autonomous communities, the total balance for goods and services is in deficit and that deficit increased in 2022.

### 1.1.5. Summary

As a summary, Table 1-5 includes the latest available data on the 20 indicators for economic-business performance. The first of the columns with symbols indicates whether the indicator has improved (green arrow), worsened (orange arrow), or has remained the same as the previous year (grey equals sign). The second column shows whether (in the event the indicator is available for the EU-27) the position of the Basque Country is better than average (green triangle), worse than the average (orange triangle), or similar (grey equals sign) in the latest year with comparable data. Finally, the last column compares the evolution of the indicator in the last year with available data from the EU-27, indicating whether it was better that the EU-27 average in the Basque Country (green plus symbol), worse (orange minus symbol), or similar (grey equals sign).

**TABLE 1-5** Summary of indicators for economic-business performance

| Indicator | Year | Value | Evolution (last year) | Position relative to EU-27 | |
|---|---|---|---|---|---|
| | | | | Level | Change |
| **Economic performance** | | | | | |
| GDP per capita (PPP) | 2022 | 38 524 | → | ▲ | + |
| Apparent productivity of labour (thousands €/person) | 2022 | 72.2 | → | ▲ | + |
| Apparent productivity of labour (€/hour) | 2021 | 42.2 | → | ▲ | + |
| Apparent productivity of labour (manuf) (thousands €/person) | 2021 | 70.8 | → | ▼ | + |
| Apparent productivity of labour (manuf) (thousands €/hour) | 2021 | 43.0 | → | ▼ | + |
| **Business profitability** | | | | | |
| Unit Labour Cost (%) | 2021 | 62.3 | → | = | – |
| Unit Labour Cost (manuf) (%) | 2021 | 67.6 | ← | ▼ | + |
| Gross operating surplus (% GDP) | 2022 | 43.2 | → | ▲ | + |
| ROA | 2022 | 5.1 | → | n/d | n/d |
| ROE | 2022 | 8.5 | → | n/d | n/d |
| **Innovation and entrepreneurship** | | | | | |
| SMEs (10-249 employees) that innovate (%) | 2021 | 39.6 | → | ▼ | – |
| Product innovative SMEs (10-249 employees) (%) | 2021 | 24.5 | ← | ▼ | + |
| Process innovative SMEs (10-249 employees) (%) | 2021 | 30.7 | → | ▼ | – |
| SMEs sales of new products (%) | 2021 | 12.0 | ← | ▲ | – |
| Total entrepreneurial activity (TEA) (% population 18-64 years old) | 2022 | 5.2 | → | n/d | n/d |
| High-growth firms (%) | 2022 | 9.2 | ← | ▲ | + |
| **Internationalisation** | | | | | |
| International exports of goods (% of GDP) | 2022 | 38.3 | → | ▼ | + |
| Balance of international trade in good (% GDP) | 2022 | 3.7 | ← | ▲ | + |
| International exports of goods and services (% of GDP) | 2022 | 40.7 | → | ▼ | + |
| Balance of international trade in goods and services (% of GDP) | 2022 | 5.7 | → | ▲ | + |

*Source:* Compiled by authors based on preceding analysis.

## 1.2 Dimensions of wellbeing

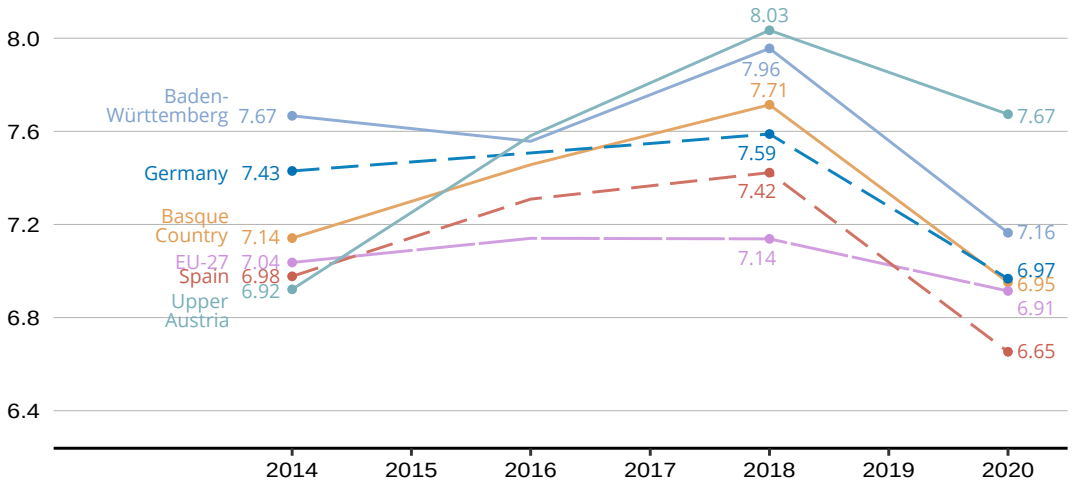
### *1.2.1. Life satisfaction*

Life satisfaction measures how people evaluate their lives as a whole. The subjective feeling of satisfaction with life that the population of a territory has reflects their overall wellbeing, within which we can analyse specific dimensions such as material and social life, employment, learning, health, and the environment. In this sub-section, we analyse the **life satisfaction** indicator, which is the result of asking how people rate their satisfaction with their lives on a scale from 1 to 10.

The level of life satisfaction in the Basque Country was slightly higher than the EU-27 average in 2020, and did not show considerable differences by gender

As seen in Graph 1-10, the level of satisfaction with life in the Basque Country, according to the European Social Survey (ESS), increased between 2014 and 2018, remaining above the average in Germany, Spain and the EU-27 and below the levels of Baden-Württemberg and Upper Austria. However, it fell across the board in all territories in 2020, the first year of the pandemic. In terms of gender, no considerable differences are observed, with the values being very close in the last year with available data (2020).

**GRAPH 1-10** Life satisfaction (on a scale of 1-10)




*Source:* European Social Survey. Compiled by authors.

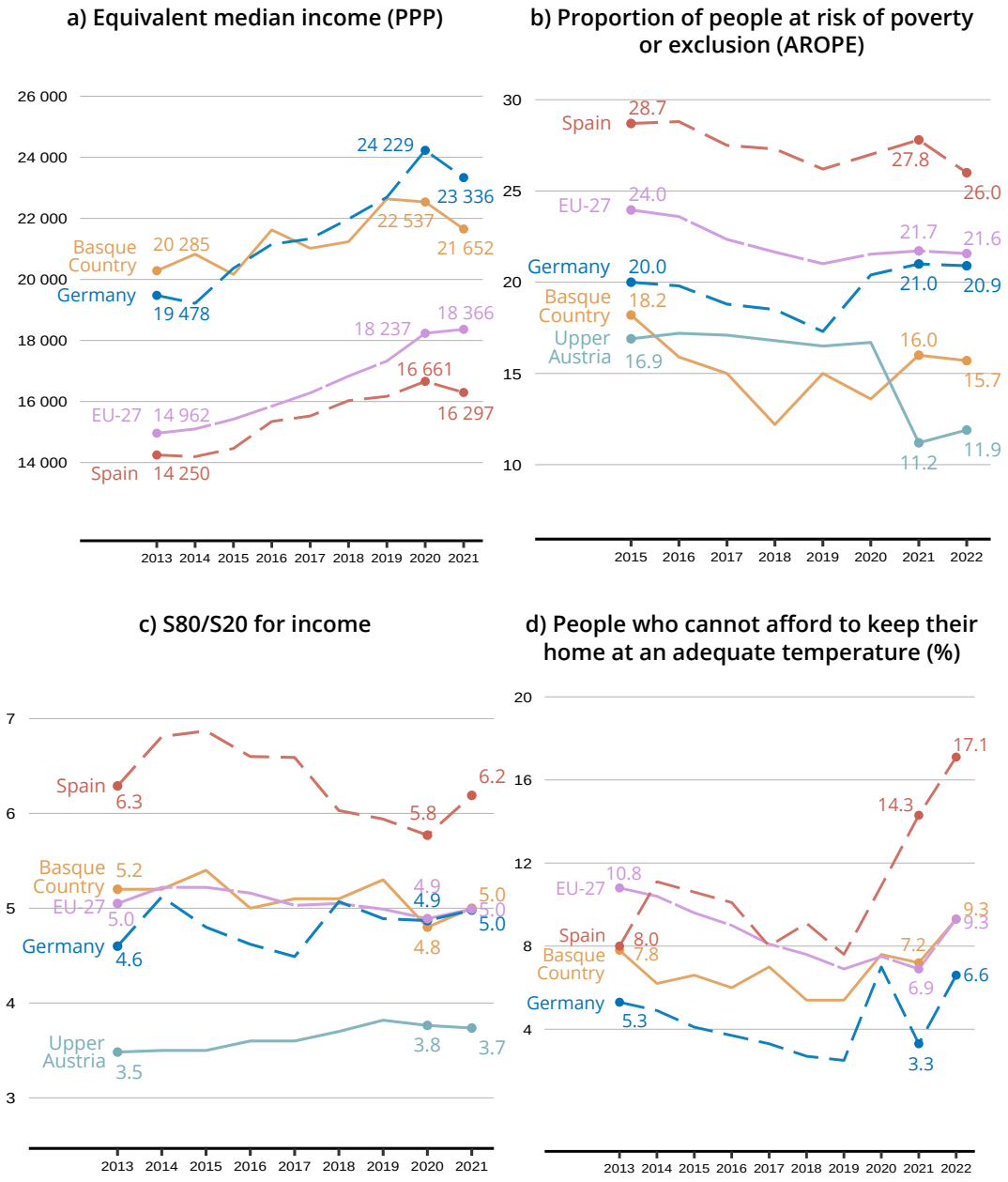
*Note:* The EU-27 average has been calculated including the number of EU-27 countries surveyed each year.

In the case of the Basque Country, the results differ from those shown by the Eustat Survey on Personal Wellbeing, which is not directly comparable with the European indicator but offers values for 2022. The Eustat indicator shows a more stable behaviour, moving at values ranging between 7.4 and 7.6 between 2018 and 2022, without a drop being seen in the first year of the pandemic.

### *1.2.2. Material life*

To understand the latest wellbeing outcomes in terms of material life, Graph 1-11 presents three key indicators:

**GRAPH 1-11** Key indicators for material life




*Source:* Eurostat and INE. Compiled by the authors.

- The **household equivalent median income (PPP)**, which measures the material standard of living reflected in the monetary resources available for households.[6]

[6] The equivalent median income indicator is considered more appropriate than GDP per capita to measure the wellbeing of the population because it measures household income instead of the income of the economy as a whole, thus reflecting the monetary resources available to people themselves. Furthermore, the indicator reflects the level of the median household, eliminating the distorted image that average salary can give if there are high levels of inequality and increasing comparability between territories (which have differing levels of inequality). Equivalent median income also takes into account household makeup, adjusting for differences that could be caused by the different compositions of households in different areas.

- The proportion of **people at risk of poverty or exclusion (AROPE)**, which includes the proportion of the population that is in one or more of the following situations: risk of poverty, severe material and social deprivation, and/or living in households with low work intensity.
- The **S80/S20 ratio**, which compares the income of the 20 % of the population with the highest salaries to the income of the 20 % of the population with the lowest salaries to measure the inequality existing in terms of material life.
- The percentage of **people who cannot afford to keep their home at an adequate temperature**, as an approximation of the energy poverty level.

The pandemic led to stagnation in average disposable income in the Basque Country in 2020 and a decrease in 2021

The pandemic led to stagnation in **median disposable income** in 2020 in the Basque Country (while in the other territories, income continued to increase) and a decrease in 2021 (which also occurred in Germany and Spain, but not in the EU-27 average). Therefore, the pandemic seems to have been a turning point in terms of the income available to Basque households, which have seen their situation deteriorate to a greater extent (although they still maintain a level well above the European and Spanish average). In comparison with Germany, for example, it can be seen that in 2019 the level was similar and in 2021 it was much lower.[7]

The AROPE rate remains one of the lowest among the territories considered

The proportion of **people at risk of poverty or exclusion (AROPE)** remains one of the lowest among the territories studied and is only above that of Upper Austria, which has decreased considerably in recent years. In the case of the Basque Country, the number of people at risk of poverty or exclusion went down in 2020 but increased again in 2021 and then decreased slightly in 2022, standing at 15.7 %. Even so, it remains above the minimum level recorded in 2018 (12.2 %).

Income inequality remained quite stable, positioning the Basque Country on a par with the EU-27 and Germany and significantly better than Spain

The **S80/S20** ratio, which reflects income inequality, has remained quite stable with small ups and downs over the period, positioning the Basque Country quite on a par with the EU-27 and Germany and significantly better than Spain. However, Upper Austria, a benchmark region for the Basque Country, shows significantly lower inequality. Furthermore, the indicator worsened slightly in 2021. Therefore, it is important to remain attentive to its evolution in order to avoid (and to try to counteract) negative impacts on the most disadvantaged segments of the population.

Lastly, the percentage of **people who cannot afford to keep their home at an adequate temperature**, which reflects energy poverty, is an indicator that delves into the relationship between material life and sustainability. The indicator has followed an upward trend since 2020, reflecting the effects of the pandemic and the energy crisis on energy poverty. During this period, the indicator for the Basque Country behaved similarly to that of the EU-27, but with slightly worse performance than Germany. Having said that, the percentage of people who cannot adequately heat their homes in the Basque Country was considerably lower (9.3 %) than in Spain (17.1 %), indicating that —since electricity prices are regulated for all

[7] It is also important to highlight that, although comparison in PPP is more appropriate than in euros, due to adjustments for differences in purchasing power it is calculated on the basis of the national average. This contributes to the Basque Country's value appearing to be somewhat higher than what it really is. If the adjustment called for by Costa *et al.* (2015) were applied to the differences in prices between the Basque Country and the Spanish average, the values for disposable income in the Basque Country would be lower (20,236 euros in 2021), but still above the European average.

of Spain— the effects of the energy crisis on energy poverty in the Basque Country were significantly lower.

Energy poverty has increased since 2020, but is much lower in the Basque Country than in Spain

### *1.2.3. Employment*

Employment is an important dimension of people's wellbeing as it is the main source of their income and facilitates their professional and personal development. Due to its economic, social, and psychological impacts, it is a critical factor for the inclusion of people in society. We analysed the Basque Country's employment performance through three key indicators (Graph 1-12):

- The **unemployment rate (15-74 years)**, which reflects the ease of finding employment.
- The **average degree of satisfaction with one's job** (measured on a scale from 1 to 10), which reflects, along with other factors, employment quality.
- The **gender pay gap** per hour worked (%) as a measure of gender inequalities in employment.

**GRAPH 1-12** Key indicators for employment


*Source:* a) Eurostat; b) Eurostat and Eustat; c) INE. Compiled by authors.

*Notes:* In b), both Eustat and (*) Eurostat data have been included for the Basque Country.

The ease with which one can find employment has traditionally been recognised as a weak point in the context of the Basque Country, and even more so in Spain, as these are economies that have a structurally higher level of unemployment than the European average and other benchmark countries and regions. However, in the 2013-2019 period, the **unemployment rate** in the Basque Country fell from 16.6 % to 9.2 %, reducing the gap with the EU-27. The effects of the pandemic were felt in employment and, although temporary redundancy plans helped to contain the impact thereof, the unemployment rate increased to 9.5 % in 2020 and 9.8 % in 2021.

The unemployment rate fell in 2022, standing at 8.6 %, and it continues to fall in 2023

In 2022 the trend was reversed again, and the unemployment rate stood at 8.6 %, a level even below that of 2019. The data for the first quarters of 2023 confirm that good evolution continues, as the figures were 8.4 % and 7.1 % in the first and second quarters, respectively.

Eustat's job satisfaction indicator shows a significant increase in 2019 and subsequent stabilisation

The wellbeing gleaned from employment is a function not only of the fact of having a job but also of that job's quality, which depends on various factors such as its temporary or permanent nature and/or flexibility, the opportunities it offers to learn, and the ability to balance work with other dimensions of life. As a result of the combination of these factors and other personal elements, the **job satisfaction** indicator captures people's general perceptions of their job. The most recent comparative data are from 2018, when the Basque Country was positioned level with the EU-27 average, somewhat higher than Germany, and below Spain. Eustat presents data on job satisfaction which, although not directly comparable with European data because the Eustat data come from a different survey, allow us to see a significant increase in the indicator in the Basque Country in 2019 and a stabilisation in 2020 and 2021.

A pay gap continues to exist in the Basque Country, with women earning on average 7.3 % less than men in 2020. However, that trend is decreasing

A **gender pay gap** (measured in hourly wages) continues to exist in the Basque Country, with women earning on average 7.3 % less than men in 2020. However, that trend is downward, having reduced by almost two thirds between 2013 and 2020 and standing below the value of Spain since 2015. The closing of said gap continued even during the pandemic, something that did not happen in Spain, where the gap remained constant.[8]

### *1.2.4. Social life*

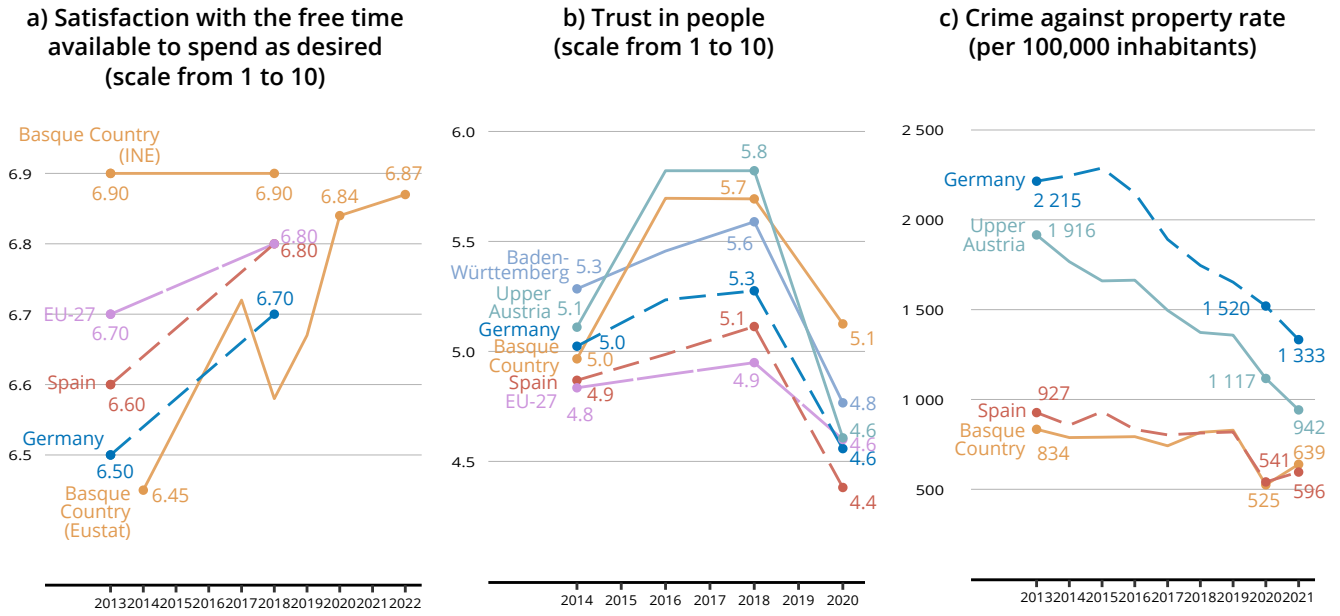
The social life of people in a territory —how they spend their free time or how they relate to other people— is another dimension of their wellbeing. We consider three key indicators (Graph 1-13) that can be compared based both on surveys carried out every two to five years and on an objective indicator:

- **Satisfaction with free time available** (measured on a scale from 1 to 10), which indicates the subjective perception of free time.
- **Trust in people** (measured on a scale from 1 to 10), one of the characteristics of relationships with others.
- The **crime against property rate** (measured per 100,000 inhabitants), which reflects the possibility of enjoying a safe environment.

**Satisfaction with free time available** shows little variation in the different territories (ranging in values that oscillate between 6.5 and 6.9) in the two years available with European and INE surveys (2013 and 2018). However, the Eustat indicator, calculated annually since 2014 (except for 2021), shows a positive trend, as it started at a lower value than that indicated by the INE in 2013 and reached the level of 6.87 in 2022.

[8] The pay gap can be measured both by total annual or monthly remuneration and by hour worked. The former depends on the total number of hours worked, which is usually lower in the case of women because part-time and temporary work is usually more prevalent among them. The hourly wage, in turn, is also conditioned by differences between men and women in terms of educational levels, the occupations they perform, and/or the sectors in which they carry out their work.

**GRAPH 1-13** Key indicators for social life




*Source:* a) Eustat, INE and Eurostat; b) European Social Survey; c) Eurostat. Compiled by authors.

*Notes:* In a), both the data from the INE and (*) Eustat are included. In b), the EU-27 average was calculated including the number of EU-27 countries surveyed each year. Graph c) includes the following crimes against property recorded by the police: robbery, burglary, and theft. No data are provided for the EU-27 because there is not data for all countries.

**Trust in people**, which increased to a greater or lesser extent in all territories between 2013 and 2018, suffered a setback with the pandemic and fell everywhere in 2020. The Basque Country is the best positioned; that is to say, it is where trust in people is greatest.

Trust in people suffered a setback in all territories analysed in 2020

The **crime against property rate** is a measure of the prevalence of crimes in the territory, which contribute to insecurity. The image given of security in the Basque Country is very similar to that of Spain and better than that of the rest of the territories, where it has improved in recent years. The index remained at a fairly constant level in the Basque Country between 2013 and 2019. During the first year of the pandemic, this type of crime decreased, only to increase slightly again the following year, but remains below the level of other territories.

The crime against property rate, an indicator of security, is very similar in the Basque Country and Spain and better than in the rest of territories analysed

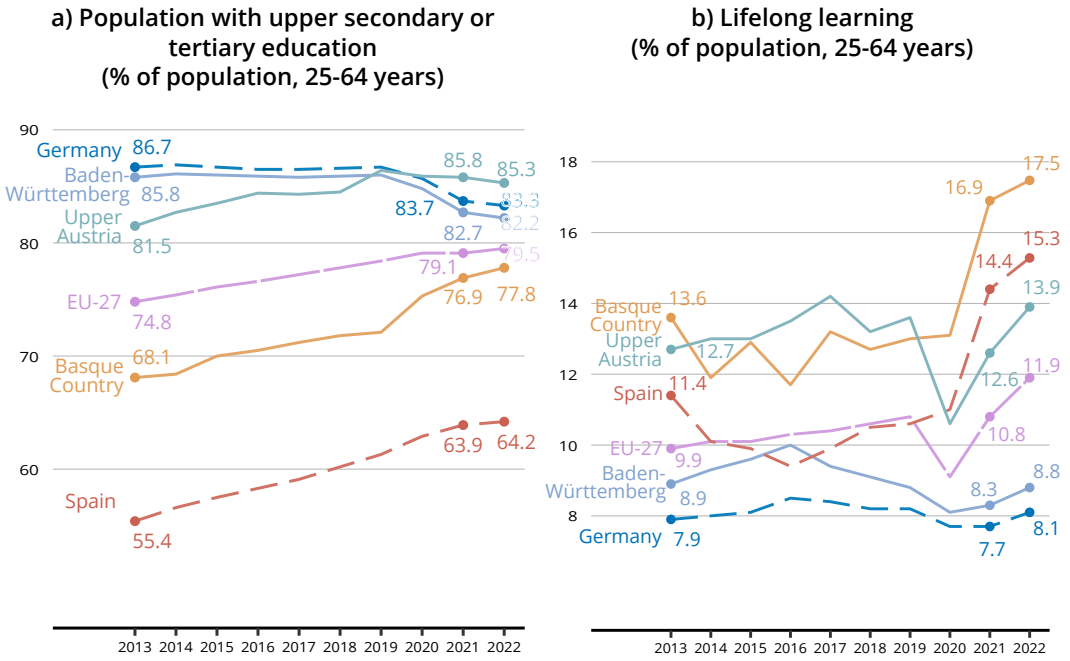
### *1.2.5. Learning*

The need to learn is a fundamental characteristic of the human being and an important dimension of wellbeing. The key indicators that we use in Graph 1-14 to measure performance in this area reflect two aspects of said dimension:

- The percentage of the **population between 25 and 64 years of age that has reached upper secondary or tertiary education**, as a measure of a level of education that exceeds compulsory studies.

- The percentage of the **population between 25 and 64 years old that has participated in training or learning activities** in the four weeks prior to being interviewed, which reflects whether learning continues throughout life.

**GRAPH 1-14** Key indicators for learning




*Source:* Eurostat. Compiled by authors.

The proportion of the population educated beyond compulsory level is lower than the EU-27 average, but in the last two years it has increased significantly

The evolution of the two indicators presents a positive outlook. On the one hand, the **proportion of the population with upper secondary or tertiary education** is lower than the EU-27 average and the benchmark regions and Germany, but in the last two years it has increased significantly. This contrasts with the evolution of territories that started with higher levels and which, with the exception of the EU-27 (where the indicator continues to grow, but at a slower rate than in the Basque Country), have stagnated or declined in recent years. As a consequence, the gap has been getting smaller. The percentage in Spain, despite continuing to grow, is significantly lower.

The Basque Country stands out in lifelong learning in comparison with other territories analysed

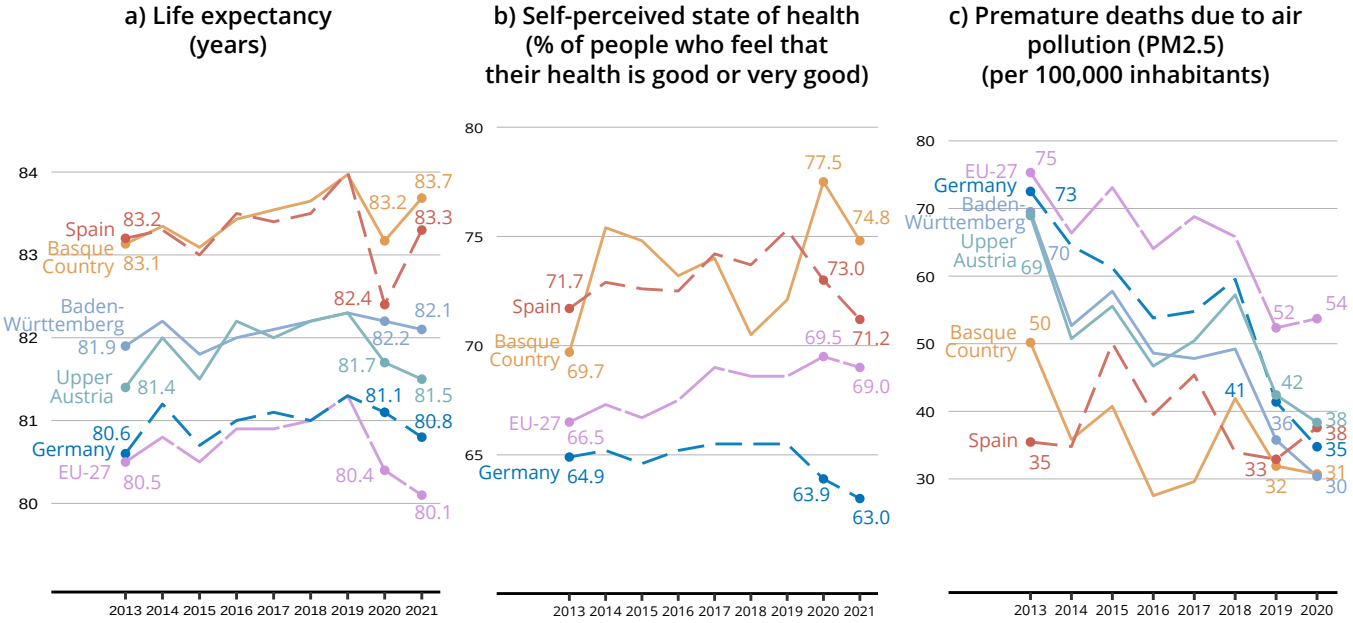
On the other hand, all territories analysed have experienced an improvement in **lifelong learning** over the last two years. This may be evidence of new perceptions and opportunities related to the economic restructuring brought on by the pandemic and the acceleration of the digital and green transitions, which demand new skills. Although this is an indicator that can be misleading if the subject matter or duration of courses is not taken into account, it is an area in which the Basque Country (where 17.5 % of the population said they had participated in training or learning activities) stands out compared to other territories.

### *1.2.6. Health*

Health contributes to people's wellbeing directly and also indirectly through the possibilities it opens up to participate in activities such as employment, leisure, and learning. Graph 1-15 presents the following three key indicators:

- **Life expectancy** in years, as an objective measure of health.
- **Self-perceived state of health** (% of people who feel that their health is good or very good), as a subjective measure of health.
- **Premature deaths due to air pollution** (PM2.5) (per 100,000 inhabitants), as a measure to estimate the relationship between health and the environment.

**GRAPH 1-15** Key indicators for health




*Source:* a) and b), Eurostat and Eustat. c) European Environment Agency. Compiled by authors.

The Basque Country is very well positioned in terms of general health, being ahead of the other territories both in the objective measure of **life expectancy** and in the subjective measure of **self-perceived state of health**. All territories saw a deterioration in life expectancy in 2020 in the context of the pandemic, but in the case of both Spain and the Basque Country, life expectancy increased again in 2021. While the negative evolution of life expectancy was expected at the beginning of the pandemic, self-perceived state of health showed a particularly interesting evolution. While in Germany and Spain the perceived state of health worsened in 2020, in the Basque Country it improved significantly, going well above the other territories analysed. In 2021, however, this subjective health indicator worsened in all territories. In the Basque Country this decrease did not offset the increase from the previous year, and the Basque region maintains a better self-perceived state of health.

The Basque Country is very well positioned in terms of life expectancy and self-perceived state of health

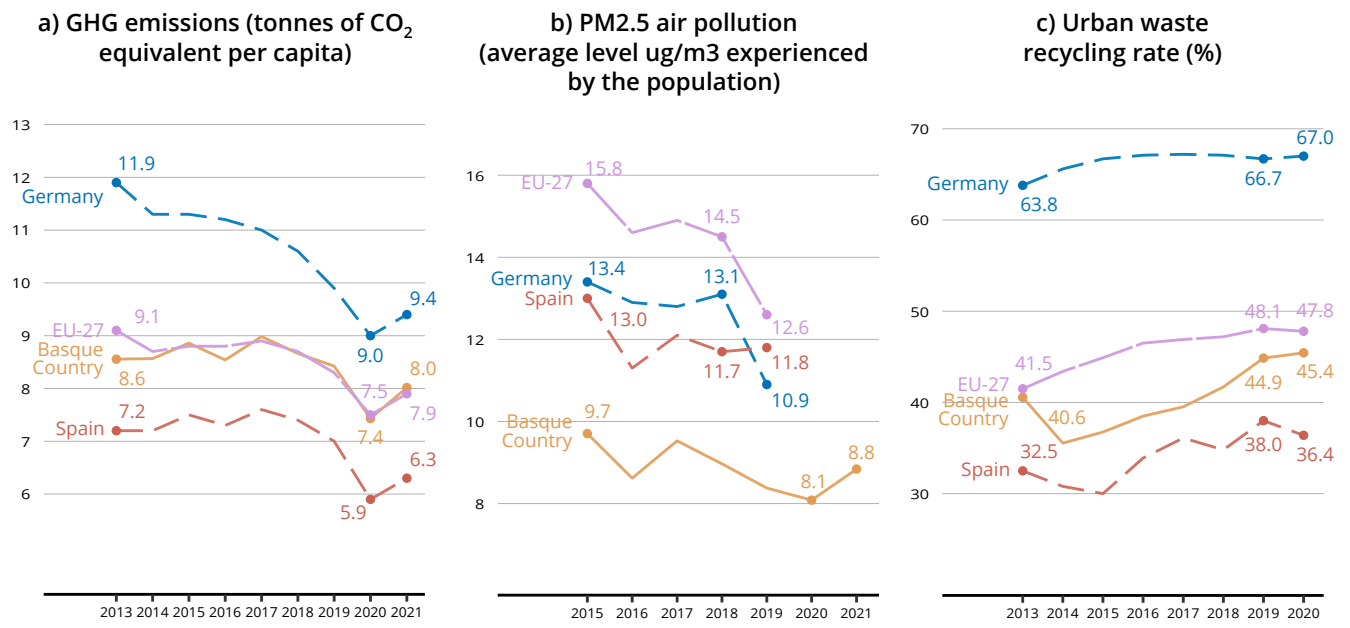
Premature deaths due to air pollution in the Basque Country are on the decline and well below the EU-27 average

Finally, we have introduced the indicator of **premature deaths due to air pollution** because pollution constitutes the greatest environmental risk to health. PM2.5 microparticles, in particular, are considered the pollutant that has the most severe impact. The Basque Country has, together with Upper Austria, the lowest numbers in terms of this indicator, with a favourable evolution in both 2019 and 2020 (the last year for which data are available). The figure in the Basque Country (31 deaths per one hundred thousand inhabitants) is much lower than the European average (which stands at 64).[9]

### *1.2.7. Environment*

The environment is the last dimension of wellbeing analysed and its inclusion in the wellbeing performance analysis reflects the impact that environmental conditions have on people's health and quality of life, both in the present and for future generations. In a context of great acceptance of the changes that we need to undertake to reduce the negative impact of human activities on the environment, this dimension takes on special importance for future wellbeing. We analyse it through three key performance indicators (Graph 1-16):

**GRAPH 1-16** Key indicators for the environment




*Source:* a) Eurostat and Eustat; b) Eurostat and Basque Government; c) Basque Government Department of Environment, Territorial Planning, and Housing. Compiled by authors.

[9] This is because there are parts of Europe, especially in the Balkans, that have very high rates of premature deaths (even above 200 per 100 000 inhabitants) linked to the burning of solid fuels (for example, biomass), causing high levels of PM2.5 microparticle concentration. The Basque Country is still far from the minimum values reached in some Scandinavian areas that saw less than one premature death associated with this type of pollution per 100 000 inhabitants. In most cases, these areas had air pollution levels below 5 μg/m³, an indicator that is analysed in the next sub-section. For more details, see EEA (2022).

- **Greenhouse gas emissions** (tonnes of $CO_2$ equivalent per capita), as a measure of the environmental impact produced in the territory.
- **Average level of air pollution** (PM2.5 microparticles), as a measure of the quality of the air we breathe.
- The **urban waste recycling rate** (%), as an approximation of citizens' attitudes towards caring for the environment.[10]

The performance of the Basque Country in these indicators in comparison with other territories paints a mixed picture. **GHG emissions** are on par with the European average, below Germany and above Spain. After a continued decline between 2017 and 2020 (quite accentuated that last year due to the cessation of various activities during the COVID-19 lockdown), in 2021 GHG emissions increased again, although they remained below 2019 levels, which suggests movement towards a more environmentally sustainable and decarbonised economy and society. Even so, we are far from achieving at the local level the EU's binding target set in European Climate Law of reducing net GHG emissions by at least 55 % compared to the levels of 1990. In 2020 (with the closure of part of the economic activity) GHG emissions in the Basque Country were only 21.5 % lower than in 1990.

GHG emissions in the Basque Country are on a par with the European average, but far from reaching international commitments at the local level

In terms of the **air pollution** indicator, we can observe that the Basque Country was better positioned than the rest of the territories for the years for which comparative data are available (until 2019). However, after continuing to improve in 2020, the air quality worsened in 2021 and the value in said year (8.8) was worse than in 2019 (8.4). The 2021 level is below the maximum limit stipulated in the EU (25 µg/m³) but above the level recommended by the World Health Organisation (5 µg/m³) which, as mentioned in the previous section, is associated with low levels of premature death. It is important, therefore, to continue moving in that direction.

Air pollution is lower in the Basque Country than in the other territories analysed, but the situation worsened in 2021

Finally, regarding the last indicator considered, it can be observed that despite the positive evolution (close to the EU-27 average), there is still a significant gap in the **recycling rate** when compared with the leading countries. This is an important aspect to continue working on to counteract the negative impact of waste on the environment – something that can be achieved both by increasing the volume of waste separated for recycling and by reducing waste generation.

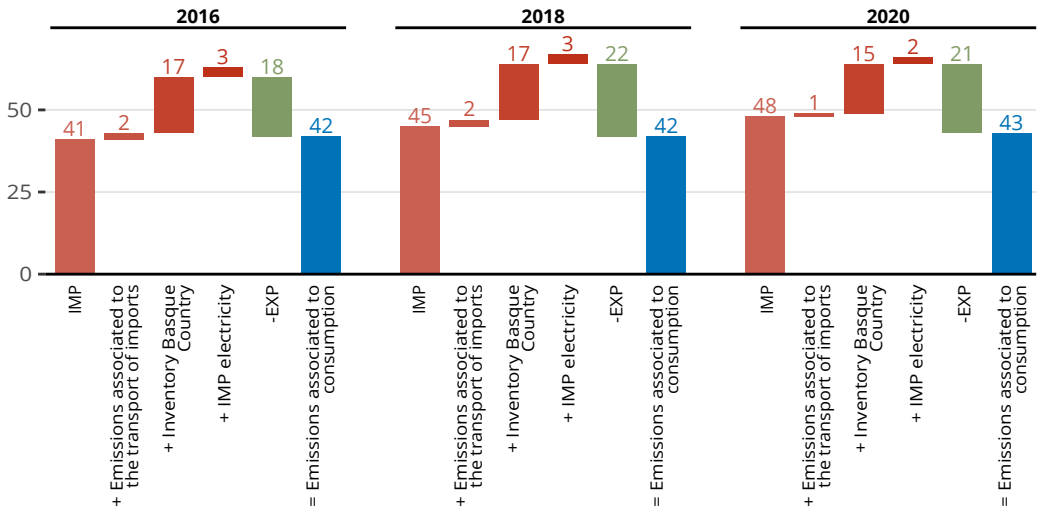
To complement our analysis, Box 2 delves into another important aspect of our environmental impact: the carbon footprint resulting from our consumption patterns.

[10] It is important to acknowledge that this indicator not only reflects attitudes among the population but also depends on the infrastructure capacity of public and private services for recycling urban waste.

## BOX 2 The carbon footprint of the Basque Country from the point of view of consumption[11]

Graph 1-16a illustrates the emissions inventory (or carbon footprint) with a focus on production, representing the GHG emissions generated in the Basque Country as a consequence of activities related to energy processing, industry, agriculture, land use changes, forestry, and waste treatment and disposal. However, due to the relocation of activities to other geographical areas, to fully explore the responsibility that a territory has in terms of emissions, it is necessary to complete this study with the consumption inventory emissions (see Graph 1-17). Said inventory includes all the emissions associated with domestic material consumption and is estimated by subtracting the emissions associated with exports from the sum of the emissions from imports (including electricity), their transportation, and the emissions inventory with a production focus.

**GRAPH 1-17** Consumption-based emissions in million tonnes of $CO_2$ equivalent (average, 2016, 2018 and 2020)




*Source:* Compiled by the authors based on data from the Tax Agency (AEAT), C-Intereg, Eustat, and Orkestra (2021) following the methodology of Larrea Basterra and Álvaro Hermana (2020).

*Notes:* For this exercise, the emissions inventory of the Basque Country has been broken down to include internal emissions in the inventory and electricity imports separately.

The estimates show that in 2020 (the year of the pandemic and the lockdown), emissions related to consumption in the Basque Country amounted to 21.3 million tonnes of $CO_2$ equivalent, which represented emissions of 9.68 tonnes per inhabitant. This is a reduction of just 3.5 % compared to 2018, a decrease that occurred due to a combination of a reduction in emissions of 0.5 million tonnes and a population increase of 0.9 %. Emissions linked to imports and exports largely offset each other, and transport-related emissions for imports were 1.5 billion tonnes, less than in 2018 and 2016. This indicates that, from the point of view of consumption, the carbon footprint in the Basque Country is closely linked to emissions related with goods and services being produced in the Basque territory.

[11] The carbon footprint differs from the ecological footprint, which is used to calculate the impact of citizens' lifestyles and is defined as the land surface area needed to produce the resources used by a population and assimilate the waste it generates. The ecological footprint analyses six land/surface-area aspects, namely: (i) carbon demand on land, (ii) the ecological footprint of forest products, (iii) the ecological footprint of built-up land, (iv) the ecological footprint of cultivated areas, (v) the ecological footprint of fishing grounds, and (vi) the ecological footprint of grazing lands. According to Ihobe (2019), the ecological footprint of the Basque Country amounts to 4.32 hectares per inhabitant, which is 7 % lower than the 2001 footprint and below the European average.

With these results, the urgency to advance with decarbonisation in the Basque Country is apparent. In fact, emissions were higher in 2020 than in 2016, despite the context of the pandemic, the drop in emissions from transportation, and the new climate commitments acquired. The challenge for an economy with a significant industrial component is to advance simultaneously on two fronts: (i) to reduce emissions related to production processes in the territory; and (ii) to reduce emissions associated with the import of materials and products and their transportation, thus improving specific emissions, among others.

The carbon footprint of the Basque Country was higher in 2020 than in 2016, despite the context of the pandemic and associated drop in emissions from transportation

The effort that needs to be made is great, taking into account that energy intensity has already been optimised over the last three decades and that part of the drop observed in 2020 is probably due to the closure of all non-essential activities for two weeks along with a drop in activity at many companies.

The decarbonisation process should be based on innovation in processes and production (and other) technologies, where there are various options, many of which still with low technological maturity. This lack of technological maturity raises uncertainties about future viability, hindering the ability to obtain financing (see Section 3.5). Despite this, since the publication of the European Green Deal, large amounts of funds are being made available to players at the European level to advance with the decarbonisation of industry. Institutions must optimise the use of said funds, ensuring that their transfer to companies is not held back by administrative or other barriers.

The decarbonisation process should be based on innovation in processes and production technologies

Likewise, it will be necessary to make progress in reducing emissions associated with the consumption of electricity (produced and imported), something that is already happening according to data from Red Eléctrica de España and which has the potential to generate value for the energy-intensive Basque industry.

The Carbon Border Adjustment Mechanism (which should enter into force provisionally on October 1, 2023) could play an important role by generating economic criteria that will favour materials (such as cement, steel, and aluminium) with lower emissions. However, there are big challenges in terms of information and data. While emissions associated with the transportation of imports registered a drop in 2020, there is room for improvement, in particular over short distances (movements within Spain and the EU), where the means of transport that generate the greatest emissions in relative terms are used (for example road transport vs. sea transport).

### *1.2.8. Summary*

As a summary, Table 1-6 includes the latest available data for the 19 wellbeing performance indicators. The first of the columns with symbols indicates whether the indicator has improved (green arrow), worsened (orange arrow), or has remained the same as the previous year (grey equals sign). The second column shows whether (in the event the indicator is available for the EU-27) the position of the Basque Country is better than average (green triangle), worse than the average (orange triangle), or similar (grey equals sign) in the latest year with comparable data. Finally, the last column compares the evolution of the indicator in the last year with available data from the EU-27, indicating whether it was better that the EU-27 average in the Basque Country (green plus symbol), worse (orange minus symbol), or similar (grey equals sign).

**TABLE 1-6** Summary of wellbeing performance indicators

| Indicator | Year | Value | Evolution (last year) | Position relative to EU-27 | |
|---|---|---|---|---|---|
| | | | | Level | Change |
| **Life satisfaction** | | | | | |
| Life satisfaction (0-10) | 2022 | 7.5 | ← | = | – |
| **Material life** | | | | | |
| Housholds equivalent median income (PPP) | 2021 | 21 652 | ← | ▲ | – |
| Proportion of people at risk of poverty or exclusion (AROPE) (%) | 2022 | 15.7 | → | ▲ | = |
| S80/S20 ratio for income | 2021 | 5.0 | ← | = | – |
| Population who cannot afford to keep their home at an adequate temperature (%) | 2022 | 9.3 | ← | = | + |
| **Employment** | | | | | |
| Unemployment rate (15-74 years) (%) | 2022 | 8.6 | → | ▼ | – |
| Degree of job satisfaction (0-10) | 2022 | 7.3 | = | = | = |
| Gender pay gap (%) | 2021 | 7.3 | → | n/d | n/d |
| **Social life** | | | | | |
| Satisfaction with the time available (0-10) | 2022 | 6.9 | → | = | – |
| Confidence in people (0-10) | 2020 | 5.1 | ← | ▲ | – |
| Crime against property rate (per 100,000 inhabitants) | 2022 | 639 | ← | n/d | n/d |
| **Learning** | | | | | |
| Population aged 25–64 with tertiary education (%) | 2022 | 77.8 | → | ▼ | + |
| Lifelong learning (%) | 2022 | 17.5 | → | ▲ | – |
| **Health** | | | | | |
| Life expectancy (years) | 2021 | 83.7 | → | ▲ | + |
| Self-perceived state of health (%) | 2021 | 74.8 | ← | ▲ | – |
| Years of life lost due to air pollution (per 100,000 inhabitants) | 2020 | 298 | → | ▲ | + |
| **Environment** | | | | | |
| Greenhouse gas emissions (tonnes of CO2 equivalent per capita) | 2021 | 8.0 | ← | ▼ | – |
| Air pollution (PM2.5 microparticles) | 2021 | 8.8 | ← | ▲ | – |
| Urban waste recycling rate (%) | 2020 | 45.4 | → | ▼ | + |

*Source:* Prepared based on the foregoing analysis.

# 2
# Towards sustainable competitiveness

Achieving a low environmental footprint economy will require changes in production processes (including the materials, technologies and processes used), in logistics and trade processes, in the way goods and services are consumed, and in end-of-life processes (promoting greater circularity of products and materials) It also requires the development of new knowledge on the efficient use of materials and energy, a new vision of the role of natural resources in the economy, and the promotion of behavioral changes among citizens leading to the responsible consumption of goods and services. The transformation is therefore profound and comprehensive, affecting all socio-economic activities and all actors in the territory (businesses, consumers, public institutions, knowledge institutions, etc.).

Achieving an economy with a low environmental footprint will require changes in production processes, logistics and trade processes, as well as in the way goods and services are consumed and in end-of-life processes

The main challenge for all territories is to ensure that the regulatory and incentive framework developed and implemented for this transformation also strengthens the factors of economic competitiveness and the capacity to generate well-being for citizens. It is therefore a question of moving towards a model of 'sustainable competitiveness' that promotes business and industrial activity, competitive advantages linked to the strengths of a territory, employment and innovation based on clean technologies, and optimized processes from the point of view of environmental sustainability.

The idea of sustainable economic development, linked to what in this report we call sustainability transition, forces us to reflect on the concept of sustainability or sustainable development that has been studied since the beginning of the last century.[12] In academia, there has been an unresolved debate for decades on whether sustainability should be 'weak' or 'strong' (Neumayer, 2013).

Weak sustainability is based on the idea that different capitals (physical, human, natural, etc.) are substitutes for each other and can be framed in the conventional (neoclassical) economic theory of welfare (Solow, 1974, 1995; Hartwick, 1977). In this view,

[12] Ramsey (1928) already addressed the issue of intergenerational allocation of resources and 'optimal' economic development, which, in his view, implied the maximisation of the net present value of the utility (or welfare) of all generations (present and future). On the other hand, although antecedents of the idea of sustainable development can be found in previous centuries —see Caradonna (2014)— the concept as such was not formulated until 1987, with the publication of the United Nations report *Our Common Future*, also known as the Brundtland Report (United Nations, 1987).

the long-term goal is to increase the welfare of the population, regardless of how physical capital (and other types of human-created capital) and natural capital are developed and used. Obviously, increasing welfare in the short, medium and long term under a weak sustainability model implies taking into account the constraints of natural resources (negative externalities, etc.).

On the other hand, the concept of 'strong sustainability' is based on the idea that natural capital and other types of human-developed capital are not substitutable. This implies that sustainable development (including its economic and social dimensions) requires maintaining a certain stock of natural capital and ensuring the proper functioning of the biosphere.[13]

In this report, we do not take a position on these two paradigms of sustainability, which contain some complementary and other conflicting foundations (Navarro, 2022). Orkestra's framework for analyzing territorial competitiveness for well-being includes elements that can be associated with these two major theories, including a clear focus on the well-being of the population and the conviction that sustainable development is closely linked to a balance between the economic, environmental and social dimensions.

The sustainability transition represents an opportunity for industry, building on the competitive advantages of each territory

The transition to sustainable competitiveness implies a profound transformation of production and consumption processes towards the development of green markets for goods and services, leading to acceptable results in all dimensions of sustainability. The development of products and services with a low or zero environmental footprint implies, as a *sine qua non* condition, the adoption of a life cycle vision, taking into account the environmental impacts at all stages of their life cycle. These impacts include those related to greenhouse gas emissions, but also other types of environmental impacts such as waste, impacts on ecosystems and biodiversity, particulate pollution, noise pollution, etc.

In addition, the sustainability transition also represents an opportunity for industry to exploit the competitive advantages of each territory in value chains related to the energy vectors of decarbonisation, as well as the development of innovative products, services and solutions related to emission reduction, heating and cooling networks, sustainable mobility, recycling, circular economy, etc.

In this chapter, we first examine the international, European and Basque context for the transition towards this sustainable competitiveness. We then reflect in general terms on how to proceed with this transition and the opportunities and costs involved. This reflection highlights a series of dilemmas and trade-offs that need to be considered, but for which the answers are not clear. Finally, we identify the main levers for accelerating the transition in general terms, as a basis for analyzing different dimensions of it in the Basque Country in Chapter 3.

[13] This could involve, for example, ensuring a functioning economic (and social) system that ensures that 'planetary boundaries' are not breached (Richardson *et al.*, 2023; Rockström *et al*., 2009).

## 2.1 International, European and Basque context

### *2.1.1. International context*

The Paris Agreement, adopted at COP21 in December 2015, is a milestone in multilateral climate change negotiations, setting a binding goal to limit global warming to well below 2°C, preferably 1.5°C, compared to pre-industrial levels. Achieving this goal requires transition to a decarbonized economy with zero net emissions by 2050. To do so, ambitious policies must be shaped for the 2050 horizon (European Parliament, 2020), and everything must be aligned with the Sustainable Development Goals (SDGs) of the 2030 Agenda, an agenda set in 2015 to eradicate poverty, protect the planet and ensure prosperity for all people (United Nations, 2023).

The goal of zero net emissions from the economy, which has been upheld at international summits since Paris, is highly unlikely to be achieved in 2050 if current trends continue. In fact, according to the latest IPCC study, human activities, mainly through the consumption of non-renewable fossil fuels, are responsible for an increase in global surface temperature of 1.1°C over 1850-1900 in the period 2011-2020 (IPCC, 2023). Far from being reduced, global GHG emissions have continued to increase in recent years, with uneven contributions from individuals, regions and countries. A continuation of current GHG emission rates could lead to a global average temperature increase of more than 2.5°C and severe socio-economic and environmental impacts across the planet.

The goal of zero net emissions from the economy is highly unlikely to be achieved in 2050 if current trends continue

As a result, a profound transformation of production processes and the way goods and services are consumed, in line with SDG 12 (Sustainable Consumption and Production), is essential to sustain the livelihoods of current and future generations. At present, these livelihoods are at the root of a planetary crisis that goes beyond climate change and extends to dimensions such as biodiversity, pollution or access to energy, among others.[14]

### *2.1.2. European context*

The resolution on the climate and environmental emergency declared by the European Parliament in 2019 (European Parliament, 2019) was a reinforcement of the commitments of the aforementioned Paris Agreement. In order to address this challenge, the European Climate Law was published in 2021 (European Parliament and Council of the European Union, 2021). This law sets the binding target of climate neutrality in the EU by 2050 and provides a framework for advancing efforts to adapt to the impacts of climate change. It also sets a binding target to reduce net greenhouse gas emissions by at least 55 % by 2030 compared to 1990 levels and indicates that a new EU emission reduction target will be set for 2040.[15]

The EU is driving the sustainability transition with a wide range of strategies, action plans, policies, legislation and regulations contained in the European Green Deal (EGD) and related packages such as 'Fit for 55'. The EU is committed to incorporat-

The EU is driving the sustainability transition with a wide range of strategies, action plans, policies, laws, and regulations contained in the European Green Deal (EGD) and related packages such as 'Fit for 55'

[14] A recent analysis, based on more than 2 000 studies within the framework of the limits to guarantee life on earth, has found that six of the nine established borders have been transgressed, which means that the earth is currently outside the safe environment for human life (Richardson et al. 2023).

[15] According to data from the European Environment Agency, EU emissions in 2020 were 34 % below those recorded in 1990.

ing environmental sustainability as an additional factor of competitiveness, which, in addition to reducing net greenhouse gas emissions, means increasing the circularity of activities and processes, thereby reducing the amount of materials and energy required and limiting the amount of waste generated. It also aims to increase the value (economic and social) and protection of natural resources (including air, soil and marine coastlines, as well as biodiversity).

In essence, the EGD aims to consolidate European industry as green, circular and digital, in addition to ensuring a just transition (European Commission, 2019).[16] The EGD has a roadmap, as a result of which numerous proposals, plans and strategies have been published (European Commission, 2023a), also in response to developments since 2020 and the geopolitical context (European Commission, 2023b). The aim is to achieve an active leadership position in the new markets for sustainable products and services, trying to anticipate the changes that are taking place.

## The European Commission proposes integrating sustainability into all policies

The set of legislation and standards resulting from the EGD covers all sectors of the economy, with particular emphasis on transport, energy, agriculture, industry and construction. In addition, the European Commission proposes the need to integrate sustainability into all European policies. Given that the implementation of this strategy will require, according to the Commission's forecasts, an investment of around one trillion euros in the period 2021-2030, a key element is to achieve leadership in sustainable finance, which also includes the integration of the environmental sustainability dimension in national budgets (European Parliament, 2020). In fact, the EGD essentially acts as a compass or guide for sustainability transition processes in the different EU member states and regions.[17]

The ongoing transition requires the activation of education and training for sustainability, for which the Commission plans to develop a European Competence Framework for the development and assessment of knowledge, skills and attitudes related to climate change and sustainable development. This framework will provide support materials and facilitate retraining, skills upgrading and exchange of best practices in networks of teacher training programs.

Similarly, EU research (e.g. Horizon Europe) and innovation (e.g. Innosup) programs will be used as levers to mobilize R&D and innovation towards green solutions, such as the large-scale deployment and demonstration of new technologies or the creation of new, innovative value chains.

Meeting the identified challenges will also require changes in geopolitical strategy and international relations, for example through development cooperation, climate diplomacy or active leadership in negotiations on climate change mitigation and adaptation. In addition, the EGD seeks to empower regions and put citizens at the

[16] The EGD includes the implementation of the Just Transition Facility (part of the investment plan) to provide support to the regions and people most negatively affected by the sustainability transition and thus reduce the associated socio-economic costs (European Commission, 2022a).

[17] In Spain, progress is being made in line with EU guidelines. In 2020 the Long-term Strategy for a Modern, Competitive and Climate Neutral Spanish Economy in 2050 was approved, and in 2021 Law 7/2021 on Climate Change and Energy Transition was approved in response to the commitment adopted by the country at international and European level. Its articles establish the objective, among others, of achieving climate neutrality by 2050. These two documents form the basis of the strategic framework for sustainability transition in Spain, together with the Energy Poverty Strategy, the National Climate Change Adaptation Plan and the National Integrated Energy and Climate Plan 2021-2030 (currently under review).

centre of the transition, for example through regulatory changes that facilitate direct and active participation of people in the energy sector, or by creating spaces for the expression of ideas and facilitating the implementation of citizen-driven initiatives.

A key element of the Fit for 55 package is the legal commitment to reduce EU emissions by at least 55 % by 2030 compared to 1990 levels (European Council and Council of the European Union, 2023a). It includes a series of proposals aimed at updating EU legislation and promoting initiatives, strategies, roadmaps and action plans that are consistent with this objective, as well as ensuring a just transition, the innovation capacity and competitiveness of European industry, and EU leadership in the fight against climate change.[18] As with the EGD, significant progress has recently been made under the Fit for 55 package (European Council and Council of the European Union, 2023b), and further progress is expected in the coming months (Wettengel, 2023).

A key element of the Fit for 55 package is the legal commitment to reduce EU emissions by at least 55 % by 2030 when compared to 1990 levels

The EU's strategic commitment to sustainability transition, structured around the EGD, can be described as ambitious and not without risks. Some of the associated risks may have unintended consequences both for the decarbonisation process and for the competitiveness of the economy and the well-being of the European population (Pisani-Ferry *et al*., 2023).

The EU's strategic commitment to a sustainability transition, structured around the EGD, can be described as ambitious and not without risks

For example, while the strategy seeks to achieve its ambitious goals through the development of a comprehensive and complex regulatory framework, the difficulty of developing detailed rules in all sectors that provide the right incentives and maintain overall coherence carries the risk of imposing excessive costs on some actors. In addition, there is a risk of coordination failures between EU policies and national legislative and regulatory frameworks (which are often disjointed or inconsistent with each other), resulting in the combined EU effort falling short or creating inefficiencies. On the other hand, meeting climate change targets will require far-reaching changes in the behaviours and lifestyles of actors and will have distributional consequences that could trigger a political and social backlash against the process.

It is also important to consider the profound implications of the EGD and Fit for 55 for industrial and business competitiveness in the context of a globalized economy and changing geopolitics. China, for example, has committed to becoming a global leader in clean and digital technologies, is already the leading investor in the energy transition (BNEF, 2023), and controls the value chains of key critical materials and rare earths essential for the climate transition (IEA, 2023). On the other hand, in 2022, in response to the Chinese strategy and the EGD, the US passed the Inflation Reduction Act (IRA), an ambitious program of subsidies and incentives for investments in clean technologies, which threatens to put European industry at a competitive disadvantage due to its attractiveness to investors (Kleimann *et al*., 2023).

[18] This package includes, inter alia: (i) a Social Climate Fund; (ii) $CO_2$ emission reduction targets and removals related to land use, land use change and forestry; (iii) $CO_2$ emission standards for passenger cars and vans and reduction of methane emissions in the energy sector; (iv) standards on renewable energy, hydrogen and decarbonized gases, and aviation and maritime transport fuels; (v) investment in infrastructure for alternative fuels; (vi) promotion of energy efficiency in general, and in buildings in particular; and (vii) energy taxation and carbon border adjustment mechanism.

In response to the challenge posed by Chinese and US policies, the EU launched a package of measures in March 2023, including the Net-Zero Industry Act (NZIA), a reform of the electricity market design, and the proposed Critical Raw Materials Act. However, this response may not be sufficient to maintain the competitiveness of European industry in a context of strong competition, technological change and uncertainty (Tagliapietra *et al.*, 2023).

The Net-Zero Industry Act (NZIA) is a critical legal development for European industry because of its focus on a competitive technological and industrial base that facilitates the development and deployment of decarbonisation solutions

The NZIA is a particularly critical legislative development for European industry as a whole because it focuses on: (i) consolidating a competitive technological and industrial base that facilitates the development and deployment of decarbonisation solutions based on key clean technologies (solar, offshore wind, electric batteries, heat pumps, electrolysers, etc.); and (ii) reducing other strategic external dependencies (e.g. related to key technologies or components for the sustainability transition). To this end, it proposes targets related to the manufacturing capacity of key technologies, tools to facilitate their financing and the promotion of new cooperation mechanisms (e.g. Net-Zero Europe Platform or Net-Zero Industrial Partnerships).

In short, the path to sustainability transition proposed by the EU is a bold one, aiming at real transformation and consolidating the leadership of European industry in clean technologies and environmental sustainability. However, it must always be in line with economic and social reality and take into account the evolution of the global economy to ensure its success in the medium and long term. Policies, regulatory frameworks and action plans must be transparent and flexible, provide clear incentives for investment and innovation, and avoid unnecessary barriers and costs that hamper the transformation decisions of companies and other actors.

### *2.1.3. Basque context*

The Basque Country has been in the process of transition towards environmental sustainability for more than four decades

While the Basque Country faces the same major challenges in terms of sustainable competitiveness as other regions and, as will be explained, continues to make progress in the development of policies, strategies and concrete measures, it has been in the process of transition towards environmental sustainability for more than four decades.

To this end, the Basque Energy Agency (EVE) was created in 1982 under the Department of Industry and Energy, which has been involved in the design of long-term strategic plans and energy policies together with the Basque Government. The energy policy has evolved over time, from focusing in the past on issues related to energy independence (reducing the weight of hydrocarbons in the energy mix, as well as coal) and optimizing consumption in sectors such as transport, housing and industry, to strategies related to the fight against climate change and the decarbonisation of the economy, as well as technological development in the field of energy.

In this way, EVE has contributed to the energy transition and the decarbonisation of the territory's energy consumption, focusing on gas and renewable energies (in the Basque Country there are 40 energy communities and photovoltaic and wind farm projects) and the virtual disappearance of coal from the energy mix. Energy efficiency in general, and especially in industry, has been one of the *leitmotifs* of the

territory's energy policy, which has led to an improvement in energy intensity of 18.3 % since 2010. Only Denmark, Ireland or Luxembourg have achieved better results in this area than the Basque Country during this period. In recent years, this whole process has followed the guidelines set out in the Basque Country Energy Strategy 2030 (3E2030).

At the same time, in 1983, the Public Environmental Management Company of the Basque Government (Ihobe) was created, which, in partnership with businesses and public administrations, has contributed to improving the environment and the quality of life of citizens, as well as to integrating the environmental variable into public policies. Initially, Ihobe tackled the legacy of soil contamination, becoming a European benchmark in this area, which has been reinforced with the new Euskadi 2030 Soil Protection Strategy. Subsequently, it helped companies to implement environmental certification processes, an area in which it continues to work, promoting certifications such as EMAS and the European Ecolabel. It has also contributed to promoting the circular economy and solving problems related to waste, as well as promoting the reduction of greenhouse gas emissions.

To make further progress in sustainable competitiveness, the Basque Country is a pioneering region in the adoption and implementation of the 2030 Agenda, with the publication of the first Euskadi Basque Country Agenda in 2018 and subsequent SDG monitoring reports (Basque Government, 2018). The current legislature has the Basque Agenda 2030 Priorities Program (Basque Government, 2021a), an action plan with an interdepartmental, multilevel and multi-stakeholder vision that ensures the transversal integration of the SDGs in government actions and establishes sophisticated mechanisms to monitor commitments. Indeed, in 2023, the Basque Country was cited as a reference by the European Commission for its holistic approach and voluntary monitoring process (European Commission, 2023c), and Bilbao was selected as the permanent seat of the Secretariat of the Local 2030 Coalition.

The Basque Country is a pioneering region in the adoption and implementation of the 2030 Agenda

In the specific area of environmental sustainability, in 2021 the Basque Government proposed its own roadmap to achieve a more environmentally sustainable future, following on from the EGD. The Basque Green Deal is a proposal for an economic development model focused on environmental sustainability, in which the fundamental levers are industry and technology, and in which science, technology, circular economy, etc. are aligned to achieve fair and sustainable development (Ihobe, 2021).

The Basque Green Deal is a proposal for an economic development model focused on environmental sustainability in which the fundamental drivers are industry and technology

The main areas of work to advance the transition under this plan are: (i) the development of renewable energy; (ii) the promotion of sustainable industry; (iii) the promotion of new models of sustainable mobility; (iv) the protection of biodiversity and the reduction of pollution; and (v) the achievement of greater sustainability in the food sector, with support for rural and coastal development and ensuring generational replacement in the primary sector. All of these areas correspond to several of the 'strategic areas' and 'areas of opportunity' identified in the Basque Country's smart specialisation strategy (RIS3) (Basque Government, 2023a).

The practical implementation of this deal will require a regulatory context in line with EU guidelines. In this sense, in May 2023, the Basque Government approved the

draft Law on Energy Transition and Climate Change to achieve climate neutrality in the Basque Country before 2050 and a more resilient territory. The text is currently awaiting approval in Parliament, which could happen before the end of the current legislature.

In order to achieve its objectives, the bill includes energy efficiency and renewable obligations for all consumers, the promotion of new energy vectors (such as green hydrogen), energy storage or $CO_2$ capture and storage, and sustainable mobility plans (Basque Government, 2023b). Among the innovative elements of this draft law are:

- The use of taxation as a tool to incentivize decarbonisation.
- The creation of a registry of initiatives (energy, industrial, infrastructure projects, etc.).
- The development of local energy and climate plans in areas with more than 5 000 inhabitants.
- The creation of an Energy Transition and Climate Change Office to monitor the objectives of the law.
- The encouragement of citizen participation.
- The creation of a Citizens' Assembly on Energy and Climate Transition.
- The introduction of the energy and climate perspective in public budgets.

In addition, the Basque Government will have to approve a roadmap for energy transition and climate change until 2050 within a maximum of 18 months from the approval of the law, scheduled for 2025. Likewise, by 2025 it is expected to have the Energy Transition and Climate Change Strategy 2030, which will establish more specific objectives and action plans until 2030 in the areas of mitigation, adaptation, just transition and technological-industrial development, with a sectoral approach and vision. This new strategy will replace the current 3E2030.

In March 2023, the V Environmental Framework Program 2030 (EFP 2030) was presented, which will be the compass of the environmental policies of the Basque Country until the end of the decade and will set the course towards a more sustainable territory (Basque Government, 2023c). The EFP 2030 identifies challenges in the horizon of 2030 and sets out a series of transformative projects that, by focusing on digitalisation, decarbonisation and increasing the material efficiency of the Basque economy, will allow progress to be made in the sustainability transition of the Basque Country

Circular economy policies represent a great opportunity to reduce GHG emissions and contribute to the development of new knowledge, skills, and specialised businesses in the territory

Although energy supply and consumption are responsible for a large part of greenhouse gas emissions, to make progress in decarbonisation it is also necessary to focus on production processes and the consumption of goods, as well as land use. Circular economy policies represent a great opportunity to reduce GHG emissions through the efficient management of material resources and waste, as well as contributing to the development of new knowledge, skills and specialised business fabric in the territory.

In this sense, since 2019, the Basque Country has a Circular Economy Strategy until 2030 (Basque Government, 2019), in which nine challenges are identified, organized around four main themes: (i) competitiveness and innovation; (ii) production; (iii) consumption; and (iv) waste management and use of secondary raw materials. Several action lines are organised around these themes, including new sustainable materials, new business models and sustainable waste management. This strategy includes an action plan up to 2025 as a precursor to 2030. As discussed below, the Basque Country also has a Circular Economy and Bioeconomy Plan that aims to create jobs, contribute to economic growth, foster talent and creative solutions, and support other industrial sectors by safely treating and recovering their waste and transforming it into secondary materials that strengthen local supply chains.

In July 2023, Ihobe identified ten keys for action for the circular economy in the Basque Country, which are closely related to the guidelines of the European Green Deal and will have a significant impact on Basque companies (Ihobe, 2023). These keys relate to the implementation and adoption of new standards related to: (i) the communication of non-financial information; (ii) a digital product passport and new eco-design regulation; (iii) a new framework for explicit environmental claims and greenwashing; (iv) the assessment of sustainability along the supply chain; (v) criteria for assessing circularity in products and the right to repair; (vi) the inclusion of secondary raw materials as substitutes for virgin raw materials; (vii) a new law on critical raw materials and related risks; (viii) the challenge of Scope 3 emissions; (ix) the European taxonomy; and (x) the future directive on industrial emissions.

On the other hand, in order to achieve the objective of competitive decarbonisation of Basque industry, the Basque Government proposes a strategy based on the use and promotion of existing technological and industrial capacities, which have been built up over the years as part of the Technological and Industrial Development Strategy in the Energy Sector. These will be harnessed to (i) respond to global challenges and (ii) create a local supply of clean technologies, services and solutions to support the decarbonisation of the industrial sectors and the Basque economy as a whole in its transition to a scenario of greater environmental sustainability. The Net-Zero Basque Industrial Supercluster initiative can be highlighted as an essential tool for promoting this decarbonisation strategy (see Box 3).

In order to achieve a competitive decarbonisation of Basque industry, the Basque Government proposes leveraging existing technological and industrial capacities built up over the years as part of the technological and industrial development strategy

The Net-Zero Basque Industrial Super Cluster is a public-private and cross-sectoral initiative to promote the decarbonisation of Basque industry

**BOX 3** Net-Zero Basque Industrial Super Cluster

The Net-Zero Basque Industrial Super Cluster (NZBISC) is a public-private and cross-sectoral initiative to promote the decarbonisation of Basque industry. The term Super Cluster derives from the cross-sectoral involvement of different industrial clusters in the Basque Country, starting with an initial work phase with the five sectors that together represent approximately 67 % of the total GHG emissions of Basque industry (refining, iron and steel, foundry, cement, and pulp and paper). On this basis, the aim of the initiative is to promote joint projects to reduce emissions from these priority sectors, gradually extending the scope to other industries with lower emissions until the active participation of the sixteen cluster management organisations (CMOs) and other stakeholders is achieved. Launched at the end of 2021 and presented at COP26 in Glasgow, the Super Cluster is part of the Transitioning Industrial Clusters Towards Net Zero project promoted by the World Economic Forum (WEF) and other international organisations.

This initiative involves the participation of actors with different strategies, capacities and needs, who share the challenge of decarbonising industrial activities. Firstly, the main drivers of this initiative are the Basque Government (through SPRI) and the two main energy companies in the Basque Country (Iberdrola and Petronor). These actors, in collaboration with the WEF, define the strategy and objectives of the initiative and guide the development of the main technological projects. On the other hand, various technological and innovation agents support the coordination and monitoring of the projects and operations of the supercluster as a whole. Finally, the industrial companies present in each of the aforementioned sectors and clusters implement joint decarbonisation projects in their field of activity, in collaboration with the Basque Science, Technology and Innovation Network (RVCTI) and financial entities.

The NZBISC has a twin objective: to contribute decisively to the decarbonisation of Basque industry and to generate new clean technologies and sustainable solutions that support a competitive and innovative industrial fabric. To achieve this, the initiative is launching various lines of work and projects related to the four groups of strategic technologies of the WEF project (systemic efficiency and circularity; direct electrification and renewable heat; capture, storage and use of $CO_2$ and hydrogen) and in 5 industrial sectors (paper and cardboard; refining; cement; steel; foundry). To date, more than 50 decarbonisation technology solutions have been identified (Basque Government, 2023d).

## 2.2 Guidelines for the transition to sustainable competitiveness

Although there is no single recipe to define the Basque strategy for sustainable transition, some key guidelines can be identified that are common to different economic, industrial, and social realities

Having established the international, European and Basque context in terms of the commitments, strategies and programmes that frame the sustainability transition, we can reflect on how to move towards sustainable competitiveness within this context. The complexity of the process implies that there is no single optimal trajectory for the transformation of the socio-technical system that will allow these objectives to be achieved (Geels, 2005).

The configuration of the economic, social and environmental context at the global, European, State, regional and local levels, together with the multiple choices and approaches of the economic, social and institutional actors, will shape the path of

the Basque economy and society. This path will not necessarily be the same as that of other territories. However, although there is no single recipe, some key guidelines can be identified that are common to different economic, industrial or social realities:

- **Place environmental sustainability at the centre of the economic transformation vision**: Territorial strategies and regulatory and incentive frameworks must adopt a life-cycle vision and take into account economic, social and environmental cost-benefit analyses of economic development policies. In addition, it is necessary to ensure the coherence and sustainability of visions, strategies, action plans and, in general, the behaviour of all public and private actors.
- **Seek to balance policies and actions in terms of their focus on economic, social and environmental outcomes**: This means, for example, analysing where transformation efforts should be focused, balancing the short-term vision (the urgency of implementing real transformations that will reduce GHG emissions) with the systemic vision of change in the medium term (the importance of achieving net-zero emissions while ensuring that the process is economically and socially viable).
- **Prioritize:** It will be important to pick the 'low-hanging fruit' first[19] and implement 'no regret' actions (i.e., actions that are independent of technological or regulatory developments).[20] Moreover, this prioritisation of efforts and resources must be based on the strengths and capabilities of the environment to ensure the materialisation of techno-industrial opportunities and the evolution of existing value chains with the capacity to generate new value-added, innovation, quality employment and business fabric.
- **Implementing policies focused on specific missions or projects in key areas for sustainability transition**: In addition to prioritizing the efforts and resources available, it seems relevant to implement specific strategies and action plans focused on niches of particular relevance in the transition process, for example in areas such as innovation in clean technologies, energy-environment taxation, investment financing or training and capacity building.
- **Securing societal support for the sustainability transition**: In addition to increasing knowledge and awareness of environmental issues and the different options for addressing climate challenges, promoting the active involvement of people in the transformation process, establishing compensation and support mechanisms for the most vulnerable groups, and facilitating the updating of human capital in areas where it can contribute to the change process will contribute to the success of the process.

[19] This expression refers to actions that could be implemented in the very short term and that can have a significant impact on reducing GHG emissions at low cost (e.g. reducing food waste, reducing methane leakage, encouraging better thermal insulation of houses, inducing more energy efficient behaviour, etc.).

[20] For example, investments in new infrastructures associated with the vegetative growth of the economy or the replacement of equipment or infrastructures that are reaching the end of their useful life with state-of-the-art technologies.

Progress in the transition to sustainable competitiveness will entail costs and opportunities in the short, medium, and long term

It is also clear that progress in the transition to sustainable competitiveness will entail costs and opportunities in the short, medium and long term. Given this reality, the aim should be to ensure the generation of a positive net benefit for the economy and society in the medium and long term. In order to manage the costs and opportunities, including the temporal, geographical, actor-specific, etc. aspects,[21] several points for reflection can be considered:

- **Not taking decisive action is the option with the highest total cost**: Decisive action in the short and medium term will make it possible to avoid some of the real impacts expected in the medium and long term: climate risks and mitigation and adaptation costs, potential social tensions due to asymmetric impacts, impacts related to the allocation of scarce resources, lower levels of well-being, etc.
- **Advancing the transition in the short term will help solve some economic and business problems**: For example, there are synergies between the sustainability transition and solutions to problems related to energy prices, dependence on energy and critical materials, or current macroeconomic problems.
- **A smart transition will contribute to medium- and long-term success:** Acting decisively means advancing the transformation in all sectors of the economy, adapting the pace to the economic viability of the necessary actions, taking into account the current development of available technologies and the costs associated with environmental inaction. To this end, it is essential to coordinate and steer the drivers of territorial and business competitiveness in a direction that increases 'sustainable competitiveness' and the ability to compete in international markets, in order to maintain a balance between environmental, economic and social sustainability.
- **Opportunities must be identified and optimised:** The comprehensive, complex and multidimensional transformation underway will generate economic, industrial and business opportunities. It is the shared responsibility of institutions, companies and citizens to steer practices and behaviours to generate the greatest possible private and social benefits.

It is possible to highlight the different roles of the main territorial players in the process of promoting sustainable competitiveness

Finally, it is possible to highlight the different roles of the main territorial actors in the process of promoting sustainable competitiveness:

- **Public institutions**: Promote ecosystems of business, innovation, and finance that facilitate the necessary investments in infrastructure and clean technologies, the optimal use of natural resources, and the development of an economy based on green goods and services with a reduced environmental footprint. It would also be advisable to continue to take an active position in: the promotion of strategic projects and innovation in new technologies; public-private partnership schemes; multi-level governance; the involvement of citizens in defining challenges and responses; and the development of regulations.

[21] The UN vision of sustainable development implies achieving a balance between SDGs in different dimensions, such as temporal (i.e. intergenerational balance), geographic (i.e. local vs. global sustainability); balanced participation and impact across actors (albeit with different roles, at global, national, regional, local levels), etc.

- **Firms:** Take advantage of the favourable environment to innovate in value propositions focused on environmental sustainability, developing strategic visions that include sustainable transformation as a medium-term goal, inevitably taking risks.
- **Citizens**: Contribute to the process of change by increasing awareness and the level of understanding of the problems, participating in critical and reasoned debates on the alternatives and options available, and taking an active stance on the need to increase training and develop attitudes and habits based on responsibility.
- **Knowledge actors**: Promote the generation of new knowledge, methodologies, technologies and processes related to all dimensions of the sustainability transition, contribute effectively to their dissemination and transfer to companies, public administrations, etc., and facilitate their adoption.
- **The 'third sector'**: NGOs and other civil society associations can contribute to facilitating the process of sustainability transition and minimizing the impact on certain sectors of society, by strengthening cohesion, visibility and inclusion of all people and working on the needs and visions of all relevant groups.

## 2.3 Dilemmas and trade-offs in the sustainability transition

All stakeholders in the territory —companies, public institutions at various levels, citizens, investors, research and knowledge centres, etc.— will inevitably face dilemmas in the coming years, the responses to which will depend on the evolution of economic, social, technological, regulatory and geopolitical variables subject to a high degree of uncertainty.

These dilemmas involve trade-offs[22] in areas and dimensions that are highly relevant to the sustainability transition, such as the allocation of available resources and strategic policy choices (i.e. on support for certain technologies, or how to protect the most vulnerable populations and enterprises in value chains that will be negatively affected by the ongoing transformation). However, specific dilemmas and trade-offs cannot be resolved without in-depth analysis and consideration of realistic scenarios and the implications of the different choices that may be made. Moreover, they arise in the context of a process that is fraught with uncertainty and will necessarily involve complex choices with asymmetric impacts and winners and losers.

The dilemmas and trade-offs associated with sustainability transition cannot be resolved without in-depth analysis of the implications of different choices that may be made

On the supply side, there are dilemmas about the pace of change required (how to reconcile the urgent need to reduce emissions with the gradual change required by certain industries), the scope of measures to protect vulnerable industries, or how to deal with job destruction in certain sectors of the economy.

On the demand side, dilemmas will relate to the distribution of the costs of the sustainability transition among different actors, the design of protection schemes for the most vulnerable groups, and strategies for achieving the broad social consensus

[22] By trade-off we mean alternatives to choose between with different levels and distributions of benefits and costs.

needed to facilitate effective and relevant transformations, to name just a few of the most relevant ones.

In the area of institutions and policies, trade-offs will address aspects such as the direction of industrial, technological and innovation policies (e.g. the balance between supporting R&D and innovation activities around certain promising technologies and maintaining an environment of technological neutrality), the optimal combination of incentives and regulation to induce an effective sustainable transformation of production processes and the development of new technologies, or how to move towards effective governance (more participatory versus command and control policies).

In addition, other dilemmas may arise in other dimensions of the sustainability transition process, such as the balance between accelerating environmental sustainability and protecting economic or social sustainability in other regions of the planet, or the financing of mitigation and adaptation processes in countries of the global South, among many others.

This report does not attempt to resolve these dilemmas, which are numerous and complex, or to propose an optimal solution for the process of sustainability transition. Rather, it seeks to provide reflections and data within Orkestra's territorial competitiveness for wellbeing framework, that will enable all actors to face the most complex issues and address the sustainability transition with the aim of also increasing economic competitiveness and strengthening the wellbeing of Basque society.

'Sustainable competitiveness' implies addressing multiple dilemmas and acting on elements that can lead to greater economic competitiveness, environmental improvements and greater wellbeing

As mentioned above, the vision offered by this report is that it is possible to reconcile the ongoing transformation with a strengthening of the foundations of economic competitiveness and the territory's capacity to generate wellbeing for its citizens. For the model of 'sustainable competitiveness' to work, it is necessary to address the dilemmas and trade-offs mentioned above, and many others, and to act on those elements of the competitiveness model that can lead to greater economic competitiveness, environmental improvements and wellbeing of the population. The following section describes the 'levers' that can be actioned to accelerate this sustainability transition.

## 2.4 Levers for accelerating the transition

The transition to an environmentally sustainable economy necessarily implies an adaptation of the entire value chain of the economy (production-distribution-consumption). The main objective of this adaptation in the current market economy model is the development of markets for goods and services with a low or zero environmental footprint and the implementation of new business models and forms of cooperation between actors that place environmental sustainability at the core of socio-economic decisions.

This implies aligning adaptation, change and evolution to greater environmental sustainability with the drivers of economic competitiveness and territorial wellbeing. In other words, a sustainability-competitiveness-wellbeing trinomial must be built and strengthened to simultaneously reduce the environmental footprint of the territory

and avoid eroding the foundations of economic competitiveness and the wellbeing of the population.

At the business level, the sources of competitiveness associated with a successful environmentally sustainable transformation are related to (Fernández Gómez and Larrea Basterra, 2021a):

Business competitiveness associated with the green transformation stems from efficiency in the use of resources, specialisation in sustainable products and services, and compliance with increasingly strict environmental standards

1. Greater efficiency in the use of energy and materials, which reduces the environmental footprint and leads to higher technical and economic productivity;

2. Competitive advantages related to increased specialisation in sustainable products and services and greater diversification of value propositions taking into account the sustainability dimension (e.g. in areas such as asset servitisation, advanced digital services, product lifecycle-focused service delivery, circularity, etc.);

3. The competitive advantages that can be gained by companies that make rapid progress in their sustainability transformation, where capital markets increasingly demand that companies meet stricter sustainability standards in order to receive funding and financing.

Sustainability transition will lead to a greater capacity to generate economic development and wellbeing for the population

At the territorial level, sustainability transition will lead to a greater capacity to generate economic development and prosperity for the population if: (i) the foundations are laid for a stable legal and regulatory context (as is being attempted at the EU, State and Basque Country levels); (ii) business ecosystems are created that are conducive to the sustainable transformation of businesses and to technological and non-technological innovation; (iii) demand shifts are induced that develop and consolidate markets for sustainable goods and services; (iv) natural capital is strengthened and leveraged to realise the benefits associated with healthy ecosystems and the protection of biodiversity; (v) new sustainability capabilities and strengths are generated in areas such as knowledge, human capital, financial ecosystems and social capital; and (vii) the technological base and industrial fabric are strengthened to develop innovative solutions for decarbonizing and reducing the environmental footprint of industry and other sectors.

In the context of an economy such as the Basque economy, with a significant industrial and advanced services sector, the promotion of new technological capabilities and knowledge on environmental sustainability, with the support of the Basque Science, Technology and Innovation Network (RCVTI), and the strengthening of an innovative local business fabric based on existing industrial capabilities, are essential. They are central to achieving the twin goal of facilitating the decarbonisation of industrial sectors and positioning Basque companies competitively in local, national, European and global markets by offering clean technologies and sustainable and innovative solutions.

A particularly relevant aspect is that, in the very short term (within a few years), a window of opportunity is opening that will most likely reward those companies and territories that assume the risks of a deep (and successful) transformation earlier. This implies a dilemma between moving more quickly (assuming the necessary efforts and costs) and adopting a more conservative follow-up strategy. In the medium term, when markets for products and services with a reduced environmental foot-

print become the norm throughout the economy, companies and regions will compete again on the basis of traditional parameters and variables.

According to Orkestra's framework for analysing territorial competitiveness for wellbeing (see Figure 0-1), there are a series of 'dynamic levers' on which policies, the regulatory and legislative framework and the different actors can act. These six levers can have a positive impact on the economic and business performance of the territory and on the current and future wellbeing of its people. They represent the different types of 'capital' that exist in the economy and that together can be thought of as the 'factors' or 'explanatory variables' in a production function for competitiveness in the service of wellbeing (Orkestra, 2021).

Actions on 'dynamic competitveness levers' can be targeted at creating appropriate incentives and developing a business, social, and innovation context that accelerates results consistent with sustainable competitiveness

Actions through these levers can be steered to create appropriate incentives and develop a business, social and innovation context that accelerates results consistent with sustainable competitiveness: supply of innovative technologies and solutions for decarbonizing industry and other sectors, production and distribution processes with a small environmental footprint, responsible consumption of goods and services, greater circularity of materials, holistic optimisation of the use of assets and infrastructure, etc. In addition, by acting on these levers, changes can also be implemented in the medium- and long- term that affect elements of the structural context (e.g., sectoral or scientific-technological structure), so that competitive advantages can emerge in new sustainable value chains.

Table 2-1 illustrates some of the potential ways in which the different levers can contribute to environmental sustainability and have a positive impact on competitiveness for wellbeing. Chapter 3 then discusses in detail some key dimensions of these levers in the Basque context.

**TABLE 2-1** Examples of the impact of the different levers

| Lever | Mechanisms for achieving greater environmental sustainability | Potential positive impacts on competitiveness and wellbeing |
|---|---|---|
| **Natural capital** | • Rational use of energy, mineral and natural resources (soil, air, flora and fauna, water resources, etc.)<br>• Promoting the penetration of renewable energies in the energy matrix<br>• Protection of natural areas<br>• Identifying sources of economic value related to the sustainable use of natural resources | • Smaller environmental footprint<br>• Increased efficiency and/or reduced costs associated with energy and materials<br>• Greater enjoyment of natural resources by the population<br>• Increased attractiveness of the area to investors, businesses and individuals<br>• Reduced dependence on the outside world |
| **Physical capital** | • Planning that takes into account the sustainability dimension (lower greenhouse gas emissions, smaller environmental footprint...)<br>• Unified operation of the various infrastructure networks | • Optimization of available clean technologies and introduction of new zero net emissions technologies<br>• Accelerating sustainable and digital transformation in various sectors<br>• Increased resilience to adverse weather events |
| **Financing** | • Mobilising capital for sustainable activities and projects<br>• Innovation in financing models and products | • Acceleration of needed investments in new technologies<br>• Infrastructure investments required for sustainability transition |
| **Knowledge** | • Stimulating product and process innovation focused on environmental sustainability<br>• New business models, new materials, new forms of collaboration<br>• Improving capacity to analyse environmental, economic and social impacts | • Development of technological and industrial capital and innovative technologies and solutions for decarbonisation<br>• Competitive advantages for companies in terms of reduced environmental impact, increased efficiency, diversification, differentiation of value propositions, improved reputation<br>• Alignment of business and territorial strategies with sustainability goals |
| **Human capital** | • Acquiring new capabilities and skills related to sustainability transformation<br>• Increasing knowledge and awareness among citizens | • Improved management capacity of companies<br>• Development of a sophisticated demand for sustainable goods and services<br>• Increased social support for sustainability transition |
| **Social and institutional capital** | • Active support of the population and institutions for innovation and transformation processes<br>• Shared strategic vision among different stakeholders adapted to an uncertain, changing and complex environment<br>• Promotion of collaborative governance, encouraging collaboration and coordination of all actors (public-private, different levels, etc.)<br>• Stable, predictable regulatory framework with clear incentives for transformation | • Effective governance of the transformation process: shared decision-making, conflict resolution, etc.<br>• Increased social acceptance of sustainability transition<br>• Optimal allocation of available resources<br>• Behavioural change in line with sustainability goals |

*Source:* Compiled by authors.

# 3
# Six levers to achieve sustainable competitiveness in the Basque Country

In this chapter, we review in detail the current situation of the Basque Country in terms of key dimensions for each of the levers introduced at the end of Chapter 2, which appear on the right in Orkestra's territorial competitiveness for wellbeing framework (see Figure 0-1). For each lever, we focus analysis on dimensions that are especially important for the sustainability transition: natural resources, relevant infrastructures, sustainable finance, green knowledge bases, green occupations and training, and collaborative governance. There are other dimensions for each lever which have not been analysed in this Report. Some of them, such as digitalisation, are also very important for the success of the sustainability transition, and indicators related with many of them can be studied in the Orkestra Regional Competitiveness Observatory and in other specific reports.[23]

## 3.1 Natural capital

The competitiveness and sustainability of a territory can be improved through greater efficiency in the use of natural resources

Natural capital refers to the set of assets related to nature that can generate economic value and wellbeing for people. Its study is necessary to improve the competitiveness and sustainability of a territory and its companies, given the scope for greater efficiency and productivity in the use of natural resources as well as through a smaller environmental footprint from the set of business activities that are carried out and/or the products produced. This is especially relevant for the Basque Country (see Box 4) where, despite the different natural resources available (forest area, marine ecosystems, etc.), there is a significant environmental liability inherited from the past (especially in terms of soil quality).

[23] For an interactive indicator dashboard, see: https://www.orkestra.deusto.es/competitiveness-observatory/en/ES21/dashboard. Other specific reports include Fernández Gómez and Menéndez Sánchez (2023) on the development of the hydrogen system in the Basque Country, Lorenz Erice *et al.* (2022) on the role of foundations in promoting the SDGs, Orkestra (2022b) on the financial ecosystem of the Basque Country, as well as a report pending publication at the end of 2023 on digitalisation in the Basque Country in line with the Digital Economy and Society Index (DESI).

## BOX 4 Sustainability transition: Contribution of natural capital to the Basque Country's economy (written by Aclima)

According to data from the World Bank, half of global GDP —about 40 trillion euros— depends to some extent on nature (World Economic Forum and PwC, 2020). In fact, according to the Food and Agriculture Organisation (FAO), the estimated value of natural assets is 125 trillion dollars (FAO, 2023). Despite this, we tend not to take these assets into consideration in economic policies, something which leads to insufficient investments being made for their protection (as they are not considered at a fair value for our economic reality).

In Europe, more than 80 % of the continent's habitats are in a poor state of conservation (European Environmental Agency (EEA), 2020) and soil degradation affects between 61 % and 73 % of agricultural land. To alleviate these and other environmental problems, the European Commission has promoted legislative strategies and actions such as the Biodiversity Strategy for 2030 (European Commission, 2020a), the new EU Forestry Strategy (European Commission, 2018), and the Nature Restoration Law (European Commission, 2022b), seeking to recover 80 % of European habitats currently in poor condition and return nature to its original state in all ecosystems.

In the case of the Basque Country, natural capital contributes to the competitiveness of our economy and the wellbeing of our citizens. Business activity related to natural resources of all types is very broad, but it must grow if we want to guarantee sustainable development. This includes everything from initiatives related to waste recovery, air quality, the blue economy and nature-based solutions, to clean energy. The truth is that our natural heritage is one of the economic assets of our territory. Environmental sustainability is a driver of competitiveness, as it facilitates greater efficiency and productivity in the use of materials and energy while minimising environmental impact.

Business activity related to natural resources of all types is widespread in the Basque Country

In this sense, within our legislative framework we have standards like the Biodiversity Strategy of the Basque Autonomous Community 2030 (Basque Government, 2016), which sets the priorities and commitments regarding natural heritage, the Circular Economy and Bioeconomy Plan (Basque Government, 2021b), which seeks to promote efficiency in the consumption of raw materials, reduce waste, and optimise clean production, and the Basque Soil Protection Strategy 2030 (Basque Government, 2022a), whose objective is for all soils in the Basque Country to be managed sustainably by 2050.

This effort makes it possible to develop a business network which specialises in innovative and sustainable goods and services. Climate change is causing alterations in both the weather and the physical conditions of the territory, and these alterations will have an impact on our economy. The scarcity of resources necessitates a reduction in resource consumption and a good use of waste to turn it into materials and energy, thus promoting local supply chains. Soil management will become increasingly important, due to the need to guarantee the land's good condition to use our soil appropriately. Additionally, services related to air quality and the blue economy will become increasingly relevant, as well as anything related to biodiversity management and the sustainability of urban environments.

The green transition provides Basque companies with growth opportunities which are more pronounced in the case of companies offering environmental goods and services

The green transition offers Basque companies growth opportunities which are more pronounced in the case of environmental companies. This is because the systemic integration of the environmental variable into the economy, as promoted by the EGD, drives the creation of new business models, giving rise to sustainable companies and products in a market where sustainability is key for competitiveness. For this reason, Aclima supports various working groups that promote the innovation and effort of our partners in areas such as environmental quality, nature-based solutions, the recovery of polluted soils, as well as the consideration/implementation of 4.0 technologies in advanced and effective environmental management.[24]

[24] See: https://aclima.eus/en/grupos-2/.

Likewise, the natural resources available to the territory, as well as environmental protection activities guiding the different mitigation and adaptation measures to minimise environmental impact, must be assessed both economically and socially. This is key to the creation of sustainable business activities, as has occurred during recent decades in the environmental sector. This section analyses categories of natural capital (energy resources, biotic resources, mineral resources, and water resources) that the Basque Country has at its disposal in order to tackle the transition towards sustainability, and the opportunities for competitiveness that they offer.

### *3.1.1. Energy resources*

In 2021 there was an increase in primary and final energy consumption compared to 2020, reaching levels similar to those of 2019

GHG emissions in the Basque Country amounted to 17.2 million tonnes of $CO_2$ equivalent in 2020, lower than in 2019 because of the effect of the pandemic in slowing down the economy and reducing energy consumption. However, in 2021 there was an increase in primary and final energy consumption compared to 2020, reaching levels similar to those of 2019.[25] The Basque Country's energy dependence on the rest of the world (in terms of gas and other fuels) is very high and will continue to be this way in the future. In terms of electrical energy, the generation deficit of the Basque electrical system, which is part of the Iberian electrical system, will continue to be significant despite the growing number of energy projects promoted by companies and citizens in the territory. This is due to a lower potential for net use of renewable energies (for example, sunlight),[26] as well as to social and/or political opposition to the use of certain natural resources (for example, fracking),[27] the deployment of energy generation infrastructure (for example, wind farms, energy grids), and to a lesser extent the deployment of distributed energy resources (see Table 3-1).[28]

**TABLE 3-1** Potential for the use of renewable energies (MW)

| Origin | Net utilisation potential (MW) | Exploitation potential |
|---|---|---|
| Photovoltaic solar | More than 1000 MW | High |
| Solar thermal | Between 100 and 500 MW | Low |
| Wind energy | More than 1000 MW | High |
| Geothermal | Between 500 and 1000 MW | High |
| Biomass | More than 1000 MW | High |
| Oceania | Between 100 and 500 MW | Medium |
| Small hydro energy | Less than 100 MW | Low |

*Source:* Basque Government (2023e)

[25] 6,329 and 4,923 kgoe, respectively (EVE, 2022).
[26] See Sancho Ávila *et al.* (n.d.).
[27] Despite the recent evolution of energy prices, there are no scenarios that involve the exploration or exploitation of new hydrocarbon deposits (Irigyen, 2023).
[28] For more details, see Mosquera López and Fernández Gómez (2023).

Regarding the use of energy resources, the Basque Energy Strategy 3E-2030 establishes the goal of reducing oil consumption by 18 % compared to 2015 and of achieving 21 % penetration of renewable energies, with a list of power objectives ordered by technology. Along these same lines, the Energy Transition and Climate Change Plan 2021-2024 aims to achieve a 20 % use of renewable sources in final energy consumption, and the Basque Climate Change Strategy plans to reach 40 % by 2050.

Despite these aims, in 2021 fossil fuels represented 66.8 % of final energy consumption (59.5 % in the EU-27), consumed mainly in transport and industry, and just 16.6 % of final energy consumption (21.8 % in the EU-27) came from renewable sources (Eustat, 2023a). Likewise, electrical power capacity in the Basque Country in 2022 amounted to 2,966 MW, with around 20 % of that being renewable (Red Eléctrica, 2023), compared to 37.6 % in the EU-27 in 2021.

Fossil fuels represented 66.8 % of final energy consumption in 2021 (59.5 % in the EU-27), while 16.6 % came from renewable sources (21.8 % in the EU-27)

Over the coming years a large volume of investment is expected to move towards the established objectives. In line with the 3E-2030 Strategy, the Sector-Based Territorial Plan (PTS) for renewable energies (whose approval is expected in 2024) proposes an installed power capacity of 2 500 MW for solar photovoltaic energy, 1 100 MW for onshore wind energy, and 2 450 MW for other technologies (including biomass, geothermal, aerothermal, solar thermal, tidal, and small hydro energy) (Basque Government, 2023e). This will lead to greater use of renewable resources which are native to the region, and could cover up to 27.9 % of final energy consumption (Basque Government, 2023e).

Nevertheless, while this would align with the objective of Strategy 3E-2030, the goal set at national and European level for 2030 (reaching 42.5 % of renewable energy use) would not be achieved. What is more, said goal could rise to 45 % (European Commission, 2023d). This will make it difficult to achieve net-zero emissions in 2050 (Basque Government, 2023b). The future Basque Energy Transition and Climate Change Law and the associated Strategy and Roadmap for Energy Transition and Climate Change in the Basque Country must therefore ensure that the Basque energy transition aligns with the objectives set in the EU over the coming years.

There are obstacles to achieving the EU objectives for renewable energy in the Basque Country and we must move forward in all possible ways (investments in large facilities, self-consumption, new energy vectors such as hydrogen, energy efficiency, etc.)

There are several ways to advance this goal. For example, it is possible to promote the photovoltaic potential of the roofs of buildings (estimated at 1 600 MW – Basque Government, 2023e), as well as advancing in the development of new self-consumption solutions promoted by citizens (Basque Government, 2023b).[29]

Additionally, hydrogen can contribute to the decarbonisation process in sectors and activities that are difficult to decarbonise, as is the case of some industrial sectors and road and maritime freight transport, for example. To this end, the Basque Country has a Hydrogen Strategy and Action Plan and strategic initiatives such as the Basque Hydrogen Corridor and the Hydrogen Sector Forum, as well as a set of business-led projects (for example, Hydrogen In Gas Grids, SINATRAH, H2SAREA) (Lar-

[29] Currently, the Basque Country has 40 energy communities, with the participation of nearly 100 municipalities, more than 5 200 people, and a photovoltaic solar power capacity of about 17 MW (Deia, 2022). Likewise, there are 8 energy community projects subsidised by the Ministry for Ecological Transition and the Demographic Challenge (MITECO) (La Moncloa, 2022) and three energy cooperatives (Goiener, Energía Gara, and initiatives of the Ekiola project).

rea Basterra *et al.*, 2022). These projects seek to overcome the numerous technical, environmental, financial, and regulatory challenges (Martén Uliarte and Fernández Gómez, 2022).

Along with the development of different renewable energies, programmes to support energy efficiency and the renovation of energy installations in buildings and facilities by companies and homes continue to be proposed (Eseficiencia, 2022; Álvaro Hermana, 2022). The energy intensity of the Basque Country improved between 2010 and 2021, placing the territory in a favourable position compared to the EU-27 average and the Spanish economy (which were in a worse position in 2021 than the Basque Country in 2010), as well as the German economy. This is linked to investments made in different industrial sectors, where the electrification of consumption and the deployment of cogeneration technologies (among others) can be highlighted (Fernández Gómez, 2021).

Given this scenario, at least three major challenges arise in the energy field: (i) how to increase the renewable energy resources which are needed in the local context; (ii) how to finance and implement strategic projects regarding energy efficiency, renewable energies, and green hydrogen; and (iii) how to maintain and increase revenues, employment, and market shares among Basque manufacturers of goods and services related with renewable installations and other leading value chains in the energy sector.

### *3.1.2. Biotic resources*

Domestic consumption and imports of biotic products from the rest of Spain have been decreasing, but dependence on these materials is higher than that of other territories due to the smaller size of the Basque Country

Although domestic consumption and imports of biotic products (of biological origin) from the rest of Spain have been decreasing, dependence on these materials is higher than that of other territories due to the smaller size of the Basque Country (Basque Government, 2021b).[30] New resource chains are among the activities related to the bioeconomy (for example, biomass for thermal use), as well as forest bioeconomy activities (for example, forest resource use, water quality improvement, soil retention, and air quality improvement) and other solutions based on nature and linked to the recovery and use of different types of ecosystems.[31] Additionally, there is the wood sector (first and second transformation), among others.

In these areas, numerous strategies or plans have been developed in order to promote the circular bioeconomy and position the Basque Country as a leading region. For example, the Forest-Sector Circular Bioeconomy Roadmap promotes the creation and consolidation of high-added-value business activities from the use of forest resources (Basque Government, 2021b). Along these lines, at the end of 2019 the Basque Alliance for Bioeconomy (AVB) was created with the aim of creating a network of business players to reinforce the economic model of creating products based on biological resources and to establish a structured collaborative effort (Basque Government, 2022b).

[30] Domestic biotic extractions in the Basque Country accounted for 23 % of domestic consumption of biotic products in 2020, compared to 15 % in 2005, and 32 % in 2014. Fundamentally coming from forestry and agriculture, they grew by 15 % between 2005 and 2020. Fishing (inland waters and marine waters) amounted to 214 542 metric tonnes (MT) in 2020.

[31] See, for example, Meza and Rodríguez (2022).

In 2021, the Circular Economy and Bioeconomy Plan was published, based on the 2030 Circular Economy Strategy, which established seven priority sectors including the agri-food sector and the bioeconomy. Likewise, there is a Forest-Sector Plan 1994-2030 which is relevant, taking into account that forests represented 68 % of the total area of the Basque Country in 2021 (Hazi, 2021).[32] Closely related thereto, the Biodiversity Strategy for 2030 set four goals: (i) protection and restoration of ecosystems; (ii) promotion of the European Natura 2000 Network as an opportunity; (iii) promotion of knowledge and culture about nature; and (iv) effectiveness and efficiency in the management of the territory and natural heritage (Basque Government, 2016).

Additionally, the water resources of the Exclusive Economic Zone (EEZ) of the Basque Country are in good condition (Basque Government and Ihobe, 2021). However, the artificialisation/urban development of land, inadequate agroforestry and fishing practices, the modification of natural conditions, pollution, climate change, and invasive exotic species are causing the loss and/or deterioration of the natural heritage and its ecosystem services (Basque Government, 2016).

Although Basque water resources are in good health, there are practices that are causing the loss or deterioration of this natural resource

The main challenges in terms of biotic resources are related to the relocation of certain value chains (for example, the chemical industry), a lack of specialisation and qualification on the part of workers, a shortage of entrepreneurs, an absence of foresight considering the value of all the natural resources of the Basque Country (domestic extraction, carbon sinks, etc.), and the impacts of different activities on the natural balance.

### *3.1.3. Mineral resources and secondary raw materials*

Although the need for raw materials has reduced (unlike the trend in the EU-27, where a change in trend has been observed since 2013, particularly in the need for non-metallic minerals), the Basque economy and Basque industry require large volumes of different minerals (especially metallic minerals, see Graph 3-1) for the manufacture of products that are subsequently exported, thus reducing domestic consumption of said materials.[33] In fact, industry imports about 61 % of the total cost of what is produced (compared to 2 % of energy) and consumes about 21 million tonnes of raw materials.

Efficiency in the use of materials has increased in the last fifteen years. Domestic consumption of materials decreased considerably from 38.7 million MT in 2005 to 22.9 million MT in 2020.[34] Likewise, imports, exports, and domestic extraction[35] were reduced, placing the level of material productivity of the Basque Country at 2.71 euros/kg in 2020, compared to 2.6 in 2018 (Ihobe, 2022a).[36]

[32] Next in importance were the agricultural surface area, urban/infrastructure surface area, and unproductive spaces related with water. 23 % of the territory was declared a protected area.

[33] Since 2008, mining activity in the Basque Country has revolved around non-metallic minerals, which accounted for 67.4 % of domestic extractions in 2020.

[34] In the European Union different materials exhibit different changes in the 2000-2022 period However, the level of aggregate consumption in 2022 was slightly lower than it was in 2000. The continued decline since 2008 in the consumption of fossil fuels can be highlighted, which has translated into a reduction of more than 30 % (Eurostat, 2023a).

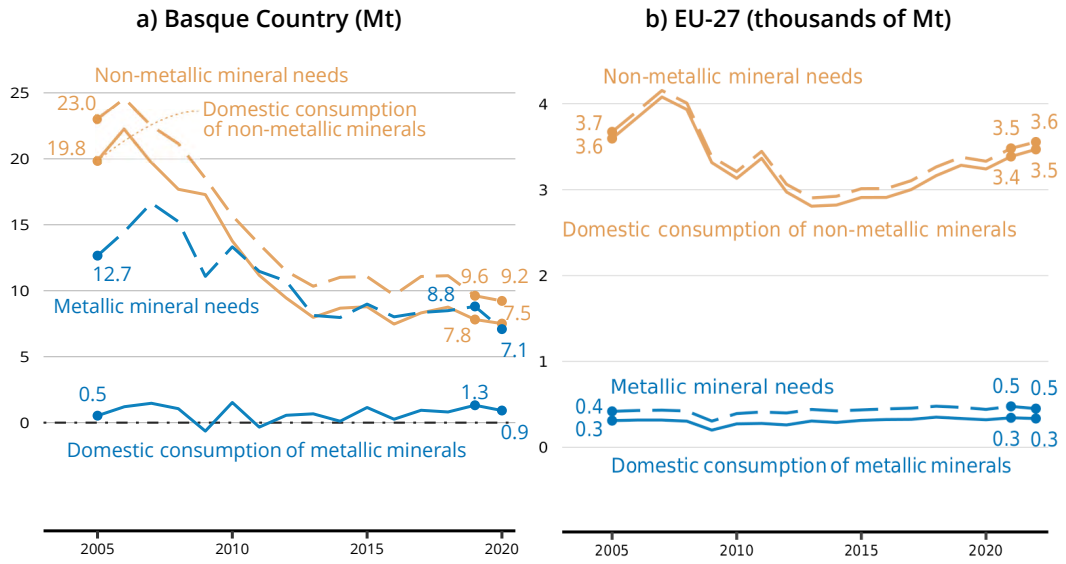
[35] Domestic extractions mainly include non-metallic mineral products (67 % of the total in 2020) and biomass (mainly products from agriculture, forestry, hunting, and fishing).

[36] Material productivity is defined as the result of dividing the gross domestic product measured in monetary units and the domestic consumption of materials measured in physical units (i.e., in tonnes, kilograms, etc.).

The Basque Country only re-uses around 43 % of the 3.5 million tonnes of waste generated

According to Ihobe (2022a), a portion of the materials used become solid and liquid waste (2.7 million tonnes) and others are treated and reintroduced as secondary raw materials through recycling/reuse/composting processes (2.6 million tonnes or 40.4 % of the waste generated) or as infill (1.1 million tonnes or 16.8 % of the waste generated). The Basque Country barely uses 43 % of the 3.5 million tonnes of waste generated (Basque Government, 2021b), which highlights a possible opportunity to improve efficiency in material use.

**GRAPH 3-1** Evolution of domestic consumption and mineral needs




*Source:* Eustat (2023b) and Eurostat (2023a). Compiled by authors.

*Note:* Domestic consumption of materials = domestic extraction + imports – exports; Raw material needs = domestic extraction + imports.

Some of the raw materials that are imported are classified as critical due to their economic importance and supply risk, in accordance with the parameters of the European Commission (2017) (for example, copper, silicon, niobium, cobalt, and tungsten). Other ferrous metals (steel, iron) and non-ferrous metals (aluminium, nickel, chromium, zinc) are also key for Basque industry, although they are not critical at the EU community level.

Ecodesign, the substitution of materials, and R&D and innovation help the Basque Country to manage the risks associated with the critical raw materials it requires

To address geopolitical and price risks, among others, the EU proposes the establishment of a regulatory framework to ensure a secure and sustainable supply of critical raw materials (the European Critical Raw Materials Act). Among the tools proposed to achieve the foreseen objectives are the promotion of eco-design, the substitution of materials, R&D and innovation and the circular economy (European Commission, 2023e), all of which are tools that have been deployed in the Basque Country. The great challenge for the Basque economy in the field of key raw materials, in addition to continuing to promote the strategies and action plans in place, is to achieve a stable and sustainable supply in the long term and to have a strategy and regulations that favour the reuse of waste and improved material productivity at all levels of the economy.

### *3.1.4. Water resources and their quality*

The Basque Country is part of three river basin districts (Basque Water Agency, 2020) that provide the region with an adequate level of resources, and it has exclusive jurisdiction over all internal basins (Gartzia de Bikuña *et al*., 2008). According to Meyer *et al*. (2019), the Cantabrian watershed is characterised by its erosive power and flows without major fluctuations (except for exceptional cases). Likewise, the Basque Country has groundwater, in the form of aquifers that are not very large and quite compartmentalised.

In general, the state of the water in the Basque Country is good, except in the case of the wetlands. It is also estimated that there are some 354 groundwater sites where the water could be affected by pollution (Ihobe, 2020). Water consumption was quite stable until 2020, when it went down by almost 15 million $m^3$, a trend that continued in 2021 (Eustat, 2022a). This evolution placed the Basque Country as the Autonomous Community with the lowest level of water consumption, with around 100 L per day, per person.

The Basque Country is the Spanish autonomous community with the lowest level of water consumption per capita, with around 100 L per day, per person

Water resource planning in the Basque Country is based on a Hydrological Plan (2022-2027), a Special Drought Plan for the Basins of the Basque Country, a Flood Risk Management Plan (2022-2027), and the plans for the Cantabrian and Ebro Basins (URA, 2023).

The main challenges are to achieve adequate management of water resources and biodiversity (two concepts that are closely related) and to promote adaptation measures in the face of the adverse effects of climate change. These include rising sea levels and extreme waves in coastal zones (as discussed in Section 3.2 on physical capital), which, along with other changes, will affect coastal wetlands, marshes, and intertidal communities.[37]

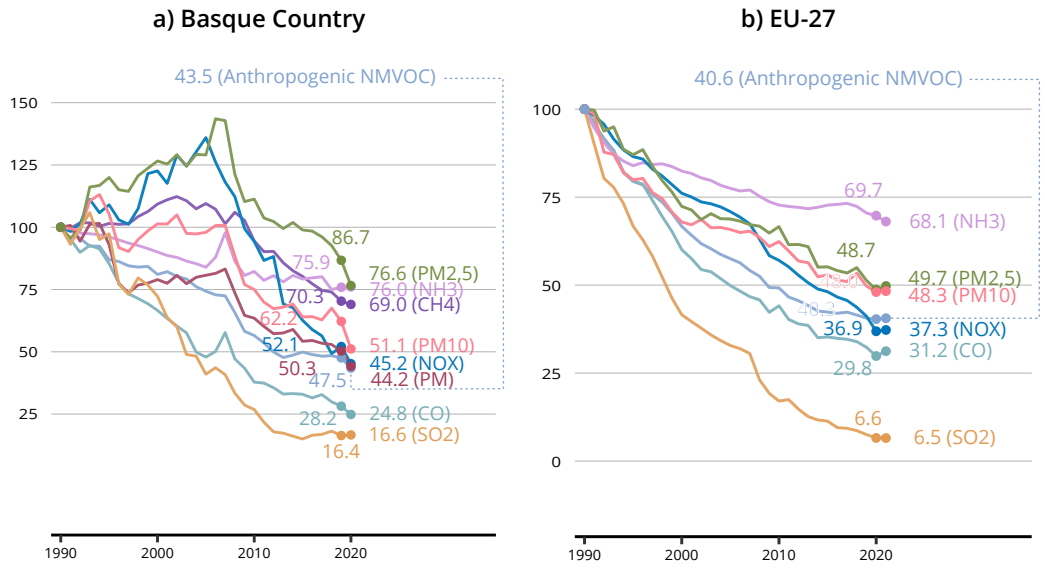
### *3.1.5. Air and soil quality*

Air quality in the Basque Country has improved since 1990, with some ups and downs, and especially since 2008 (in contrast to the EU-27, where emissions have reduced more continuously over the whole period). This is seen in the reduction of emissions from different polluting substances (see Graph 3-2). The cases of sulphur dioxide (more than 80 %) and PM 2.5 microparticle emissions are especially noteworthy (see also Chapter 1). Having said that, the annual sustainability indicator —calculated as the ratio of the number of days of very good or good quality to the total number of days— has fallen, going from 95.5 % in 2017 to 88.8 % in 2021 (Eustat, 2022b).

Air quality in the Basque Country has improved over recent decades, and especially since 2008

[37] Although this has not been specified, in all the previous areas (energy resources, biotic resources, and mineral resources) measures needed for the adaptation of the economy and the territory to climate change should be analysed and adopted.

**GRAPH 3-2** Indices of polluting substance emissions




*Source:* Basque Government (2022c) and Eurostat (2023b). Compiled by authors.

*Note:* Base year = 1990.

It has been estimated that in 2018 approximately 9 600 hectares of the territory were potentially polluted

With respect to soils, it has been estimated that in 2018 approximately 9 600 hectares of the territory (mainly industrial land[38] and landfills) were 'potentially polluted' (Eustat, 2019). Of these, around 1,700 hectares of polluted land could affect surface water courses, 159 hectares could affect areas of the Natura 2000 Network, about 588 hectares are located less than 50 meters from surface water courses in good chemical condition, 1 568 hectares are in sites of hydrogeological interest, and 1 114 hectares are in flood-prone areas (Ihobe, 2020).

The Basque Country has considerable experience and knowledge related to the protection and recovery of soils

Since 1994, standards and strategies have been developed for the protection and recovery of soils (Basque Government, 2022a); for example, Law 4/2015 for the Prevention and Correction of Soil Pollution in the Basque Country. In June 2022, the Basque Soil Protection Strategy 2030 was published and the first action plan was proposed, featuring 69 actions and a budget between 2022 and 2030 of 137.5 million euros. The challenge for the Basque Country in this area is to continue regenerating a significant amount of these polluted soils.

### *3.1.6. Opportunities for Basque Country competitiveness*

Analysis of natural capital shows that the Basque Country has limited natural resources to face great challenges and to move towards environmentally sustainable competitiveness. However, lessons from the past and the knowledge generated (for example, on renewable energy, environmental asset management, the bioeconomy, etc.) can help to seize future opportunities and further strengthen the environmental sector.

[38] Associated, especially, with metallurgy and the repair and maintenance of vehicles.

Indeed, the Basque Country has an environmental sector made up of specialised companies with extensive experience in numerous environmental areas, whose knowledge must be used and made available to different economic sectors. This environmental sector, with its knowledge and experience, is an asset that the Basque Country has at its disposal to support the sustainability transition of the economy and society, and it will be key in the future. Promoting it and highlighting its value can facilitate the development of innovative and sustainable environmental technologies and solutions in different sectors, especially the industrial sector. shows the GVA ratio from the environmental goods and services sector as a percentage of GDP, as well as employment in the environmental goods and services sector with respect to total employment in the Basque economy.[39]

An environmental sector made up of specialised companies with extensive experience in numerous environmental areas consitutes an asset for the Basque Country sustainability transition

**TABLE 3-2** GVA and employment in the environmental sector

| | GVA (% GDP) | | | | Employment (% total employment) | | | |
|---|---|---|---|---|---|---|---|---|
| | **2018** | **2019** | **2020** | **2020–2018 (%)** | **2018** | **2019** | **2020** | **2020–2018 (%)** |
| **Basque Country** | 1.70 | 1.86 | 1.94 | 14.12 % | 1.85 | 2.05 | 2.04 | 10.26 % |
| **EU-27** | 1.24 | 1.32 | 1.45 | 16.94 % | 1.23 | 1.30 | 1.39 | 13.43 % |
| **Germany** | 1.95 | 1.96 | 2.39 | 22.56 % | 1.39 | 1.45 | 1.48 | 6.18 % |
| **Spain** | 2.01 | 1.98 | 2.41 | 19.90 % | 1.79 | 1.77 | 2.01 | 12.19 % |

*Source:* Eustat and Eurostat. Compiled by authors.

Aclima (2023) characterises the environmental sector around six large cross-sector value chains: (i) waste management; (ii) polluted soils; (iii) integral water cycle; (iv) environmental quality; (v) ecosystems; and (vi) eco-efficient manufacturing and design. According to this classification, the Basque environmental sector is made up of 301 organisations, generally small, in which environmental operators represent 53 % of the collective, 54 are manufacturers, 81 are service companies, and 7 are R&D players.

The total turnover of the sector exceeds 3 billion euros (75 % in the waste area and 16 % in activities related to the integral water cycle). Total employment amounts to 11 900 people, of which 7 500 work in waste management, more than 2 000 in water management, and 742 in efficient manufacturing and ecodesign (Basquetrade & Investment *et al*., 2022).

The turnover of the environmental sector of the Basque Country exceeds 3 billion euros and employment amounts to 11 900 people

Although 82 players undertake international activity (production or sales) in 54 countries (including the USA, Mexico, United Kingdom, Germany, and China), this is a sec-

[39] The data from the Basque Country include elements that are additional to the data from the EU-27, Germany, and Spain. In the case of Spain, if the same elements as in the Basque Country were included, the GVA ratios would be 2.27, 2.25, and 2.70 respectively for 2018, 2019, and 2030; and the ratios based on employment data would be 2.16, 2.15 and 2.44.

tor with a low level of internationalisation. There are regulatory barriers that make access to foreign markets difficult. In fact, the main way to access these markets tends to be through local alliances and consortia for projects financed by multilateral entities (for example, the IDB or Europe Aid).

In addition, there are many other sectors associated with the transition towards environmental sustainability that present opportunities in the Basque Country (such as those related to renewable energies, green hydrogen, industrial decarbonisation, sustainable mobility, and digitalisation), and in which the territory has companies that operate at a local, national, and international level with recognised track records and capabilities.

Several specific opportunities related to natural capital can be mentioned. In the energy field, promoting energy efficiency and taking advantage of renewable energies will reduce energy imports and disbursements abroad, allowing for a reduction in the energy bill and helping with the volatility of energy prices, thus favouring sustainable industrial competitiveness. In addition, GHG and pollutant emissions will be reduced.

In terms of the bioeconomy, progress can be made in sensorisation, the creation of platforms, the integration of supply chains, and greater degrees of circular economy between sectors (for example, fertilisers vs. agriculture, organic products vs. packaging). Likewise, there are opportunities related to the use of the region's wooded surface area as a carbon sink, shifting land use towards this activity (for example, promoting negative emissions technologies).

Renewable energies, green hydrogen, industrial decarbonisation, sustainable mobility, circular economy, industrial ecodesign, bioeconomy and digitalisation are some of the sustainability transition activities that present opportunities in the Basque Country

Industrial ecodesign, in the context of the circular economy, also offers relevant opportunities that will impact industrial activity with efficiency improvements in terms of the consumption of energy and materials. For example, the Basque Government (2021b) estimates that more circular innovative solutions could save 6 % of raw materials, equivalent to around 2 billion euros for Basque industry. At the end of a product's useful life, provided it has a good initial design, recycling and recovery rates could increase not only for large components (for example, the steel of the chassis and body of a vehicle) but also those parts that are more difficult to separate (for example, battery and solar panel pieces that contain critical raw materials). This issue is especially relevant in the case of advanced materials (and new materials) in order to develop high value-added solutions, as well as being relevant for many critical raw materials affected by geopolitical risks and price increases.

Another area of opportunity is the recovery of soil and water ecosystems, where the knowledge generated should favour the creation and use of new business models and the development of water technologies and technologies for the integral water cycle.

Eco-innovation as a competitiveness strategy, new clean technologies, R&D and innovation, and digitalisation will all play a fundamental role in this transition and decarbonisation process. No less important will be the development of tools and technologies for surveillance, monitoring, prediction, and data analysis to be used to manage soils, water, ecosystems, biodiversity, industrial processes, etc.

## 3.2 Physical capital

Within the physical capital lever, investments in infrastructures essential to carry out the dual transition are especially important (Muench *et al*., 2022). We must develop adequate stocks of physical capital to promote a comprehensive transformation that reaches the entire economy, facilitating new ways of carrying out the activities of production, distribution, and consumption of goods and services.

Investments in essential physical infrastructure are particularly important to achieve the double transition (both energy infraestructure and ICT infraestructure)

More specifically, it will be critical for the success of the process to reinforce energy infrastructures in such a way that: (i) the electrification of end-use consumption can advance where it is efficient (electric vehicles, heat pumps, etc.) and the participation of renewable energies in the electricity mix can increase significantly; (ii) new energy vectors can be added to contribute to the reduction of emissions in sectors such as industry and transportation (for example, green hydrogen, green gases such as biogas or biomethane, and renewable fuels such as advanced biofuels or e-fuels); (iii) the deployment of new technologies can be encouraged (for example, technologies for the storage of electrical or thermal energy and technologies for the capture, storage, and use of $CO_2$); (iv) circularity and efficiency in the use of materials can be increased; (v) the use of residual heat can be optimised, one of the great potential ways to improve energy efficiency; and (vi) the active and leading role of final consumers in the energy sector can be promoted.

Increasing energy efficiency and efficiency in the use of materials in all sectors through solutions based on the circular economy also implies advancing in digitalisation and optimising the use of available (and future) infrastructure related to information and communication technologies (ICT). Likewise, resources must be dedicated to adapting and increasing the resilience of critical infrastructure for the Basque economy (many of which are necessary for moving towards decarbonisation and sustainability) and addressing the risks and impacts linked to climate change.

In short, the challenge faced by the Basque economy in updating infrastructure, like other territories, is of a great scale. It must be faced decisively in the short term to avoid bottlenecks that endanger the sustainability transition or make it difficult for the business and technological opportunities that this profound transformation entails to materialise. This section analyses the specific challenges that the Basque economy must face in relation to physical capital and what specific opportunities there are for companies in the Basque Country.

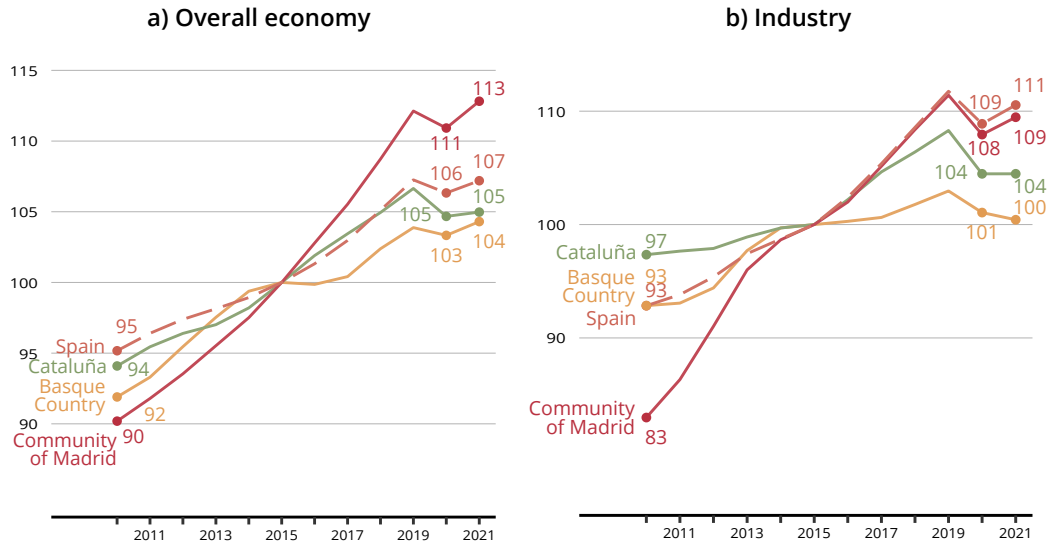
### *3.2.1. What physical capital does the Basque Country have to carry out the sustainability transition?*

The evolution of production capital in the Basque Country in the period 2010-2021 was similar to that of Spain and Catalonia and lower than that recorded by the Community of Madrid

There is no data on the amount of capital that could be considered essential for the sustainability transition; thus, the evolution of physical capital in the Basque Country must be analysed using data on the amount of aggregate capital. The evolution of the total amount of productive capital in the Basque Country in the period 2010-2021 (Graph 3-3) was similar to that of Spain and Catalonia as a whole (+13 % in the period, compared to +12 % and +13 %, respectively) and lower than that recorded by the Community of Madrid (+19 %). In industry, the growth of productive capital in that period (+8 %) was similar to that of Catalonia and

lower than that recorded by Spain as a whole (+19 %) and the Community of Madrid (+32 %).

**GRAPH 3-3** Evolution of the stock of productive capital in the Basque Country




*Source:* BBVA Foundation. Compiled by authors.

*Note:* 2015 = 100

The annual rate of change of gross investment in physical capital was higher in the Basque Country than in the other territories analysed

Additionally, the annual rate of change for gross investment in physical capital (both in the overall economy and in the industrial sector) was higher in the Basque Country than in the previously mentioned territories.[40] In part, this shows the effort made in the last fifteen years to renew and improve infrastructure in a context of a transforming industrial structure.

We analyse the main infrastructures in key sustainability transition sectors: energy, transport and mobility, industry, digital and communications, waste, buildings and built environment, and water

To delve deeper into the characteristics of physical capital in the Basque Country and assess its suitability for advancing the sustainability transition, Table 3-3 presents a qualitative analysis of the main existing infrastructures in key sectors for said transition: the energy sector, transport and mobility sector, industry sector, digital and communications sector, waste sector, buildings and built environment sector, and water sector. Additionally, some of the main challenges faced by each of these sectors are identified in relation to the infrastructure needed to carry out the sustainability transition.

[40] From 2010-2021, the annual rate of change for gross investment in physical capital was higher in the Basque Country (+2.2 % on average) than in Spain (+0.0 %) or Catalonia (+0.7 %), although lower than in the Community of Madrid (+3.5 %). In the industrial sector, on the other hand, said annual rate of change was 4.8 % in the Basque Country, compared to 2.4 %, 0.8 %, and 3.1 % in Spain, Catalonia, and the Community of Madrid, respectively.

**TABLE 3-3** Main infrastructures in the Basque Country by sector or activity and specific challenges

| Sector or activity | Key infrastructures in the Basque Country | Some of the main challenges |
|---|---|---|
| **Energy** | **Oil**<br>Biscay Refinery (distillation capacity of 12 MT/ year)<br>**Natural gas**<br>Transportation and distribution network<br>Storage infrastructures (Gaviota)<br>Biscay liquefied natural gas (LNG) storage and regasification plant<br>**Electricity**<br>Transportation and distribution network, with local development of smart grids<br>Electrical energy generation facilities using different technologies | Strengthen and extend electrical energy distribution networks for the integration of distributed energy resources (renewable generation, storage, electric vehicles, etc.)<br>Deploy infrastructure related to self-consumption in local areas<br>Development of renewable energy infrastructure in the territory (implementation of the Sector-Based Territorial Plan for Renewable Energy)<br>Progress in the deployment of smart electrical grids (for example, low voltage automation) and development of electricity storage solutions that reduce renewable energy loss.<br>Deployment of a hydrogen (and potentially $CO_2$) grid<br>Infrastructures to facilitate complementarity between energy sectors (electricity, natural gas, hydrogen, etc.)<br>Infrastructures for the development of ecological/green gases, second generation biofuels, etc.<br>Adaptation of infrastructure to increase resilience when faced with the impact of climate change (increase in temperatures, reduction in precipitation, greater probability of adverse weather events, etc.) |
| **Transport and mobility** | Road infrastructure network (toll roads, main highways, rural roads, etc.)<br>Commercial and industrial ports<br>Airports<br>Railway transport infrastructure<br>Public transport and alternative transport networks (for example, bicycle lanes)<br>Network of transport logistics centres | Development of the infrastructure network for charging electric vehicles and other alternative energies<br>Deployment of the high-speed train and new sustainable rail transport infrastructure (electric, hydrogen)<br>Connectivity with the rest of the Cantabrian area, France, Navarre, La Rioja, etc.<br>Port adaptation: cold ironing, alternative energy supply<br>Development of the public transport network<br>Alternative mobility infrastructures in urban centres<br>Advances in the integrated management of different modes of transport |
| **Industry** | Hubs, industrial parks, and logistics parks<br>Basque network of technology parks<br>Infrastructure in research and technology centres (17 Basque Research and Technology Alliance centres and other knowledge entities)<br>Other infrastructure related to industry and innovation (for example, Cooperative Research Centres, Advanced Manufacturing Centres, Automotive Intelligence Centre-AIC, Robotekin, etc.) | Development of shared infrastructure in industrial hubs aimed at efficiency (for example, heat hubs, digital hubs, material hubs to take advantage of raw material flows, etc.)<br>Improving connectivity between industrial hubs<br>Advancing the environmental sustainability of industrial infrastructures (efficiency in terms of energy and materials, waste, land use, etc.)<br>Adaptation of infrastructure and industrial processes to climate change (less water consumption in cooling processes) |
| **Digital and communications** | Communication infrastructure (telephony, image, fibre optic connections, servers and internet, etc.)<br>Cybersecurity infrastructure (Basque Cybersecurity Centre)<br>Basque Artificial Intelligence Centre (BAIC)<br>Quantum computing centre<br>Other R&D and innovation infrastructure in the digital and ICT fields | Deployment of new generation broadband infrastructure throughout the territory (5G and 6G networks)<br>Energy efficiency in the digital sector<br>Improving the coverage of connection infrastructures throughout the territory |
| **Waste** | Waste collection and treatment infrastructure (municipal solid waste —MSW— and industrial waste) | Deployment of a Basque industrial waste network<br>Advanced MSW treatment centres<br>Infrastructure for recycling and reusing waste<br>Development of specific regulations for the reuse of waste as raw materials and waste reconditioning |

**TABLE 3-3** Main infrastructures in the Basque Country by sector or activity and specific challenges

| Sector or activity | Key infrastructures in the Basque Country | Some of the main challenges |
|---|---|---|
| **Building and the built environment** | Residential, commercial, and other buildings<br>Civil works infrastructure | Improvement of energy efficiency in different infrastructures<br>Penetration of renewable energy in the energy consumption of buildings (heat pumps, geothermal, solar thermal, etc.) |
| **Water** | Network of water transport, distribution, treatment and management infrastructures | Improvement of the infrastructure network's efficiency<br>Improved management in terms of demand and conservation<br>Adaptation to meet the objectives of the Basque Hydrological Plan<br>Adaptation to face meteorological and climate contingencies |

*Source:* Compiled by authors.

### *3.2.2. Common challenges related to physical infrastructure*

There are five major challenges associated with the deployment of critical physical infrastructure for the energy-environmental transition, common to all sectors and types of infrastructure

In addition to the challenges in each sector identified Table 3-3, five major challenges can be identified associated with the deployment of critical physical infrastructure for the energy/environmental transition. These challenges are common to all sectors and types of infrastructure.[41]

Firstly, progress must be made in the coming years in the deployment of large infrastructure, especially energy infrastructure (renewable electrical energy generation infrastructure like photovoltaic panels and wind turbines, smart energy networks, etc.) and infrastructure associated with waste treatment and railway transport (for example, high-speed train).

Advancing levels of social acceptance is essential to align favourable attitudes towards the sustainability transition with the costs and inconveniences it entails

For this reason, it is essential to improve social acceptance through a better understanding of the factors that bring about personal and social commitment to the deployment of clean technologies while lessening rejection and the NIMBY ('not in my back yard') effect (Mosquera López and Fernández Gómez, 2023). In particular, progress must be made in aligning the generally favourable attitudes of the Basque population towards the sustainability transition (Eustat 2020a, 2020b) with acceptance of some of the costs and inconveniences involved in the deployment of clean energy infrastructure. In this regard, the recent approval of the Sector-Based Territorial Plan for Renewable Energy (in May 2023) opens the door to new political and social solutions and agreements to advance the penetration of renewable energies throughout the territory, as well as the deployment of other critical infrastructures (such as waste recovery infrastructure).[42]

[41] When we talk about infrastructure that is 'critical' or 'necessary' for the sustainability transition, we refer to infrastructures that guarantee a net positive effect from the environmental standpoint and, ultimately, in terms of economic competitiveness and the population's wellbeing.

[42] To develop an ambitious and advanced policy on material circularity, it is crucial to create spaces for meeting and debate between multiple players to collaboratively develop shared medium-term environmental views in relation to waste management and resource use.

A second challenge partly related to the previous one is the comprehensive and holistic planning of infrastructure networks (energy networks, transportation networks, digital networks, etc.). The latest Territorial Planning Guidelines for the Basque Country, which include the different infrastructures in Basque territory, date back to 2019. The need to advance more quickly in reducing emissions in sectors such as energy, transport, and construction, and the challenges that digitalisation implies for company competitiveness, force us to seek new synergies between transport, electrical and digital networks and innovative solutions. For example, new locations for the deployment of photovoltaic panels along the transport network, planning of an electric vehicle charging network that takes into account the reality of our roads and our electrical energy distribution grid along with the needs of users, infrastructure planning for the introduction of green hydrogen and biogas into the Basque energy matrix, etc..

Comprehensive and holistic planning of infrastructure networks is needed, as well as the promotion of strategic projects for the integration of energy sectors and development of ICT infrastructures that facilitate new sustainable business models

Along these lines, it will be essential to strongly promote strategic projects that facilitate the integration of the energy sectors (electricity, natural gas, hydrogen, heat, etc.) into initiatives such as the Net-Zero Basque Industrial Super Cluster or the Basque Hydrogen Corridor. The development of digital and communications infrastructure must also be ensured to facilitate the implementation of a more sustainable model for the mobility of people and goods, the progression of advanced services in industry, and the development of new circular solutions to increase energy efficiency and in the use of materials in Basque companies.

Another great challenge is the adaptation to climate change of physical infrastructure critical to the Basque economy. The General Public Safety and Security Plan for the Basque Country 2020-2025 (PGSPE) identifies risks associated with extreme weather and climate events and cyberattacks, and establishes measures to develop risk monitoring and assessment tools, infrastructure protection (and resilience) plans, and responses to contingencies. It will be essential to develop in detail the lines of action proposed in the PGSPE and, especially, to identify the necessary investments to adapt essential energy, transport, and communications infrastructures in such a way that the effects from floods, drought, extreme temperatures, electrical storms and windstorms, cyberattacks, etc. are mitigated.[43] To this end, the Basque Country has a solid foundation on which to build, given that it is already recognised as a European leader in the application of adaptation and mitigation policies (for example, through the Zorrozaurre urban regeneration project, recently cited by the EU as an example in the guidelines to help Member States implement and update their climate change adaptation strategies, plans, and policies).[44]

Other relevant challenges include the climate change adaptation of physical infrastructures and ensuring the flow of sufficient capital resources to guarantee the necessary investments

Lastly, the fifth common challenge is to ensure a flow of capital resources that is sufficient to guarantee the necessary investments in new infrastructure while updating existing infrastructure and adapting for climate and cyber risks (see the next section). In some cases, such as those of electric vehicle charging networks and hydrogen networks, incentives for infrastructure deployment will be closely linked to the evolution of the regulatory and legal framework and its stability over time.

[43] Examples of approaches to this topic can be seen in: Ihobe and Basque Government (2020) and Naturklima (2022).
[44] See: Basque Government (2023f).

### *3.2.3. Opportunities for Basque Country competitiveness*

**Adapting physical infrastructures in the Basque Country to ensure a positive impact on environmental sustainability and resilience can generate opportunities for territorial and business competitiveness**

Along with the aforementioned challenges, there are opportunities to increase territorial and business competitiveness associated with the deployment and adaptation of physical infrastructure in the Basque Country for environmental sustainability and resilience.

From a territorial point of view, the development of physical infrastructure that guarantees the penetration of renewable energies and clean technologies under a common outlook and with common planning will facilitate an increase in the environmental sustainability of the Basque economy, reducing GHG emissions and increasing overall efficiency in the use of energy and materials in all sectors (lower energy intensity and fewer emissions, increases in productivity, etc.). Additionally, this will improve the connectivity of the Basque Country with other surrounding territories in the energy, transport, and communications sectors (see Box 5). Another relevant aspect is improvement in the Basque economy's ability to respond to meteorological and climate contingencies, reducing the risks of supply chain breakdowns and the stoppage of economic and industrial activity. The industrial base of the Basque Country will also serve as a testbed for technological and non-technological innovation in areas related to the integration of energy sectors or advanced logistics services and the generation of knowledge applicable to multiple sectors.

In the business sphere, this will allow Basque firms to strengthen specialised value chains and take advantage of existing technical/industrial know-how, for example in smart energy networks, wind energy components and systems (especially offshore wind farms), photovoltaic plant components, electric vehicle battery charging infrastructure, equipment for production facilities, transport and industrial consumption of green hydrogen, digital solutions for industry and mobility, etc. Other general areas of potential growth in the field of infrastructure, and where the existing strengths of Basque companies can be built on, are advanced civil works, the integration of modes of transport, the development of energy communities and distributed energy resource systems, and energy efficiency in the residential sector.

In addition to the environmental benefits of reducing the environmental footprint of the Basque economy (reduced environmental impact, increased attractiveness of the territory, contribution to solving the global problem of climate change, etc.), there are also social opportunities associated with more advanced, integrated, and resilient infrastructure networks. Firstly, these more advanced networks will make it possible to strengthen the population's access to essential services in the fields of energy, communications, transport, and health, facilitating greater inclusiveness. They also offer the chance to increase capacities and employment opportunities in areas related to the sustainable transformation in multiple sectors.

### BOX 5 The 'Atlantic Arc' as a geographical axis for interregional collaboration on sustainability

The Atlantic Arc (see CPRM-Atlantic Arc Commission, 2023) is a cooperative space made up of the regions of five States (Ireland, United Kingdom, France, Spain, and Portugal) which share a connection with the Atlantic coast and a series of common challenges whose solutions go beyond the context of regional and national borders.

The Atlantic Arc's physical location on the fringes of the continent is a structural characteristic that can lead to a loss of competitiveness, attractiveness, and capacity for strategic influence in Europe if its connectivity with European economic and decision-making spaces is not favoured. Thus, the regions that make up this space face the common challenge of promoting physical, digital, and green connectivity as fundamental drivers of competitiveness to improve economic-business results, the attractiveness of the regions, and their ability to have strategic influence.

With the aim of adopting a collaborative approach in response to the challenges shared by the Atlantic regions, the Atlantic Arc Commission was created in 1989. Its aim is to position the territory on the EU agenda and strengthen cooperation between the regions. In addition to the usual areas of cooperation related to transport, innovation, marine energy, fishing and aquaculture, ocean pollution, and Atlantic culture, the Commission has recently added a new dimension related to the need to evolve towards a macro-regional strategy.

It is within this context that, in a process promoted by the Basque Government, the Chambers of Commerce of the Atlantic Arc (in the Bilbao Declaration of June 21, 2023) commit to strengthening the competitiveness of the Atlantic Arc through, among others, the improvement of the physical capital of the territory – a primary objective for tackling other challenges. Specifically, the aforementioned players commit to undertaking the efforts necessary to complete the Atlantic Railway Corridor by 2030, promote and adapt the rail connections and intermodality on the Cantabrian coast, promote a collaborative strategy between ports, promote the interconnection of the planned hydrogen infrastructures in 2030, and deploy the electric vehicle charging and hydrogen charging network for sustainable mobility in the territory.

The Chambers of Commerce of the Atlantic Arc now face the challenge of mobilising public and private players and launching specific interregional cooperative projects that have clear leadership and financing to allow these projects to become a reality.

The Bilbao Declaration of June 2023 aims to strengthen the competitiveness of the Atlantic Arc through, among others, improving the physical capital of said cooperation space

## 3.3. Financing

One of the main challenges identified in the analysis of the physical capital lever is to ensure a sufficient flow of capital resources to guarantee the necessary investments in critical infrastructure for the sustainability transition. In fact, financing is a lever that clearly also interacts with other levers, such as knowledge. In our context of competitiveness for wellbeing, the financing lever includes all factors which make it possible to attract financial resources for the generation of economic value and wellbeing. Likewise, the mobilisation of financial capital, both from public and private sources, is critical in the face of the challenge posed by the energy/climate transformation and the need to comply with the underlying supranational commitments (Berg *et al.*, 2023; OECD, 2020).

The estimates of investments needed for the energy-climate transformation are between 1.5 % and 5 % per year of global GDP for the next 15 to 20 years

The estimates of investments needed for this transformation are between 1.5 % and 5 % of annual global GDP for the next 15 to 20 years, depending on the scenarios and the nature of the economies (see, for example, OECD, 2020, p. 126). Despite observing a growing trend in the flow of sustainable investments, said investments are still clearly insufficient. Thus, the analysis and search for solutions to reduce the so-called 'green financing gap' is an urgent issue (Fernández Gómez and Larrea Basterra, 2021b; OECD, 2016).

The causes of the mismatch stem from a combination of information and governance problems and a limited alignment of interests between the public and private sectors (Berg *et al*., 2023; Claessens *et al*., 2022; Hafner *et al*., 2020; OECD, 2020). The incidence of these factors, together with external shocks, generate uncertainty and affect the efficiency of the financial system in the face of the environmental challenge, increasing the cost of capital and generating an inadequate valuation of assets.

The financing of activities related to the energy transition and the adaptation to and mitigation of climate change is considered sustainable finance, an evolving field with increasing relevance (Bhatnagar and Sharma, 2022; Hafner *et al*., 2020; Zhang *et al*., 2019). The main research topics are related to the incidence of public policies, the players (and their behaviour), the instruments, and the interaction mechanisms that promote a green or sustainable financial ecosystem (Fernández Gómez and Larrea Basterra, 2021b; Lindbergh, 2014). Obviously, this is a complex and interdisciplinary issue, encompassing economic aspects (for example, investment in new infrastructure and public assets and the valuation of 'green assets'), technological aspects (for example, investment in immature technologies with uncertainties), political/institutional aspects (for example, coordination of multilateral and multilevel governance and the development of regulatory frameworks), and sociological aspects (for example, cultural differences or changes in habits) (Fernández Gómez and Larrea Basterra, 2021b; Schoenmaker and Schramade, 2019; Zhang *et al*., 2019).

The aim of this section is to identify and analyse the barriers and opportunities to promote a competitive and efficient financial ecosystem for the sustainability transition. The situation of the Basque Country in this area is of great interest because: (i) its economic structure has a strong industrial component, requiring significant investments focused on mitigation and adaptation to climate change; and (ii) it has an ambitious sustainability transition policy, which could position the region as a leader in this field.

The so-called 'green financing gap' is conditioned by three types of barriers: information problems, governance problems, and limited alignment of interests between the public and private sectors

### *3.3.1. Sustainable finance: Barriers*

One of the main challenges to promoting the energy transition is the insufficient volume of funds to finance sustainability projects and activities ('green financing gap'). In order to deal with this phenomenon, it is important to generate a financial ecosystem (local, regional, national, and global) composed of relevant players and institutions, innovative instruments, and interactions between them, all with a clear orientation towards the climate challenge and increased wellbeing (Schoenmaker and Schramade, 2019). However, this is a complex, interdisciplinary phenomenon conditioned by three types of barriers: (i) information problems, (ii) governance problems, and (iii) limited alignment of interests between the public and private sectors.

Information problems have been characterised by Menon (2021) as the three D's: Data, Definition, and Disclosure. Firstly, there is a lack of knowledge about green products and services, both from the supply side (finance system) and demand side (companies), conditioning capital costs, amortisation periods, liquidity, asset valuation, etc. (Hafner *et al*., 2020; OECD, 2020; TheCityUK, 2022). Furthermore, although there are a wide range of public aid programmes for the transition (for example, Next Generation EU), said aid's use in practical projects is currently limited due to a lack of knowledge/familiarity (in the governmental agencies and the private sector) and/or administrative barriers (bureaucracy). In this regard, in the Basque Country, the Basque Circular Hub carries out training initiatives on green financing and has an observatory for available aid.

Information problems have been characterised as the three D's: Data, Definition, and Disclosure

Secondly, the negative implications of the lack of standardisation have been pointed out, such as the private sector's uncertainty about products/sectors to prioritise and/or exclude (TheCityUK, 2022). To this end, the publication of the European Taxonomy for Sustainable Activities is a great advance, as it allows financial institutions and investment portfolio managers to hone their balance sheets, risk maps, and product offerings to align with the new situation (Hafner *et al*., 2020; OECD, 2020). In the Basque Country, it is noteworthy that Ihobe and the Basque Ecodesign Centre have prepared and disseminated a guide for the application of the European Taxonomy for Sustainable Activities.

Thirdly, in relation to disclosure, there is a change in the awareness and propensity of the private sector to offer up transparency about efforts to reduce environmental impact. The EU published the Corporate Sustainability Reporting Directive (EU) 2022/2464 in December 2022. Furthermore, the adoption of ESG (Environmental/Social/Governance) criteria and rating systems (such as those that will be regulated by the future EU ESG Ratings Regulation) is growing. In the Basque Country, several human capital training initiatives and support activities in this regard are being implemented.[45] However, the application of these criteria is controversial, because there exist tensions with other business goals as well as measurement difficulties, among other issues (Perez *et al*., 2022).

Regarding governance issues, two key aspects stand out. The first is the limited and heterogeneous implementation of policies (for example, plans and actions) at the supranational level. The unequal degree and intensity of policy implementation stems from a lack of coordination in terms of environmental policies, with the negative consequence of slowing down actions and adopting an approach based on short-term thinking (Berg *et al*., 2023; Claessens *et al*., 2022; Hafner *et al*., 2020). Likewise, governmental agencies below the national level have a functional dependence on national and transnational agreements and decisions, which condition their initiatives and ability to act. The second issue is dependence (bias) in the distribution of funds at the subnational level, which is caused in the EU by a lack of coordination and clear criteria for the distribution/flow of funds within the States themselves (OECD, 2020).

The limited and heterogeneous implementation of policies at the supranational level, as well as a lack of coordination and clear criteria for the distribution of funds within States, are central to governance problems

[45] In addition to initiatives by Ihobe and the Basque Circular Hub, among others, there are several examples in Basque universities. For example, the University of the Basque Country has a research group for Ethics in Finance and Social Value with a specific line of research related to sustainable finance, while the University of Deusto promotes the 'ESG Investment and Finance Summer Programme', as well as holding an 'International Workshop on ESG Values' annually.

Public-private interactions and alignment of interests are key to developing a dynamic and efficient financial ecosystem

Finally, the central components for a dynamic and efficient financial ecosystem are private entities (for intermediation, advising, etc.) and public entities (for promotion, regulation, etc.), with public-private interactions and the alignment of interests being key. With respect to the environmental challenge, the public sector has critical functions such as market development (in terms of both supply and demand), the development of infrastructure and institutions, the implementation of rules and regulations, and even innovation in financial products, among others (Fernández Gómez and Larrea Basterra, 2021b). In this sense, the Basque Government maintains a proactive stance, promoting multiple institutions (for example, the Basque Finance Institute and Basque Venture Capital Management) and programmes/instruments (for example, tax deductions for clean technologies, the Bind 4.0 Initiative, and the Basque Green Bond Programme - see Box 6).

However, the public sector alone cannot lead the way in developing an effective green financing ecosystem. Given the scale of the climate challenge, the participation of entities in the private financial sector (for example, banks, investors, alternative financing, insurance companies, consulting firms, rating agencies, etc.) is essential. In particular, we need a more efficient distribution of financial resources (for example, enhanced risk management and/or knowledge and proximity to clients), as well as innovation in products and services, reporting/disclosure, and transparency.

From the perspective of the intermediation of financial resources, the Basque Country has had a financial ecosystem with a strong historical impact on the economy. However, over the last 30 years, its presence (measured through volume of employment) has been declining as a result of the concentration of financial activity in Europe around financial centres like London or Frankfurt, favoured by financialisation, digitalisation, and regulatory changes (Orkestra, 2022b). Likewise, the relocation of banking decision centres (for example, BBVA) and the sale of the industrial shareholdings of financial institutions due to the demands of the European Central Bank have had negative effects. These factors affect the proximity and ability for financial resource provision to align with the specific financial needs of local business networks. However, we must note that the region has entities such as Kutxabank, BBK, and Laboral Kutxa that maintain a significant territorial presence to satisfy the financial needs of local production.

## BOX 6 Green bonds in the Basque Country

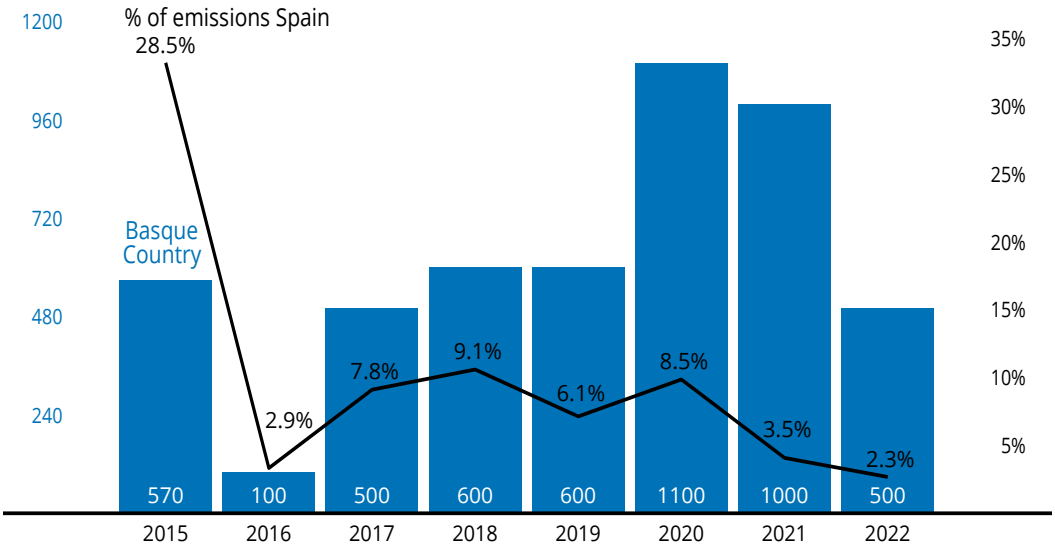
The Basque Government's sustainable bond issuance strategy relates to its commitment to activate the necessary mechanisms to comply with the reduction of emissions and adaptation of activities to the climate challenge. It is executed through the Sustainability Bond Framework, designed to improve knowledge on these financial products and which in turn is aligned with other international standards and principles (for example, green bond principles and sustainability bond principles) (Basque Government, 2021c).

It should be noted that this is a programme with a history of consolidated debt issuance (8 years, see Graph 3-4) and that its use and impact are reported annually. The external assessment mentions that this is a credible programme with an impact (Sustainalytics, 2023). An analysis of the impact of projects developed from 2018 issuances (through input-output tables) notes that 'for every euro invested, production increases by 1.69 euros and income increases by 0.398 euros. Likewise, for every million euros invested, 16.79 jobs are created' (Ruiz-Gauna *et al.*, 2020).

The Basque Country has a green bond programme that has been externally recognised as credible and impactful

Project assessment and selection is carried out by a committee of 5 members (4 from the Treasury department and 1 from another specific department). The last issuance of €700 million was disbursed in February 2023, and the proceeds from these issuances are specifically used on projects in 11 categories (as specified by the initiative's framework): affordable housing (12.6 %), access to education (13.3 %), access to health care (17.5 %), socioeconomic advancement (18.5 %), employment creation (12.1 %), renewable energies (2.3 %), clean transportation (17.7 %), pollution prevention and control (2.3 %), sustainable water and wastewater management, land and aquatic biodiversity, energy conservation and efficiency (2.5 %). In total, 26 % is used on green projects and 74 % on social projects.

**GRAPH 3-4** Basque Government green bond issuance (millions of euros and %)




*Source:* OFISO and the Basque Government (2023g). Compiled by authors.

Finally, it is worth noting that some leading companies in the Basque business community have increased their interest in issuing green debt. For example, Kutxabank (active since 2015, and the first social issuance by a private entity in Spain) and Iberdrola (the third largest issuer of sustainable bonds in Spain in 2023) maintain significant activity in sustainable finance products.

### *3.3.2. Sustainable finance: Opportunities*

The promotion of a Financial and Investor Cluster in the Basque Country represents an opportunity to contribute positively to the mobilisation of capital towards sustainable activities

Along with the aforementioned barriers there are significant opportunities, both to strengthen the competitiveness of the Basque financial ecosystem and its links with the business fabric, and specifically to contribute to the green transition of the Basque economy from the financial ecosystem. Currently, the Basque Government is promoting a Basque Finance and Investor Cluster initiative, inviting key players in the financial ecosystem to identify and work on opportunities in collaboration. The creation of this new cluster initiative focused on the financial ecosystem could contribute very positively to the mobilisation of capital towards sustainable activities.

Regarding the promotion of the local financial ecosystem with the aim of efficiently contributing to the energy transition, a series of opportunities can be identified related to the critical mass of players involved in sustainable finance, the pace of actions, and the efficiency and synergies during implementation. It is essential to build from the innovative capacity and existing knowledge in the financial sector, using the channels, mechanisms, and instruments through which financial resources flow to facilitate proximity relationships and generate knowledge about clients' attitudes, needs, etc. While the strong regulation of financial activity can be a barrier in terms of assuming risks, it can also act as a mechanism for action, thanks to new credit criteria designed to support companies through their transformation (for example, UNEP Finance Initiative). The latter aspect is especially relevant in an economy like the Basque Country where finance is dominated by banking.

Achieving greater involvement of players that offer financial intermediation services will also require increasing trust and commitment, which is one of the key objectives of the Basque Finance and Investor Cluster initiative mentioned above.

Box 7 presents two examples —from Finland and the United Kingdom— that can serve as inspiration to boost sustainable finance in a territory like the Basque Country.

## BOX 7 International experiences in boosting sustainable finance

As inspiring examples to increase the scale and pace of sustainable finance in a territory, the following are presented: a) an exploratory initiative for the development of a finance ecosystem for sustainable activities in Finland; and b) the development of an environmental fund within the context of Greater Manchester's mission-oriented environmental transformation approach.

To increase the scale and pace of sustainable finance in a territory, there are inspiring examples such as Finland's Sustainable Finance Ecosystem and the Greater Manchester Environment Fund

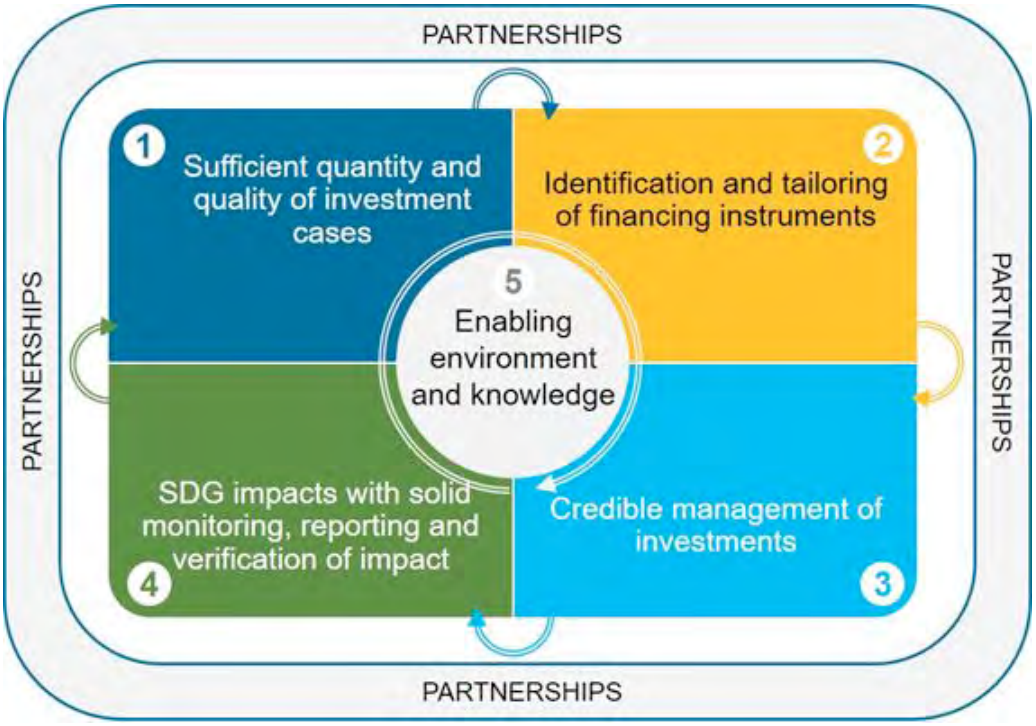
**a) The development of a sustainable finance ecosystem in Finland**

With the aim of understanding how the financial sector can be mobilised to support the sustainability transition, a European Project called 'Developing Finland's Sustainable Finance Ecosystems (2020-2022)' was undertaken in Finland. The project has two main elements:

1. Development of a roadmap for financing a decade of SDG action.
2. Implementation and analysis of four pilot projects to identify bottlenecks and solutions to mobilise investments.

Firstly, the roadmap has served to identify five critical issues and establish a strategy to systematically address the sustainable finance gap, agreeing on interactions, synergies, and roles (see Figure 3-1).

**FIGURE 3-1** Roadmap for a sustainable finance ecosystem in Finland




*Source:* https://tem.fi/en/developing-finlands-sustainable-finance-ecosystems

Secondly, the four pilot projects served to identify (in the field) capabilities, barriers, instruments, and types of collaboration in direct relationship with four SDGs. As lessons learned, one can highlight the importance of: (i) keeping all stakeholders informed for long-term decisions to be made jointly; (ii) guaranteeing a high degree of transparency and clarity in the project selection process; and (iii) clearly defining the scope and goals. Likewise, 46 specific recommendations were made, which can be summarised as follows:

In Finland, pilot projects served to identify capabilities, barriers, instruments, and types of collaboration to address the sustainable financing gap in direct relationship with four SDGs

· Provide external support at all levels of the process.

· Promote cooperation and collaboration between actors.

· Use a single access point for public funds.

· Offer financial support for experimentation and innovation.

· Offer transparency in fundraising eligibility criteria.

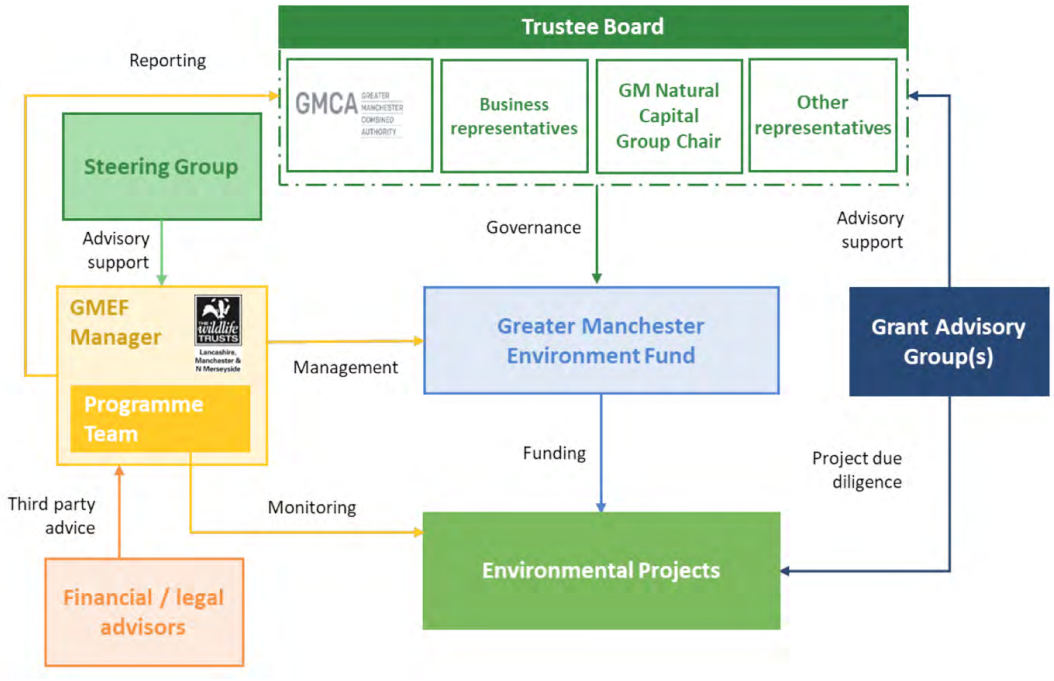
· Promote awareness about and clarity of information.

**b) Greater Manchester Environment Fund**

The city-region of Greater Manchester acquired greater powers/autonomy in 2011, including related to financial aspects and tax collection. In 2017 the new Mayor backed ambitious decarbonisation goals (for example, the goal of achieving zero net emissions in the metropolitan area by 2038) that demanded new solutions and a strategy based on innovation 'missions'. Thus, a roadmap was developed in the form of a technical programme based on science and including cross-sector innovations and an interweaving of missions/projects. The work of mobilising and involving public opinion and citizens through a series of events was important to set up the final strategy.

A crucial aspect to be able to carry out this strategy is financing. To that end, an environmental fund was created —the first in the United Kingdom— under the assumption that finances are not neutral and that it is necessary to increase momentum and innovate in the design and implementation of budgetary instruments and solutions to allow for successful interaction between environmental needs and financing sources. Thus, the attraction of private investment was sought to achieve social, financial, and environmental objectives. The fund was established as an independent charitable body and will initially provide a unified governance structure to bring together funding from the public sector, foundations and philanthropists, and related corporate organisations so as to provide grants to viable projects (Bellinson *et al.*, 2021; see Figure 3-2).

**FIGURE 3-2** Governance of the Greater Manchester Environment Fund




*Source:* Bellinson *et al.* (2021).

The fund aims to mobilise private investment around specific sub-funds that generate financial returns on activities and projects related to sustainability. The two opportunities that the Greater Manchester Combined Authority (GMCA) identified as most likely to be deployed initially are habitat banks (Environment Bank, 2022) brought on by regulatory changes (specifically the need for new developments to generate a net gain of biodiversity) and a carbon emission trading mechanism. The fund's governance structure will evolve as its operations grow. Ultimately, the fund's goal is to create a self-sustaining, environmentally impactful local investment sector.

In Greater Manchester, an environmental fund was created to increase momentum and innovate in the design and implementation of budgetary instruments and solutions that align environmental needs and financing sources

It has been argued that there are limitations in the allocation of financial resources to sustainability projects, due to the fact that the sustainability transition involves the development and implementation of new technologies. Therefore, the financing of adaptation and/or mitigation initiatives focuses on funding new projects through, for example, business creation ecosystems, etc. A proposal to increase implementation efficiency consists of adapting and/or developing known financial solutions, taking advantage of existing capacities to deal with the transition and promote green financing from the public and private spheres. At the same time, financing for the adaptation and/or mitigation of the industrial fabric also provides opportunities for the creation of local employment (with the need to have qualified labour supply, analysed in Section 3.3) and to redefine and boost local supply chains (IEA, 2020, cited in OECD, 2020).

## 3.4 Knowledge

Along with the infrastructure investments analysed in Section 3.2, the financing analysed in Section 3.3 should also facilitate investments in knowledge to accelerate the transition towards environmentally sustainable competitiveness. The generation and implementation of new knowledge is essential for the competitiveness of the Basque Country and its companies in general, but the challenge is not only to increase the knowledge base and quality of knowledge, but to give said knowledge a direction towards sustainability transition.

It is especially important to gear the generation and implementation of new knowledge (in all areas and organisations) towards the sustainability transition

Knowledge on environmental sustainability arises in all fields and organisations and covers a wide range of areas and topics, both specific to the energy/environmental field and more cross cutting (for example, digitalisation and its application with impacts on sustainability). Due to the diverse nature of the actors that generate and/or apply knowledge relevant to the sustainability transition, knowledge transfer and collaboration is essential.

What knowledge bases does the Basque Country have in order to carry out the sustainability transition? To delve deeper into this question, in this section we focus our analysis on indicators related to R&D spending and financing, scientific excellence and patent performance in areas related to environmental sustainability.

The positive evolution of R&D spending on production, distribution and rational use of energy —as well as on environmental monitoring and protection— is noteworth

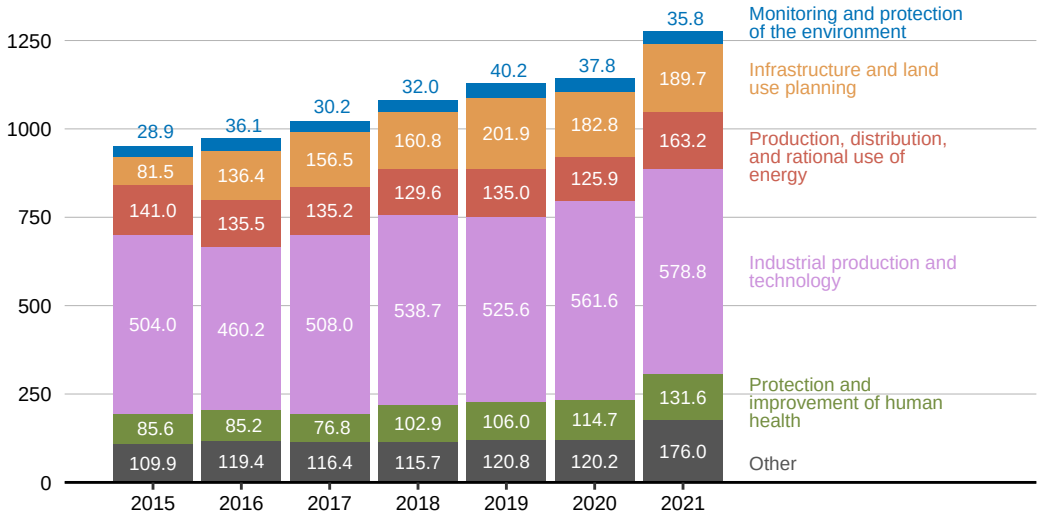
### *3.4.1. R&D expenditure*

Graph 3-5 shows the evolution of internal R&D spending by private non-profit companies and institutions, listed by socioeconomic objective.[46] Noteworthy is the fact

[46] Private non-profit institutions include the technology centres and cooperative research centres of the Basque Science, Technology, and Innovation Network.

that, in 2021, 45 % of R&D spending was directed to industrial production and technology, which aligns with the specialisation of the Basque Country. In terms of environmental sustainability, the positive evolution of R&D spending on the production, distribution, and rational use of energy stands out (12.8 % R&D spending in 2021), even above spending on protecting and improving human health (10.3 % in 2021). R&D spending aimed at controlling and protecting the environment accounted for close to 3 % of total spending in 2021.

**GRAPH 3-5** Internal R&D spending by companies and private non-profit institutions in the Basque Country, by socioeconomic objective (millions of euros)




*Source:* Eustat. Compiled by authors.

Internal R&D spending in areas related to the energy/climate transition (energy, eco-innovation, and sustainable cities) accounted for 17 % of total spending in 2021

Another view of the distribution of internal R&D spending is included in the Science, Technology and Innovation Plan 2030 Monitoring Report,[47] whose latest update includes the evolution of internal R&D spending from 2019 to 2021 in accordance with the Basque Country's smart specialisation priorities. According to these figures, internal R&D spending in areas related to the energy/climate transition (energy, eco-innovation, and sustainable cities) accounted for 17 % of total spending in 2021. Furthermore, the figures show an increase in internal R&D spending in these areas that amounts to 15.2 % between 2019 and 2021, which is especially positive considering that the average increase in total internal R&D spending was 11.2 % in the same period.

### *3.4.2. Support for green R&D activities*

Public support for knowledge generation and R&D activities is underpinned by the existence of market and system failures that may be acting as barriers. Furthermore, in recent years, the need has been identified for public policies to address failures in terms of directionality; that is, to adequately guide the different players as regards the direction of their R&D and innovation activities (Mazzucato, 2018; Schot and Steinmueller, 2018).

[47] Report drafted by Innobasque and available at: https://www.euskadi.eus/web01-a2pcti30/en/contenidos/informacion/monitori_evaluacion_pcti_2030/en_def/index.shtml.

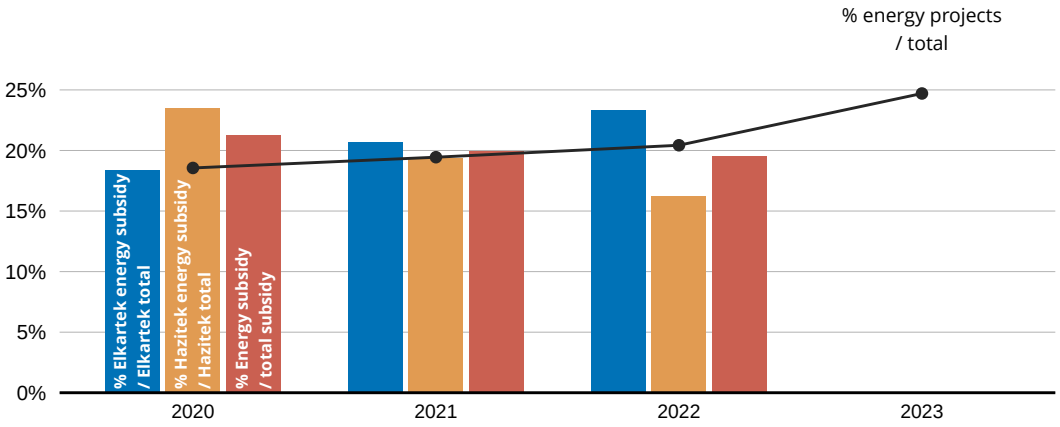
Basque companies and knowledge organisations have the support of the Basque Government to carry out R&D activities related to environmental sustainability in the areas prioritised by the 2030 Science, Technology, and Innovation Plan (PCTI). These include cleaner energies, sustainable cities, eco-innovation, the circular economy, and electric mobility. In addition, the Basque Circular Economy Strategy 2030 includes programmes to support eco-innovation in the circular economy.[48] Likewise, the policy mix of the Basque Country has strategies and tools developed and implemented by different governmental agencies aimed at generating knowledge for the green transition.

The policy mix of the Basque Country has strategies and tools aimed at generating knowledge for the green transition

In Graph 3-6 we present, by way of illustration, the evolution of financing for the Elkartek[49] and Hazitek[50] strategic programmes from 2020 to the present in the priority area of energy (from 2021, 'cleaner energies'). [51] One can observe that the percentage of projects approved in this area out of the total number of projects continues on a positive trend, reaching close to 25 % in 2023. Regarding the distribution of the grants awarded, the positive evolution of the Elkartek programme, more geared towards fundamental research, stands out. This highlights the commitment to knowledge generation in the energy area by actors from the Basque Science, Technology, and Innovation Network. However, in the strategic Hazitek programme, more geared towards the business community, the evolution of assistance granted shows a downward trend both in absolute and relative terms.

The percentage of Elkartek and Hazitek projects approved in the priority area of clean energy has increased, reaching close to 25 % in 2023

**GRAPH 3-6** Evolution of R&D financing in the field of cleaner energies (strategic Elkartek and Hazitek programmes)




*Source:* asque Government. Compiled by authors.

Companies' commitment to R&D in the field of environmental sustainability is also evident. Ihobe (2022b) presents the results of 105 projects successfully completed in the context of the Circular Eco-Innovation Programme in the 2014-2020 period,

[48] See a summary of circular economy strategies and tools in the Basque Country in: European Commission (2020b).

[49] Support programmer for the implementation of collaborative fundamental research projects and research projects with a great industrial potential carried out by Basque Science, Technology, and Innovation Network members in the smart specialisation priority areas of the PCTI 2030.

[50] Support programme for the implementation of strategic R&D business projects with high potential for results and impact in the smart specialisation priority areas of the PCTI 2030.

[51] Currently, most of the R&D resources and projects in these programmes focus almost exclusively on the energy field, which includes the value chains with the greatest strength and industrial capacity in the Basque Country.

within the scope of 9 different sectors.[52] The results of the projects analysed by Ihobe are positive. 24 % of projects developed solutions that reached the marketing phase and these are showing returns of 21 euros (in turnover) for every euro invested, as well as yielding job creation, new lines of business, and significant environmental impacts (228,000 tonnes of $CO_2$ emissions avoided and 300 000 tonnes of waste not dumped per year).

Of the 105 projects successfully completed in the Circular Eco-Innovation Programme during the 2014-2020 period, 24 % developed solutions that reached the market phase and yield returns of 21 euros in turnover for every euro invested

Another 42 projects (40 %) are R&D initiatives that have not yet reached the marketing phase. The projects focus on strategic and critical aspects for Basque industry, such as the recovery, separation, and recycling of materials (some of which are critical raw materials), the production of other high-quality materials from waste, the recovery of polluted soils, $CO_2$ capture and fixation in materials, machinery ecodesign, and the development of advanced circular services focused on Industry 4.0. The rest of the projects analysed are still in the early phases of the R&D chain.

In the same way that there are regional R&D support tools, the EU supports research projects through its research and innovation framework programme. The current program (Horizon Europe), in addition to promoting scientific excellence (pillar 1) and an innovative Europe (pillar 3), funds research to address global challenges (pillar 2). Challenges are grouped into clusters (which include things like 'the climate, energy, and mobility' and 'food resources, bioeconomy, natural resources, agriculture, and the environment'). In addition, the 'digital world, industry, and space' cluster prioritises research in clean industries and circular industries. The programme's predecessor (the Horizon 2020 programme) also included financing for projects in green areas among its priorities.

Almost 41 % of the Horizon 2020 funds received in the Basque Country were dedicated to green projects, mainly in the areas of smart transportation and safe, clean, and efficient energy

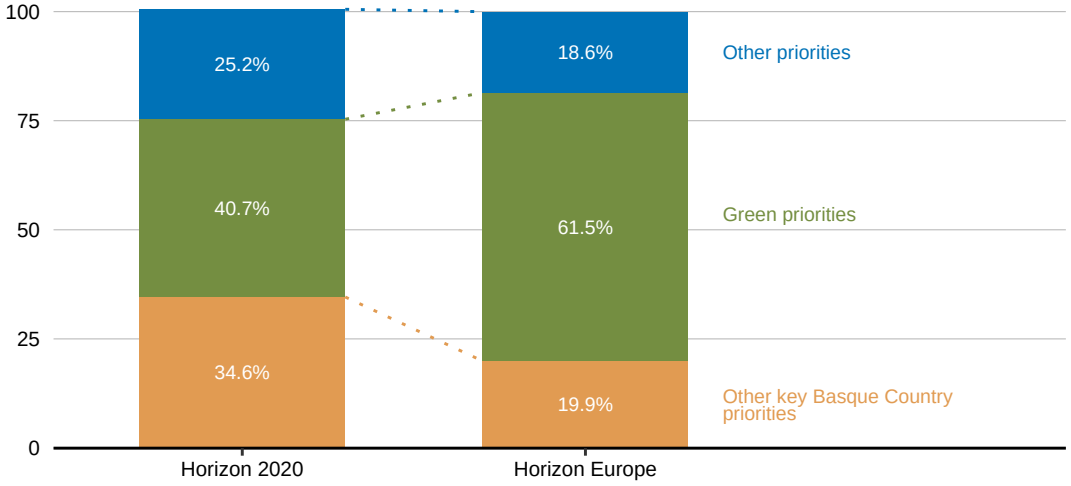
In Graph 3-7, we can observe the distribution of the EU's net contribution to the different projects carried out by Basque organisations since 2014. Almost 41 % of the Horizon 2020 funds received in the Basque Country were dedicated to green projects, mainly in the areas of smart transportation and safe, clean, and efficient energy. This percentage increased to 61.5 % in the first three years of the Horizon Europe programme, mainly in the climate, energy, and mobility cluster. This percentage is well above the equivalent in Germany (31.8 %) and Spain (43.1 %), something which reflects the Basque Country's specialisation in green R&D and innovation.

To assess the magnitude of the funds received by Basque organisations, the intensity of the funds received from Horizon 2020 in terms of green priorities is compared with the Community of Madrid and Catalonia, the two Spanish autonomous communities that have the highest percentage of the whole of these funds (29 % and 28 %, respectively, compared to 13.5 % in the case of the Basque Country). Thus, Graph 3-8 shows that the Basque Country received 17.5 % of all Spanish financing for green priorities during the years 2014-2020, ranking third among the Spanish regions in terms of volume of funds. Nevertheless, the Basque Country is in first position when taking the GDP into account (the funds represent 0.06 % of the Basque GDP, compared to 0.03 % of Madrid's GDP or 0.02 % of Catalonia's GDP).[53]

[52] This guide has been included by the European Circular Economy Stakeholder Platform, together with the Catalogue of Circular Products Manufactured in the Basque Country, among the catalogues of good practices to advance the circular economy in the context of the European Green Deal. See: Basque Government (2023h).

[53] It should be noted that the same thing happens with the figure for overall returns from the Horizon 2020 Program. Although in absolute numbers the Basque Country is below Madrid and Catalonia, the weight in regional GDP is higher in the Basque Country (0.15 % in the Basque Country, 0.11 % in Madrid, and 0.10 % in Catalonia).

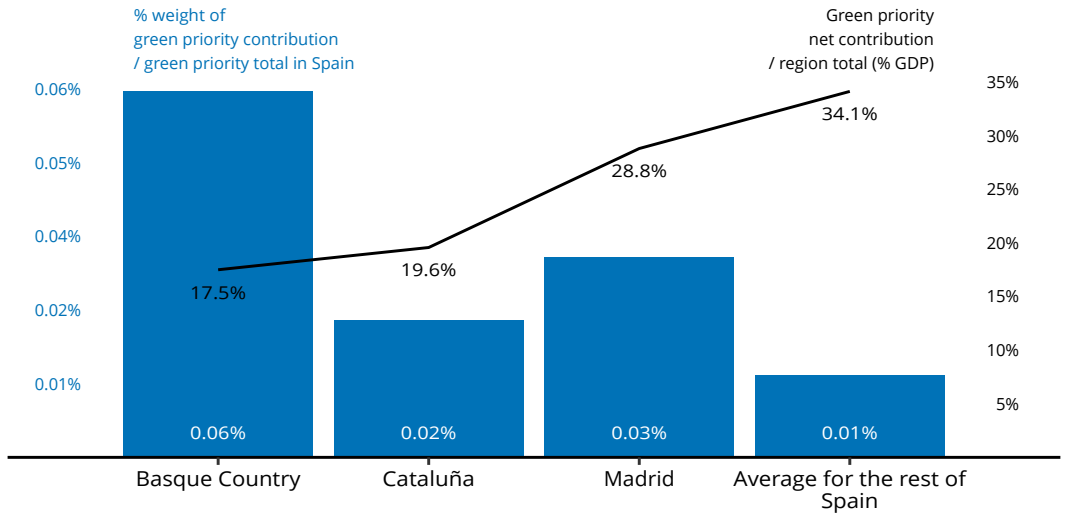
**GRAPH 3-7** Distribution of Horizon 2020 and Horizon Europe programme funds in the Basque Country by themed priority (% net EU contribution)




*Source:* European Commission (Horizon Dashboard). Compiled by authors.

*Note:* The category listing other key priorities for the Basque Country includes, for the Horizon 2020 programme, advanced manufacturing, advanced materials, biotechnology, ICT, nanotechnology, health, demographic change, and wellbeing; for the Horizon Europe programme, in includes the digital world, industry, and space (except for sustainable industry) and health.

**GRAPH 3-8** Comparison of EU financing of green priorities (Horizon 2020)

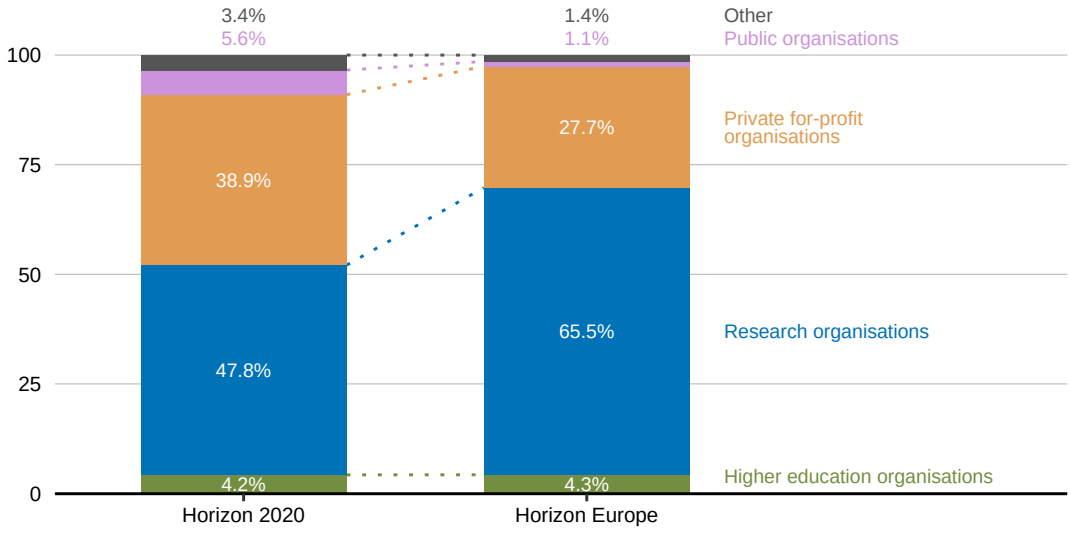



*Source:* European Commission. Compiled by authors.

By organisation type, it is research organisations (Basque Science, Technology, and Innovation Network actors, mainly technology centres and the Basque Excellence Research Centres) followed by private for-profit organisations (businesses) that have the greatest participation in the Basque Country in the two programmes in terms of green initiatives. Furthermore, the participation of SMEs in green priorities is similar to their participation in other thematic priorities (around 20 %). Thus, Graph 3-9 shows that R&D and innovation capabilities are distributed all along the knowledge value chain, highlighting the potential for collaboration between different players and the intermediary role of the Basque Research and Technology Alliance (BRTA) (see Box 8).

The R&D and innovation capabilities for green priorities are distributed all along the knowledge value chain, highlighting the potential for collaboration between agents

**GRAPH 3-9** Participation in green priorities in the Horizon 2020 and Horizon Europe programmes by organisation type (% net contribution received)




*Source:* European Commission. Compiled by authors.

## BOX 8 Coordination of technological supply to identify and respond to sustainability transition opportunities (drafted by BRTA)

The energy-environmental transition has become a motor of new economic growth, since significant socioeconomic and environmental challenges can lead to business and production opportunities. New and future environmental regulations establish a space full of opportunities for the economic and social development of our region, for which the development of new green technologies and their transfer to industry is essential.

To have a real impact on company competitiveness, said transfer requires building consensus around and transmitting technological possibilities in an orderly fashion. The technologies necessary for the green transition are characterised by a cross-sector outlook and high multidisciplinary component, making the need for coordination between different players and the identification of their different capabilities and opportunities even more important.

In 2021 the Basque Research and Technology Alliance began the development of a collaborative research agenda among its 17 members to tackle the main socioeconomic challenges with available technology

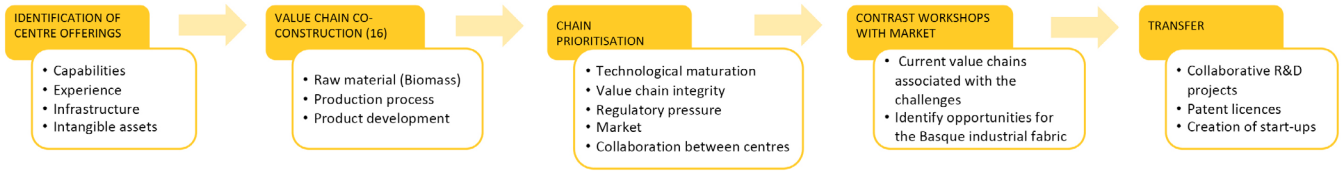
To respond to the main socioeconomic challenges with current technology and through research and new technologies, BRTA began its research agenda in 2021 (Orkestra, 2022a). This work, carried out among the 17 BRTA centres, includes 7 agendas in white paper format: smart industry, cleaner energy, personalised health, healthy food, sustainable mobility, eco-innovation, and digital technologies.

A clear example of the cross-cutting and multidisciplinary facet needed for the green transition is the fact that each of the technological challenges and sub-challenges included in the 7 agendas have a significant component related to said transition. The transformation towards a net-zero economy, energy efficiency, a reduction of material resource consumption, and the use of sustainable materials is present throughout each of the 7 agendas.

BRTA contributes to the Basque Country's green transition through the simple, concise, and clear identification of the opportunities that are included in these 7 research agendas. In addition, it also facilitates effective and multidisciplinary collaboration between its associated centres so that the technologies available can be transferred to the economy as a whole.

In this way, it has carried out —mong other things— the creation and verification of 16 value chains in the bioeconomy field (see Figure 3-3), where different sectors are intertwined. As an example, among these 16 value chains, the following stand out: (i) the chain for the development of bio-based components for the automotive industry using agricultural, food, and forestry waste as starting material; and (ii) the chain for the development of sustainable and bio-based packaging for the food sector based on fruit and vegetable by-products and food waste.

**FIGURE 3-3** Methodology used for the creation and verification of value chains in the bioeconomy field




*Source:* Basque Research and Technology Alliance.

### *3.4.3. Green scientific publications*

One of the most relevant indicators of scientific excellence (and, therefore, of the quality of the knowledge base) is the number of scientific or academic publications in prestigious journals. In this area, the Web of Science's 'publications per million inhabitants' indicator paints a very positive picture for the Basque Country, with 3 435 publications per million inhabitants in 2022, a figure which is well above Spain and the EU-27 (2 405 and 1 806 publications per million inhabitants, respectively).

To carry out an analysis of the evolution of publications with Basque authorship in the field of sustainability (a field related to a number of scientific disciplines), the methodology of Traag *et al*. (2019) has been followed. Thanks to this methodology, the scientific production assigned to each Sustainable Development Goal (SDG) can be identified via the Web of Science. Although there are synergies and complementarities between the different SDGs, those most related to the field of environmental sustainability are SDG 6 (clean water and sanitation), SDG 7 (affordable and clean energy), SDG 11 (sustainable cities and communities), SDG 12 (responsible consumption and production), SDG 13 (climate action), SDG 14 (life below water), and SDG 15 (life on land).

The Basque Country stands out above the EU-27 average in scientific publications related to SDG 7 (Affordable and Clean Energy) and SDG 11 (Sustainable Cities and Communities)

If we look at the weight of publications related to the different SDGs in the Basque Country, we see that SDG 3 (health) is represented in 37 % of the total, followed by SDG 11 (sustainable cities) and SDG 7 (energy) (see Table 3-4). If we compare these weights with those of the EU-27, calculating the specialisation

index,[54] we see that the Basque Country stands out above the EU-27 average both in SDG 7 and SDG 11 (slightly). It is also notable that the weight of publications related to SDG 7 has been growing since the beginning of 2000, in contrast to the evolution of the rest of the regions, something which shows a clear degree of specialisation in the energy field in the Basque Country. Other SDGs worth highlighting are numbers 14 and 12.

**TABLE 3-4** Specialisation of scientific publications from the Basque Country

| | % of publications over the total for the Basque Country (three-year average) | | | | | | | | Specialisation index with respect to EU-27 (EU-27=1) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2004 | 2007 | 2010 | 2013 | 2016 | 2019 | 2020 | 2022 | 2004 | 2007 | 2010 | 2013 | 2016 | 2019 | 2020 | 2022 |
| SDG 01 | 0.5 % | 0.7 % | 0.7 % | 1.0 % | 0.8 % | 0.8 % | 0.9 % | 1.0 % | 1.20 | 1.27 | 1.11 | 1.32 | 1.08 | 1.04 | 1.09 | 1.18 |
| SDG 02 | 1.2 % | 0.8 % | 1.1 % | 1.2 % | 1.3 % | 1.3 % | 1.4 % | 1.5 % | 0.63 | 0.45 | 0.67 | 0.73 | 0.78 | 0.80 | 0.81 | 0.84 |
| SDG 03 | 38.1 % | 35.7 % | 34.0 % | 35.3 % | 35.3 % | 34.5 % | 35.1 % | 37.3 % | 1.03 | 1.05 | 1.06 | 1.11 | 1.18 | 1.17 | 1.16 | 1.16 |
| SDG 04 | 0.9 % | 1.7 % | 2.7 % | 2.5 % | 3.1 % | 3.2 % | 3.0 % | 2.9 % | 1.11 | 1.47 | 1.82 | 1.52 | 1.64 | 1.58 | 1.54 | 1.52 |
| SDG 05 | 1.7 % | 1.9 % | 2.1 % | 2.5 % | 2.7 % | 2.8 % | 2.9 % | 3.2 % | 0.78 | 0.88 | 0.92 | 1.08 | 1.16 | 1.17 | 1.18 | 1.25 |
| SDG 06 | 1.4 % | 1.5 % | 1.7 % | 1.7 % | 1.7 % | 1.6 % | 1.4 % | 1.4 % | 0.82 | 0.92 | 1.08 | 1.07 | 1.07 | 0.98 | 0.91 | 0.90 |
| SDG 07 | 3.8 % | 3.7 % | 4.1 % | 4.6 % | 4.7 % | 4.8 % | 5.0 % | 5.2 % | 1.32 | 1.33 | 1.60 | 1.68 | 1.63 | 1.64 | 1.77 | 1.97 |
| SDG 08 | 0.6 % | 0.5 % | 0.7 % | 0.7 % | 0.7 % | 0.8 % | 0.8 % | 0.7 % | 1.11 | 0.75 | 0.87 | 0.89 | 0.81 | 0.97 | 0.99 | 0.89 |
| SDG 09 | 1.5 % | 1.7 % | 2.5 % | 2.5 % | 2.6 % | 2.7 % | 2.8 % | 2.7 % | 0.87 | 0.94 | 1.30 | 1.27 | 1.25 | 1.25 | 1.34 | 1.44 |
| SDG 10 | 0.4 % | 0.6 % | 1.0 % | 1.3 % | 1.1 % | 1.3 % | 1.4 % | 1.5 % | 0.81 | 0.89 | 1.16 | 1.32 | 1.11 | 1.24 | 1.33 | 1.42 |
| SDG 11 | 4.6 % | 4.5 % | 5.0 % | 4.6 % | 5.4 % | 6.1 % | 6.1 % | 5.6 % | 0.93 | 0.93 | 1.03 | 0.97 | 1.02 | 1.15 | 1.17 | 1.18 |
| SDG 12 | 3.3 % | 2.9 % | 2.5 % | 2.4 % | 2.3 % | 2.7 % | 2.9 % | 2.8 % | 2.15 | 2.16 | 1.98 | 1.84 | 1.71 | 1.89 | 2.00 | 1.90 |
| SDG 13 | 5.0 % | 4.4 % | 4.8 % | 5.1 % | 5.5 % | 5.2 % | 5.3 % | 5.5 % | 0.85 | 0.83 | 0.91 | 0.97 | 1.03 | 0.98 | 0.98 | 1.02 |
| SDG 14 | 2.5 % | 2.5 % | 2.8 % | 2.3 % | 2.2 % | 2.1 % | 2.1 % | 2.0 % | 1.59 | 1.71 | 2.02 | 1.69 | 1.73 | 1.61 | 1.59 | 1.49 |
| SDG 15 | 3.7 % | 3.1 % | 3.3 % | 3.5 % | 3.6 % | 3.6 % | 3.6 % | 3.4 % | 1.17 | 1.00 | 1.08 | 1.12 | 1.16 | 1.19 | 1.19 | 1.14 |
| SDG 16 | 0.1 % | 0.3 % | 0.4 % | 0.5 % | 0.5 % | 0.7 % | 0.7 % | 0.6 % | 0.93 | 1.54 | 1.30 | 1.32 | 1.30 | 1.61 | 1.49 | 1.34 |

*Source:* Incites. Compiled by authors.

## The quality of green publications in the Basque Country is, in general, higher than the European average

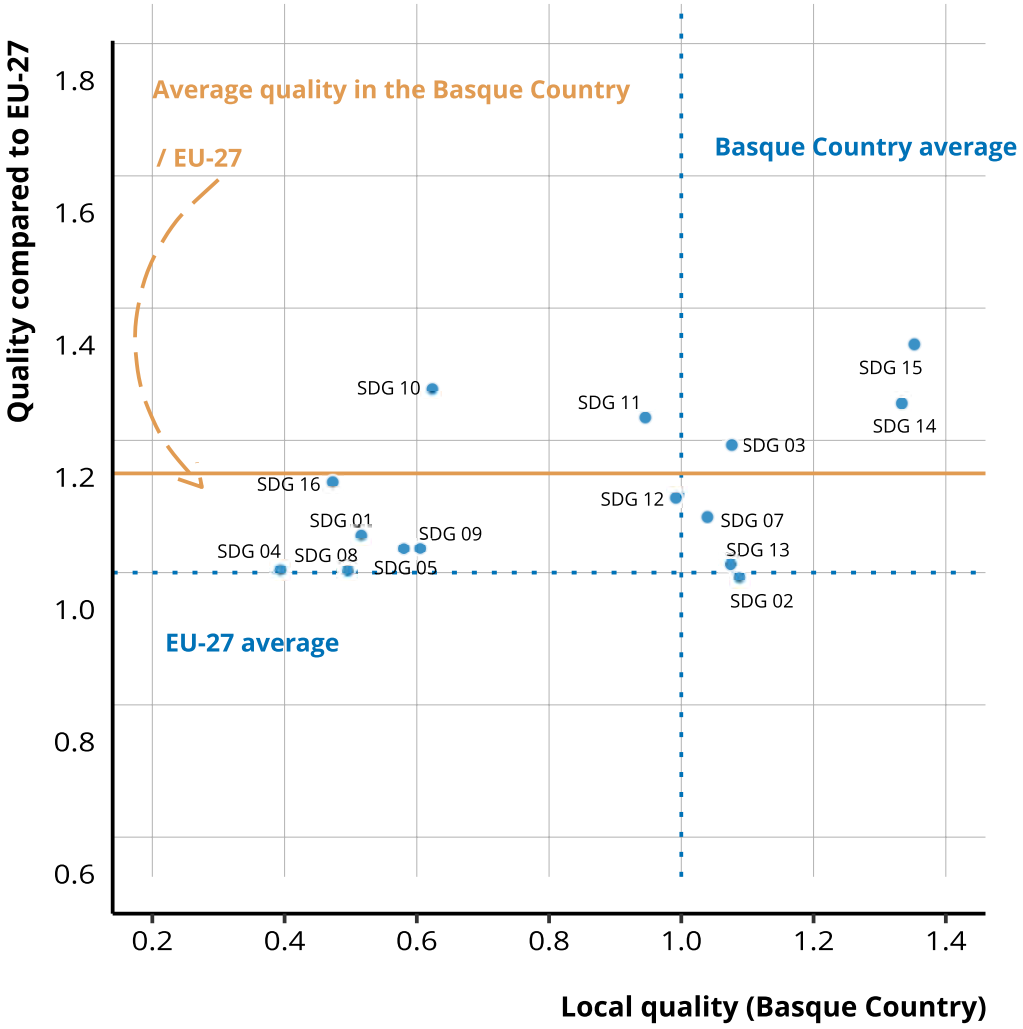
Analysis of the quality of publications in accordance with their appearance in Q1 academic journals[55] (see Graph 3-10) shows that the quality of publications in the Basque Country is, in general, higher than the European average. Furthermore, the publications related to almost all the most relevant SDGs for sustainability (6, 7, 13, 14, and 15) present a quality above the overall for the publications of the Basque Country (local quality, with 1 on the X axis being average of local quality) and above the quality in the EU-27 (quality with respect to EU-27, with 1 on the Y axis being the average reference quality in the EU-27).

[54] The specialisation index (or localisation quotient, LQ) represents the comparative advantage when compared with the EU-27 as a whole and it is calculated by dividing the weight that each SDG has in all the publications in the Basque Country and the same weight in the EU-27:

$$LQ^{SDG\,n}_{BASQUE/UE\,27} = \frac{publications^{SDG\,n}_{BASQUE} \,/\, publications^{total}_{BASQUE}}{publications^{SDG\,n}_{BASQUE} \,/\, publications^{total}_{BASQUE}}$$

[55] In the academic sphere, there are rankings of scientific journals based on their impact (citations, etc.) in different subject areas. Q1 journals are those that are within the top 25 % of journals with the greatest impact in a given topic area.

**GRAPH 3-10** Quality of publications by SDG in the Basque Country and comparison with the EU average (2020-2022)




*Source:* Incites. Compiled by authors.

### *3.4.4. Green patents*

In order to analyse patents based on technologies related to environmental sustainability, we used patents from the EPO (European Patent Office).[56] Graph 3-11 shows that patent performance for the Basque Country is higher than that of Spain, but well below the average of the EU-27 and Germany.

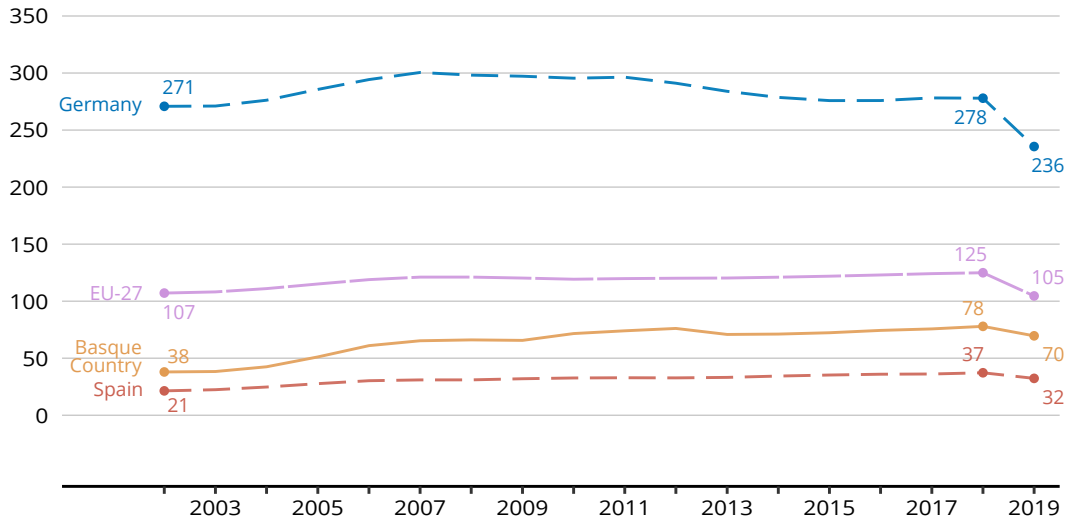
The weight of environmental technology patents in the Basque Country was higher than the State average during the most recent period available (2017-2019), reaching 11 % of all Spanish environmental patents.[57] Regarding a comparison with Europe, specialisation in patents for environmental technologies in the Basque Country and Spain has been improving since the beginning of the 2000s, when it was below the EU-27 average, eventually rising above said average, with the turning point being around 2010/2011.

While patent performance for the Basque Country is below the EU-27 average, specialisation in environmental technology patents has improved since the early 2000s, and is well above average

[56] This indicator shows published patents. It therefore presents a certain lag in time and the data from recent years may not be consolidated.

[57] Ahead of the Basque Country are Navarre, Aragon, and Madrid.

**GRAPH 3-11** EPO patents per million inhabitants (three-year average)




*Source:* OECD-REGPAT and Eurostat. Compiled by authors.

**TABLE 3-5** Specialisation of environmental technology patents in the Basque Country

| | % of patents over the total of the Basque Country (three-year average) | | | | | | | Specialisation index with respect to EU-27 (EU-27=1) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Technology group:** | **2004** | **2007** | **2010** | **2013** | **2016** | **2019** | **2020** | **2004** | **2007** | **2010** | **2013** | **2016** | **2019** | **2020** |
| **1: Environmental management** | 0.8 % | 1.3 % | 1.1 % | 2.9 % | 2.1 % | 1.7 % | 1.6 % | 0.29 | 0.46 | 0.36 | 0.98 | 0.75 | 0.70 | 0.76 |
| **2: Climate change mitigation technologies related to power generation transmission and distribution** | 1.2 % | 6.6 % | 8.6 % | 9.1 % | 8.1 % | 7.7 % | 9.4 % | 0.63 | 2.42 | 1.69 | 1.81 | 2.07 | 1.92 | 2.13 |
| **3: Capture, storage, sequestration or disposal of greenhouse gases** | 0.0 % | 0.0 % | 0.0 % | 0.1 % | 0.0 % | 0.1 % | 0.2 % | 0.00 | 0.00 | 0.00 | 0.34 | 0.00 | 0.64 | 1.18 |
| **4: Transportation-related climate change mitigation technologies** | 0.8 % | 0.0 % | 0.6 % | 1.4 % | 1.4 % | 1.3 % | 1.2 % | 0.54 | 0.00 | 0.22 | 0.46 | 0.56 | 0.48 | 0.45 |
| **5: Building-related climate change mitigation technologies** | 0.7 % | 1.4 % | 2.5 % | 1.5 % | 1.1 % | 1.8 % | 1.9 % | 1.12 | 1.71 | 1.65 | 0.98 | 0.80 | 1.52 | 1.54 |
| **6: Climate change mitigation technologies related to water treatment or management** | 0.8 % | 0.4 % | 0.8 % | 1.4 % | 0.8 % | 0.2 % | 0.7 % | 1.86 | 0.74 | 1.46 | 2.45 | 1.48 | 0.28 | 0.78 |
| **7: Climate change mitigation technologies in goods production and processing** | 1.0 % | 2.8 % | 1.1 % | 3.1 % | 2.5 % | 4.3 % | 5.3 % | 0.74 | 1.74 | 0.48 | 1.31 | 1.00 | 1.62 | 1.83 |
| **8: Climate change mitigation technologies in ICTs** | 0.0 % | 0.0 % | 0.0 % | 0.2 % | 0.0 % | 0.2 % | 0.2 % | 0.00 | 0.00 | 0.00 | 0.50 | 0.00 | 0.41 | 0.41 |
| **9: Climate change adaptation technologies** | 0.9 % | 0.9 % | 2.3 % | 0.7 % | 0.5 % | 0.4 % | 0.4 % | 0.91 | 0.73 | 1.69 | 0.49 | 0.35 | 0.31 | 0.31 |
| **10: Economics of sustainable oceans** | 0.0 % | 0.7 % | 1.4 % | 1.2 % | 2.1 % | 1.4 % | 0.4 % | 0.00 | 2.89 | 3.95 | 3.20 | 6.85 | 4.02 | 1.27 |
| **Total environmental technologies** | **4.7 %** | **10.1 %** | **13.9 %** | **15.3 %** | **15.1 %** | **15.1 %** | **16.4 %** | **0.59** | **1.06** | **1.07** | **1.12** | **1.22** | **1.23** | **1.29** |

*Source:* OECD-REGPAT and Eurostat. Compiled by authors.

*Note:* See the footnote on the previous page about the specialisation index.

An analysis of specialisation by technology group (see Table 3-5) shows that the Basque Country stands out in technological groups 02 (CCM energy), 05 (building), 06 (water and waste), 07 (technologies for production and the processing of goods) and 10 (oceans), falling behind in 01 (management), 04 (transport), and 08 (ICT). Furthermore, in terms of the weight of the patents of the different technological groups compared with the whole of the environmental patents of the Basque Country for the 2016-2019 period, it is the energy technological group that has more than half of the patents, followed by 07 (production technologies), 05 (building), 04 (transport), and 10 (oceans).

## 3.5 Human capital

The transition towards a low-carbon economy based on the efficient use of resources represents a significant challenge in the area of people's competencies and abilities, also known as skills (European Commission, 2022c). This transition requires a restructuring of the economy that involves the creation of new jobs, as well as the redefinition and replacement of others. To do this, it is necessary to incorporate skills that allow for the adequate performance of work processes (Rodrigues *et al*., 2021) and, in particular, 'green jobs'. This set of skills will facilitate jobs in the new economic model that favours the decarbonisation of the energy system and the rest of the economy's business activities, the transition of industry towards a circular and climate-neutral economy, efficient investments in resources in the field of construction, preservation of ecosystems and biodiversity, and the creation of a pollutant-free environment, as established by the EGD (European Commission, 2022c).

Specifically, in terms of the energy-environmental transition, it is necessary for people who carry out certain occupations to have different green capabilities; that is, 'knowledge, skills, values, and attitudes necessary to live in, develop, and support a society that reduces the impact of human activity on the environment' (Cedefop, 2012, cited in European Commission, 2022c, p. 14). For this reason, the European Commission, within the context of ESCO (European Skills, Competences, Qualifications, and Occupations), has prepared a catalogue of 571 green skills, establishing relationships between these skills and the occupations for which they are essential or optional (European Commission, 2022c).[58]

For the energy/environmental transition, it is necessary for people in certain occupations to have different green capabilities

In this section we carry out a new type of analysis in order to identify: (i) occupations that contain green skills intensively and that, therefore, are key to the energy-environmental transition; (ii) their weight in the Basque labour market; and (iii) the undergraduate university degrees and vocational training programmes linked to these occupations.

### *3.5.1. Potentially green occupations*

The first step in our analysis is to identify occupations that are potentially green from the ESCO Green Skills database. 'Potentially green' occupations are those that have the capacity to generate, adapt, or implement sustainable solutions in production and economic processes (Froy *et al*., 2023). Specifically, for this analysis we have de-

'Potentially green' occupations are those that have the capacity to generate, adapt, or implement sustainable solutions in production and economic processes

[58] For example, the ability to 'perform environmental audits' is considered essential for the occupation classified as 'technicians in the fields of occupational risk prevention and environmental health', while the ability to 'train on recycling regulations' is considered optional for said occupation.

fined potentially green occupations as those occupations for whose adequate performance (from the point of view of environmental sustainability) it is essential to have at least one green skill.[59]

ESCO identifies green skills for 342 occupations (although with different levels of intensity). These occupations were differentiated according to the four-digit Spanish National Classification of Occupations (CNO). Once the potentially green occupations were identified, the different intensities of said green potential were quantified taking into account the weight that essential and optional green skills have with respect to the total number of green skills for each occupation. Taking this green potential indicator as a reference, four groups of occupations were created according to their green potential / green intensity (Table 3-6).

**TABLE 3-6** Number of occupations by green potential indicator (in accordance with 4-digit CNO)

| Green potential | Number of occupations | Total occupations percentage |
|---|---|---|
| **High** (>20 %) | 26 | 7.6 % |
| **Medium-high** (10-19 %) | 26 | 7.6 % |
| **Medium-low** (5-9 %) | 54 | 15.8 % |
| **Low** (<5 %) | 236 | 69.0 % |
| **Total** | **342** | **100 %** |

*Source:* ESCO Green Skills. Compiled by authors.

*Note:* The green potential indicator reflects the percentage of green skills with respect to the total number of skills for each occupation, taking into account a weighting factor of 0.6 for essential green skills and 0.4 for optional green skills. This indicator varies between 0.4 and 71.8.

We have identified 26 occupations with high green potential, nine of which belong to the Engineering field

The above has made it possible to identify occupations with a high green potential. These occupations are those which can bring about a greater impact in environmental terms and, therefore, they are subject to more detailed analysis. Table 3-7 specifies the 26 occupations categorised as having a high green potential.[60] They are mainly located in the top three categories of the occupational hierarchy. Specifically, it can be observed that four occupations (15.4 %) are associated with the highest category of directors and managers (CNO 1), 13 occupations (50 %) are associated with scientific and academic technicians and professionals (CNO 2), seven occupations (26.9 %) are associated with technicians and support professionals (CNO 3), and two occupations (7.7 %) are associated with farmers and qualified agricultural, forestry, and fishing workers (CNO 6). It is also notable that nine of the 26 occupations (34.6 %) belong to the field of engineering.

[59] We worked initially with analyses of ESCO occupations and subsequently with their equivalents in the Spanish National Classification of Occupations (CNO) based on an equivalence system provided by ESCO. Similar analyses exist from different sources and using different methodological approaches. In Emilia-Romagna, the ESCO classification was used to identify 'green occupations' based on the development of a green rating and a proximity analysis between said occupations (Direzione Studi and Ricerche, 2023). In Scotland, a catalogue of 'green jobs' has been identified based on the United States O*Net Database and its weight in the regional labour market (Cardenas Rubio *et al.*, 2022).

[60] The full list of potentially green occupations can be consulted in the online annex: https://www.orkestra.deusto.es/images/investigacion/publicaciones/informes/informe-competitividad-pais-vasco/230048-basque-country-competitiveness-report-2023-annex.pdf.

**TABLE 3-7** Occupations with high green potential according to the number of essential and optional green skills

| CNO 1-dig | CNO 4-dig | Occupation name | Green Skills Essentials ESCO No. | ESCO No. Optional Green Skills | Coefficient of Skills Green potential |
|---|---|---|---|---|---|
| 3 | 3326 | Technicians in the fields of occupational risk prevention and environmental health | 69 | 76 | 71.8 |
| 2 | 2433 | Mechanical engineers | 38 | 106 | 65.2 |
| 2 | 2421 | Biologists, botanists, zoologists and related fields | 55 | 64 | 58.6 |
| 2 | 2432 | Construction and civil engineers | 19 | 98 | 50.6 |
| 2 | 2441 | Electrical engineers | 41 | 51 | 45.0 |
| 2 | 2469 | Technical engineers not classified under other headings | 32 | 57 | 42.0 |
| 3 | 3129 | Other technicians in the physical, chemical, environmental and engineering sciences | 39 | 43 | 40.6 |
| 3 | 3131 | Technicians in energy production facilities | 38 | 35 | 36.8 |
| 3 | 3132 | Technicians in waste treatment plants, water treatment plants and other operators in similar plants | 28 | 42 | 33.6 |
| 1 | 1313 | Directors of manufacturing industries | 16 | 52 | 30.4 |
| 2 | 2437 | Environmental engineers | 28 | 30 | 28.8 |
| 2 | 2462 | Public works technical enginee | 25 | 32 | 27.8 |
| 1 | 1113 | Directors of social interest organisations | 27 | 28 | 27.4 |
| 3 | 3142 | Agricultural technicians | 25 | 31 | 27.4 |
| 2 | 2463 | Mechanical engineers | 13 | 48 | 27.0 |
| 2 | 2326 | Environmental education professionals | 24 | 29 | 26.0 |
| 6 | 6110 | Skilled workers in agricultural activities (except in orchards, greenhouses, nurseries and gardens) | 23 | 28 | 25.0 |
| 2 | 2466 | Mining, metallurgical and related technical engineers | 22 | 25 | 23.2 |
| 2 | 2414 | Geologists and geophysicists | 21 | 26 | 23.0 |
| 1 | 1219 | Directors of policy and planning and of other administrative departments not elsewhere classified | 17 | 31 | 22.6 |
| 2 | 2422 | Agricultural engineers | 19 | 27 | 22.2 |
| 1 | 1509 | Directors and managers of waste management companies and other service companies not elsewhere classified | 15 | 32 | 21.8 |
| 6 | 6120 | Skilled workers in orchards, greenhouses, nurseries and gardens | 19 | 26 | 21.8 |
| 3 | 3121 | Physical and chemical science technicians | 13 | 34 | 21.4 |
| 3 | 3143 | Forestry and environmental technicians | 29 | 9 | 21.0 |
| 2 | 2426 | Environmental protection professionals | 18 | 25 | 20.8 |

*Source:* ESCO Green Skills. Compiled by authors.

## Occupations with high green potential represented 9.2 % of the total employed population

In Table 3-8, it can be seen that, taking as a reference the data from the Spanish National Statistics Institute's Economically Active Population Survey (EPA),[61] in 2022 occupations with high green potential represented more than 86 thousand employed people in the Basque Country (9.2 % of the total employed population) and these individuals were mostly employed in the field of engineering (4.1 %).[62]

**TABLE 3-8** Employed population aged 16 to 64 in the Basque Country in occupations with high green potential (2022)

| NCO (3 digits) | Occupation | No. Employed | % employed of total employed |
|---|---|---|---|
| 111 | Members of the executive branch and legislative bodies; directors of the public administration and social interest organisations | 1 835* | 0.2 % |
| 121 | Directors of administrative departments | 6 415 | 0.7 % |
| 131 | Production managers in agriculture, forestry, fishing, manufacturing, mining, construction, and distribution | 7 438 | 0.8 % |
| 150 | Directors and managers of other service companies not elsewhere classified | 4 385* | 0.5 % |
| 232 | Other teachers and teaching professionals | 9 862 | 1.1 % |
| 241 | Physicists, chemists, mathematicians and related fields | 2 378* | 0.3 % |
| 242 | Professionals in natural sciences | 2 727* | 0.3 % |
| 243 | Engineers (except agronomists, forestry, electrical, electronic and ICT engineers) | 18 481 | 2.0 % |
| 244 | Electrical, electronics and telecommunications engineers | 7 392 | 0.8 % |
| 246 | Technical engineers (except agricultural, forestry, electrical, electronic and ICT) | 2 973* | 0.3 % |
| 312 | Technicians in the physical, chemical, environmental and engineering sciences | 9 245 | 1.0 % |
| 313 | Process control technicians | 4 329 | 0.5 % |
| 314 | Natural science technicians and related ancillary professionals | 19* | 0.002 % |
| 332 | Other health technicians | 3 696* | 0.4 % |
| 611 | Skilled workers in agricultural activities (except for orchards, greenhouses, nurseries and gardens) | 2 111* | 0.2 % |
| 612 | Skilled workers in orchards, greenhouses, nurseries and gardens | 2 739* | 0.3 % |
| | **Total 26 high green intensity occupations** | **86 025** | **9.2 %** |
| | **All occupations** | **930 243** | **100.0 %** |

*Source:* Active population survey, INE (2022). Compiled by authors.

*Note:* (*) This data should be taken with caution because small sample sizes can lead to large sampling errors.

[61] We have taken the EPA as a reference as it is the source that disaggregates occupations by CNO to the greatest extent. It does so down to 3 digits and, although correspondence between ESCO and CNO uses 4 digits, this would be the most approximate estimate. However, the data should be taken with caution due to a certain overestimation of people employed in occupations with great green potential, given the absence of four-digit CNO data on employed people.

[62] CNO: 243, 244, 246, and 312.

### *3.5.2. Connection between occupations with high green potential and the training system*

The role of the training system is essential for the competitiveness of a territory in the midst of a sustainability transition, as it provides students with the knowledge, skills, and techniques for sustainability that they could subsequently need during their professional career. These competencies can presumably be acquired directly in the classroom, but also through internships in the workplace or through different initiatives that are undertaken from within the formal and non-formal training system.[63] For all these reasons, it is important to know what specific training programmes are providing professionals for the occupations with a high potential to generate, adapt, and implement sustainable solutions in Basque companies' production processes.

The training system's role is essential for a territory's competitiveness in the sustainability transition

**TABLE 3-9** Main university degrees and vocational training courses of recent graduates who work in the 5 occupations with the greatest green potential in the Basque Country

| NCO (4-dig) | Name of the occupation and the associated degrees and training courses | % of graduates % of total graduates in occupation | Number of graduates employed |
|---|---|---|---|
| **3326** | **Technicians in the fields of occupational risk prevention and environmental health** | | |
| | Superior Technician in Prevention of Professional Risks | 31.6 % | 49 |
| | Degree in Labour Relations | 8.4 % | 13 |
| | Degree in Civil Engineering | 3.9 % | 6 |
| **2433** | **Mechanical engineers** | | |
| | Degree in Mechanical Engineering | 76.1 % | 331 |
| | Degree in Industrial Technology Engineering | 8.5 % | 37 |
| | Degree in Industrial Engineering | 4.6 % | 20 |
| **2421** | **Biologists, botanists, zoologists and related fields** | | |
| | Degree in Biology | 42.8 % | 68 |
| | Double Degree in Biochemistry and Biology | 24.5 % | 39 |
| | Degree in Biotechnology | 15.7 % | 25 |
| **2432** | **Construction and civil engineers** | | |
| | Degree in Civil Engineering | 75.0 % | 78 |
| | Degree in Industrial Technology Engineering | 5.8 % | 6 |
| | Degree in Industrial Organisation Engineering | 3.8 % | 4 |
| **2441** | **Electrical engineers** | | |
| | Degree in Electrical Engineering | 39.7 % | 58 |
| | Degree in Industrial Technology Engineering | 11.6 % | 17 |
| | Degree in Renewable Energy Engineering | 11.0 % | 16 |

*Source:* Lanbide survey of vocational training graduates one year after graduating (2017 to 2021 cohorts) and university graduates three years after graduating (2014 to 2018 cohorts). Compiled by authors.

*Note:* There may be an underestimation of the number of graduates who perform each of the occupations because only recent graduates of university degree and vocational training programmes are taken into account.

[63] For example, the Basque Circular Hub (www.basquecircularhub.eus), Ihobe, and other entities have undertaken training for more than 500 young people with company internships on green employment, especially aimed at integrating the life cycle approach in terms of materials, products, and services.

We have identified the main qualifications corresponding to the five occupations with the highest green potential

To this end, the main university degrees and vocational training qualifications for people who graduated in recent years and who perform potentially green occupations have been identified, as these training programmes are key in the development of green skills and a driving force of the energy-environmental transition. Taking the last 5 years of the job placement surveys carried out by the Basque employment agency to graduates of both vocational training and university studies, Table 3-9 presents the main qualifications corresponding to the five occupations with the greatest green potential.[64]

Around 75 % of graduates who work in occupations with high green potential have a STEM degree

The data indicate notable differences by occupation in terms of the number of graduates who work in occupations with high green potential. In general, the occupations of scientific and academic technicians and professionals (CNO 2) have a greater number of graduates, while occupations associated with executive and management positions (CNO 1) have a smaller number of graduates. This is due both to the difficulty of accessing this type of occupation just a few years after graduating and the relatively low weight of this occupational level within all occupations. Likewise, there is a greater presence of university degrees (around 70 %) —especially in the field of engineering— and a scarce presence of intermediate-level vocational training degrees (8 %) when compared to higher-level vocational degrees (23 %). In general, the greatest weight falls on STEM degrees (around 75 %),[65] which seem to have a high impact on the green transition we aspire to. Finally, in the field of vocational training, the presence of studies associated mainly with industrial professional skills (48 %) stands out; these studies include mechanical, chemical, and electrical-electronic manufacturing, as well as agricultural manufacturing (35 %).

**TABLE 3-10** Main programmes (university and vocational training) that train workers for occupations with high green potential and which have the highest number of graduates in the Basque Country

| **University degree of origin** | **Total graduates** | **Percentage of provision** | **Percentage of total undergraduate graduates** |
|---|---|---|---|
| Mechanical engineering | 422 | 24 % | 45 % |
| Civil engineering | 106 | 6 % | 48 % |
| Biology | 87 | 5 % | 47 % |
| Degree in Industrial Technology Engineering | 85 | 5 % | 16 % |
| Electrical Engineering | 76 | 4 % | 46 % |
| **VET cycle of origin** | **Total graduates** | **Percentage of provision** | **Percentage of total graduates cycle** |
| Prevention of occupational hazards DF. GS | 51 | 14 % | 55 % |
| Analysis and Quality Control Laboratory CF.GS | 34 | 9 % | 12 % |
| Landscaping and Rural Environment CF.GS | 31 | 9 % | 42 % |
| Gardening and Floristry CF.GM | 28 | 8 % | 38 % |
| Environmental Education and Control G.S. | 25 | 7 % | 28 % |

*Source:* Lanbide survey of vocational training graduates one year after graduating (2017 to 2021 cohorts) and university graduates three years after graduating (2014 to 2018 cohorts). Compiled by authors.

*Note:* CFGS = High-level training cycle y CFGM = Medium-level training cycle.

[64] The full list of occupations with high green potential and their main associated qualifications can be consulted in the online annex: https://www.orkestra.deusto.es/images/investigacion/publicaciones/informes/informe-competitividad-pais-vasco/230048-basque-country-competitiveness-report-2023-annex.pdf.

[65] Degrees in sciences, technology, engineering and mathematics – both university and vocational training.

In Table 3-10 we can see the 5 training courses that currently train the greatest number of people who end up in occupations with a high degree of green potential.

This analysis can provide a basis for subsequent analyses of the degree to which green skills are being developed in these training programmes (and in other forms of training),[66] in addition to stimulating analysis of the evolution of enrolment and degree issuance. The aim is to bring about measures that somehow guarantee the necessary flow of people with the qualifications, knowledge, and skills needed to drive the environmental transition. On the one hand, it is important to guarantee that key training programmes have sufficient numbers of people, analysing the evolution of demand for green occupations to adjust supply and demand. On the other hand, venturing beyond specific degree/training programmes, we must ensure that green skills are developed in a wide range of different training modules and training combinations, moving towards a skills-based approach.[67]

It is important to ensure that key training programmes have sufficient numbers of people, analysing the evolution of demand for green occupations to adjust supply and demand

## 3.6 Social and institutional capital

The final lever that we analyse for its role in accelerating the transition towards environmentally sustainable competitiveness is that of social and institutional capital, which, by its nature, interacts with many of the challenges and opportunities already analysed under other levers. By social and institutional capital we mean the system of rules and organisations which structure social interactions, influencing the creation of economic value and wellbeing. Of the multiple elements that make up social and institutional capital (a concept which includes key aspects for the sustainability transition such as institutional structure in different geographical areas, multilevel governance, legislative, policy, and regulatory frameworks, and attitudes and ways of relating) this section focuses specifically on collaborative governance. This approach to governance is especially relevant when searching for and implementing solutions that integrate the different players needed for the transition towards an environmentally sustainable territory.

Collaborative governance is especially relevant when searching for and implementing solutions that integrate the different players needed for the sustainability transition

Indeed, it is clear that the management and execution of the transition towards a more environmentally sustainable society will not be easy. On the contrary, this is a multidimensional challenge that requires the action, knowledge and resources of a wide array of players and citizens, and which demands changes in the behaviour of all the people and organisations in the territory. The climate crisis and the transition towards a more sustainable model for society thus becomes an extremely complex challenge around which different interests, points of view, and narratives are emerging. For example, while some advocate for a radical change of model, others warn that a disruptive change would negatively impact competitiveness and wellbeing and promote transitions with different intensities and speeds.

[66] Fernández Gómez and Larrea Basterra (2022) carry out a preliminary analysis of the green content in the programmes of the main official and non-official training entities in the Basque Country.

[67] Fernández Gómez and Larrea Basterra (2022), using the United States O*Net database, identify the main tools required by the green employment profiles identified in this analysis. A very significant weight is observed in terms of tools associated with statistical, analytical, programming, and digital skills, among others.

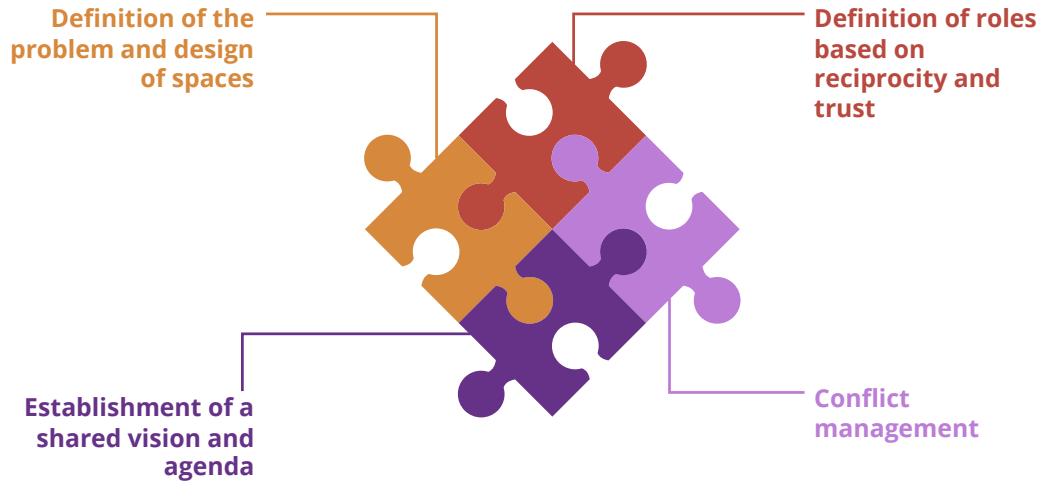
Territorial leaders (public and private), despite being people who have hierarchical positions in their own organisations, lack a hierarchical position with respect to the organisations in their territory. This leads to the proposition that no single player can make decisions for another. In this context, the complexity and implications of the challenge make collaboration an essential requirement to construct collective responses. For example, as mentioned in sections 3.1 and 3.4, the social acceptance of new energy and infrastructure solutions and the involvement of citizens in said solutions' implementation are both topics that governments will need to delve into to address the social nature of the climate crisis. Likewise, this challenge forces the governmental players of a territory to reconfigure their power relations and act jointly with others through their policies and actions.

Collaboration between territorial players is an area in which the Basque Country has experiences which have led to collective learning that can serve as a basis for articulating collaborative responses to the challenge of accelerating the sustainability transition. However, collaboration in a context of multiple interests and narratives does not happen automatically. That is, the conditions must be created for collaboration to emerge and develop and, in this sense, policy plays a key role in facilitating collaborative governance. This facilitation involves creating the conditions for multiple territorial players (who at first sight do not have the same interests, languages, and positions of power) to dialogue, collaborate, and act together.

The Basque Country has considerable experience with collaborative governance, and Orkestra has participated in facilitating several specific initiatives through action research

During the last decade, Orkestra has participated (through action research for territorial development) in the facilitation of collaborative processes promoted by different public institutions in the Basque Country, involving a wide range of actors in the territory. These processes have generated collective learning in relation to four key elements that allow us to understand how the interaction between territorial players can be facilitated in a way that strengthens the social capital of the territory in the face of complex problems like the sustainability transition (see Figure 3-4).

**FIGURE 3-4** Key elements in collaborative governance




*Source:* Compiled by authors.

The following subsections explain the lessons learned and share definitions and experiences that illustrate the key concepts. Thus, the Boxes include cases in which

Orkestra has participated or is participating, and which are linked to one or more of the specific concepts and/or are significant collaborative governance experiences. This is not a one-size-fits-all or unique recipe, and the order in which the elements are presented does not imply that they are steps to be taken sequentially. We are facing a phenomenon that requires an approach that combines the best of what we have been doing with new ways of managing things, with it being necessary to learn as we go, as actions are taken.

### *3.6.1. Definition of the problem and design of spaces*

The transition towards environmentally sustainable competitiveness is a complex challenge because it requires making decisions that will favour certain sectors and negatively affect others (for example, on mobility and its implications in the automotive sector, or on the energy mix and its implications in the energy sector and other sectors). These decisions will require that we find difficult balances, as there are jobs and significant economic interests behind the business activities that will suffer from restrictions. Faced with complex problems like this, unilateral solutions can be highly contested and technical reports, although helpful, are not enough. Decisions around this great challenge must be made in multiple spaces. Companies must make their decisions, governments must make theirs, and citizens must make theirs. The viability of these decisions together can increase if spaces are created in which all parties affected by the decisions can dialogue, understand their differences, and seek agreement.

The transition towards environmentally sustainable competitiveness will sometimes require seeking out difficult balances

Thus generating spaces for dialogue between players is key to facilitating, structuring, and institutionalising collaboration. At the beginning, the normal thing is for each player (or a small group of players) to define the specific problem or challenge they want to work on and begin the process of mobilising and integrating other players and their knowledge and resources. Based on this problem, spaces for dialogue are generated that involve the rest of the players who, in turn, must confirm the problem and ensure that it is significant for everyone and that there is a general desire to solve it collaboratively. At the same time, everything is about seeking balances (structural ambidexterity) between existing structures and new spaces, both formal and informal, and with greater or lesser openness, etc. For example, in the case of economic promotion policies, it is important to open this dialogue in the traditional spaces like departments, agencies, cluster management organisations (CMO), and/or programmes aimed at companies. But at the same time, new specific collaboration spaces must be explored to address environmental challenges, such as the Net-Zero Basque Industrial Supercluster, illustrated previously in Box 3 (Chapter 2). In addition, there may be several spaces with different functions and their own corresponding players. Thus, it is also important to have mechanisms for interconnection between them.

Generating spaces for dialogue between players is key to facilitating, structuring, and institutionalising collaboration

The collaborative governance scheme of the supercluster represents an innovative model to address a complex and shared challenge while taking into account industrial realities. By involving both energy producers and consumers, as well as institutions, R&D and innovation players, and the financial ecosystem, the supercluster constitutes a framework with an appropriate level of singularity and oneness to identify common interests and facilitate cooperation. Furthermore, the planning and progressive evolution of the supercluster through different phases and scopes implies a succession of reflective processes and action to adapt the initiative to the needs dictated by the diversity of participating players.

### *3.6.2. Definition of roles based on reciprocity and trust*

Collaborative governance requires defining the role that each player has in the process, seeking complementarity, mutual acknowledgement, and reciprocity

In order for governance spaces to exist and foster trust and mutual acknowledgement, in addition to defining who the players are, it is necessary to define what role each one plays in the reflection and collaboration processes. In particular, the definition of roles must be based on reciprocity. This refers to the players' capacity for mutual acknowledgement, and it begins with accepting that other players are also entitled to participate in and influence these processes. This is about defining roles while seeking complementarity and, therefore, helping to identify the uniqueness of each player's contribution to the process.

Mutual acknowledgement and reciprocity depend on relationships of trust. In turn, the process of building such reciprocity enables the shared definition of roles while at the same time contributing to creating the relationships of trust needed to make collaborative governance work (see Box 9). Trust is an intangible asset that is built over the medium and long term. At the beginning of processes, there may be bilateral relationships of trust between some of the players involved. The aim is to extend these ties to the rest of the players so that everyone shares their position and viewpoint in a transparent and honest way. This can help, for example, when making difficult decisions or managing frustration.

**BOX 9** YouCount

YouCount is an experimental citizen social science project funded by the EU's Horizon 2020 programme. The project is deployed by 10 research teams distributed over 9 European countries with the aim of addressing the challenge of the social inclusion of young people. To accomplish that goal, young people who are immigrants, refugees, or who live in marginal urban or rural areas voluntarily play the role of citizen scientists in the research teams. To play that role, the project includes a training stage in research methodologies and methods. This training includes topics ranging from how to formulate research questions to how to present results. This stage allows for relationships of trust to be developed between the young people and the research staff.

The topics addressed in the project are of diverse nature. However, the environmental transition was the subject of study in one of the cases, which explored how young people could participate in local product repair and exchange in order to reduce their consumption of resources and the associated climate impact.

The YouCount project provides evidence that reciprocity and mutual acknowledgement can only be approached as ideals because they are affected by power relations

Although the preliminary results show that the participants felt empowered just by their participation, the project provides evidence that reciprocity and mutual acknowledgement can only be approached as an ideal because they are affected by power relations. In the case of YouCount, citizen scientists do not receive a salary for their work, but the other players who participate in the collaborative spaces do. Questions related to the appropriation of project results and project sustainability beyond the funding period also remain to be resolved. These are ethical and policy challenges that can be extrapolated to other spaces and which require collective responses to be addressed. It is not always possible to solve these challenges, but it is very important to identify and recognise them collectively to try to address them.

### *3.6.3. Establishment of a shared vision and agenda*

A shared vision is a result of dialogue between players, and it facilitates action —although that action is not always joint in nature. Having a shared vision does not mean that all players agree, but rather that they are aware of the positions of the rest of the players and have made an effort to understand the different positions. It is about making the differences known with respect to, for example, what the priorities are for addressing environmental sustainability, who the key players are that must act or assume responsibilities, and how to finance the necessary actions. This process of identifying the differences involves creating conditions that allow for mutual understanding and construction based on the interpretations that different players have of reality.

Having a shared vision does not mean that all players agree, but rather that they are aware of the opinions of other players and have made an effort to understand the different positions

Thus, moving towards a shared vision makes it easier to define a shared agenda. A shared agenda refers to reaching an agreement —albeit minimal— to take action. It is a tool for cohesion and action that aims to address the shared problem that brought about dialogue and collaboration between players in the first place. This process of defining a shared agenda normally also requires the co-definition of the expected results from the collaborative process.

In the Basque Country, for example, there are processes aimed at giving rise to shared agendas (led above all by public agencies), like the Euskadi 2040 project explained in Box 10. Some of the questions to answer in relation to the sustainability transition would be: How can cohesion be facilitated around these processes? Which territorial players are already involved, and which ones are left out? Is there a clear vision in terms of what the points of agreement are regarding the transition? What are the main disagreements?

**BOX 10** Euskadi 2040

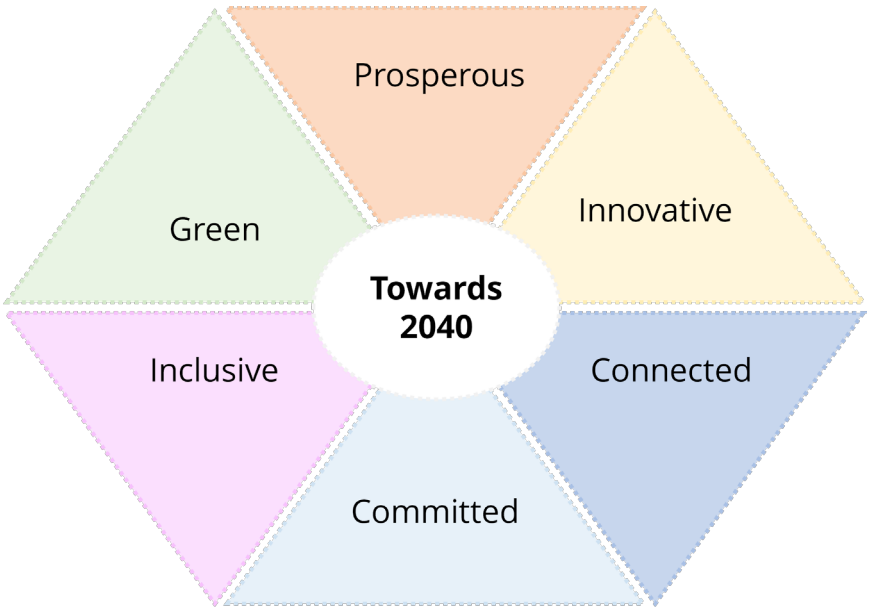
'Competitiveness for the Wellbeing of the Basque Country 2040' is a transformative research project led by Basque Presidency and the Basque Department of Economic Development, Sustainability, and Environment (DDESMA), with the collaboration of Orkestra as a research partner. The aim of the project is to agree on a shared vision and identify the competitiveness challenges for the next generation in the Basque Country. The three provincial councils, the three city councils of the capital cities, and EUDEL have also participated in the project, as well as four groups of local players (companies and company representatives, trade unions, third sector entities, and groups of vocational training and university students). Moreover, the project has been discussed with a range of international players with experience or knowledge in processes of this type.

The vision resulting from the participatory process contains six dimensions (see Figure 3-5), among which are a 'Prosperous Basque Country' (with unemployment below 6 % and among the top 10 % of European regions with the highest income per inhabitant), an 'Innovative Basque Country' (a leader in innovation according to the Regional Innovation Scoreboard), and a 'Green Basque Country' (carbon neutral in 2040). An essential characteristic of the vision is its systemic nature as a tool not to look at each dimension in isolation but to understand the potential positive or conflicting impacts that action in one dimension may have on the rest of the dimensions.[68]

'Competitiveness for the Wellbeing of the Basque Country 2040' is a transformative research project with the aim of agreeing on a shared vision and identifying the competitiveness challenges of the next generation of Basques

[68] For more information on the Euskadi 2040 vision and its underlying process, see Izulain *et al*. (2023).

**FIGURE 3-5** The six dimensions of the Euskadi 2040 vision




*Source:* Izulain *et al.* (2023).

In one of the contrast sessions, one of the participating institutional representatives put the following dilemma on the table: what if leadership in the environmental field and advancing the decarbonisation process to other fields affects us in terms of loss of competitiveness and prosperity? Another participant shared that the key to compatibility between both dimensions is the direction of new technologies towards sustainability. That level of honing in on positions and dialogue between the different participants allowed us to reach a collective opinion that highlighted the importance of the systemic nature of the Euskadi 2040 Vision. The question lies in understanding the positive and negative impacts of each of the dimensions on the rest of the dimensions; for example, looking for innovative potential to strengthen the green and prosperous Basque Country dimension while mitigating the adverse effects that could be brought on for other dimensions.

### *3.6.4. Conflict management*

Conflict emerges as something natural in processes that involve many players, interests, and positions, and conflict management requires that differences be made explicit through dialogue

Conflict emerges as something natural in processes that involve many players, interests, and positions. Spaces of collaborative governance to address environmental sustainability are no exception. In this case, it is to be expected that there exists shared motivation on the part of the players involved. However, as progress is made towards the specific definition of means and actions to be carried out, conflicts and/or consensuses may arise.

When managing conflict in collaborative governance processes, making differences known through spaces for dialogue is necessary in order to build consensus, as illustrated in the case analysed in Box 11. However, the conditions for this to be done effectively are not always met. The people who facilitate these processes must assess the situation and work on bringing about the conditions needed to subsequently manage the transition towards agreements for action. Bilateral dialogues and informal spaces that can be created and linked to more formal spaces of collaborative governance can be key in conflict management.

## BOX 11 The Gipuzkoa Territorial Development Laboratory

The Territorial Development Laboratory put into place by the Provincial Council of Gipuzkoa and through which it collaborates with the regional development agencies of the territory provides an example of long-term collaborative governance. Orkestra has participated in facilitating the process since the beginning, accompanying in the reflection, decision making, and actions of the participating organisations. This is governance focused on the modernisation of SMEs which has addressed the issue of energy in the past and can, in the future, tackle new environmental sustainability agendas.

The Territorial Development Laboratory put into place by the Provincial Council of Gipuzkoa provides an example of long-term collaborative governance

In period between 2013 and 2015, one of the officials of the Provincial Council raised the problem in the following way: 'the Provincial Council does not reach small businesses, and small businesses do not reach the Provincial Council.' It was thought that collaboration with regional agencies could allow for SME access and it was decided to establish collaborative governance between the Provincial Council and said regional agencies.

In the case of the Laboratory, two spaces for dialogue were created. The first space, the interregional table, is where the highest political and technical officials from the Provincial Council meet with the regional development agencies to negotiate and agree on the objectives to be achieved in collaboration. The second space is made up of the facilitator tables, where representatives (especially technicians) from all the organisations collaborate to put the established objectives into practice. From 2013 to 2015, the Laboratory promoted the creation of regional tables to face the challenges linked to energy. Afterwards, it has focused more on areas such as Industry 4.0 and digitalisation, areas which are also relevant to the sustainability transition.

The Provincial Council started the Laboratory in 2009, the agencies joined in 2013, and in 2017 it was decided to institutionalise this relationship —a relationship that, until then, had been experimental. This transformation involved a process of building a shared vision in which different interpretations emerged from the Provincial Council and the agencies about the role of each organisation in terms of how to address economic promotion. It was necessary to explicitly work to recover relationships of trust and mutual acknowledgement of roles in the territory. In short, a conflict that had once been tacit became explicit through facilitation. All of this work made it possible to formalise an agreement in 2017 that established a new collaborative governance model between the Provincial Council and the agencies. This initial four-year agreement was re-signed in its updated version in 2021.

The investment made in the establishment of governance can now be translated into a greater ability to face the challenge of sustainability, which will require adding new territorial players, redefining roles, strengthening new relationships of trust, and determining new shared visions and agendas.

# Conclusions

Climate change and its environmental, social, and economic consequences pose a major challenge, undoubtedly one of the most complex faced by humankind

Climate change and its environmental, social and economic consequences present us as a society with a major challenge, undoubtedly one of the most complex faced by humankind. The process of reducing greenhouse gas emissions to zero net emissions must be carried out as quickly as possible in order to limit the increase in the average temperature of the planet and to ensure that the impacts are manageable and the costs are bearable. The so-called sustainability transition also involves the rational and responsible use of natural resources to ensure that future generations are not limited in their ability to achieve the highest possible level of well-being.

The process of transforming economies to meet the climate and environmental challenge is extremely complex, for several reasons:

- It is a global process, since emissions affect all countries and regions of the world, regardless of where they occur.
- It is a process that implies huge financing needs in the short and medium term.
- It has economic and social implications that affect the entire value chain of the economy (production, distribution and consumption activities) and, therefore, all sectors, activities and actors (public institutions, companies, citizens, etc.).
- It is not only a matter of mitigating climate change, but also of strengthening adaptation and resilience to the impacts of climate disruption, which will mainly affect the most disadvantaged countries and regions and the most vulnerable people.
- It is taking place in a complex global economic and geopolitical context, where the post-pandemic recovery of the global economy has been hampered by successive crises and an increasingly complex geopolitical situation.
- It will have to be carried out hand-in-hand and in parallel with other ongoing and far-reaching transitions, such as the digital transition or the demographic transition.

We are facing a multidimensional, global, and comprehensive problem that requires urgent changes and for which there is no single path to success

In short, we are facing a multidimensional, global and comprehensive problem that requires urgent changes and for which there is no single recipe to solve the different challenges faced by each society and each economy.

In this Competitiveness Report we have applied Orkestra's territorial competitiveness for wellbeing framework to:

- Identify the current results of competitiveness and wellbeing in the Basque Country, as a starting point to advance in the sustainability transition in the coming years (Chapter 1).
- Understand the relationship between 'sustainability transition' and 'competitiveness for wellbeing' and how both concepts can be made compatible and their synergies reinforced (Chapter 2).
- Explore key aspects of the six dynamic levers of competitiveness and wellbeing in the Basque Country (natural capital, knowledge, human capital, physical capital, financing, and social and institutional capital) to advance in the sustainability transition (Chapter 3).

## Current competitiveness and wellbeing in the Basque Country

Recent Orkestra Competitiveness Reports have highlighted that the Basque Country has solid competitiveness foundations that have generated positive results in terms of the economy, business and wellbeing, also in comparison with other territories, and are well consolidated. In 2023 the overarching message is similar. Nevertheless, there are some areas to which we must pay attention.

This Report describes a scenario similar to that of previous reports regarding the economic-business and wellbeing results of the Basque Country: generally positive and well consolidated, with some areas where attention is needed

In the four dimensions of economic and business performance analysed, the following results stand out:

- **Economic performance:** The recovery from the sharp decline in GDP per capita in 2020 is still on track in all economies. The Basque Country has grown slightly more than the EU-27 average in 2022, reaching a GDP per capita level of 109.5 % of the EU-27 value (still below the average of 115 % in the 2013-2019 period). Productivity also continued to recover in 2022, with the Basque Country outperforming Spain and the EU-27 average, and slightly narrowing the gap with Germany. In the manufacturing sector, however, the level of productivity is quite similar to that of the EU-27.
- **Business profitability:** All indicators of corporate profitability have improved. On the one hand, unit labor costs in the Basque Country decreased in 2021 to be lower than those of Germany, Spain and the EU-27 for the economy as a whole, and equal to those of Germany (and higher than those of Spain and the EU-27) in the manufacturing sector. On the other hand, the gross operating surplus has increased in the Basque Country between 2020 and 2022, with a higher share of capital income compared to the EU-27 average. Finally, both ROA and ROE increased in 2022.
- **Innovation and entrepreneurship:** The good health of the Basque innovation system as a whole is reflected in an improved ranking in the Regional Innovation Scoreboard, where the Basque Country is classified as a strong innovator and a pole of excellence. However, the challenge of innovation in SMEs remains, since despite a slight increase in the percentage of SMEs with innovative activity, this figure remains below the pre-pandemic level and the gap with the EU-27 and Germany is considerable, especially in process innovation related to or-

ganisational innovation. With regard to the sustainability transition, the fact that 80 % of the enterprises with innovative activity in the Basque Country obtained environmental benefits from innovation underlines the crucial importance of innovation in the transition towards sustainable competitiveness. On the other hand, the rate of entrepreneurial activity in the Basque Country has been relatively stable in recent years and is slightly below that of Spain and well below that of Germany. All in all, the results point to the need for continued efforts to strengthen the culture of innovation in SMEs and the entrepreneurial spirit in society in general.

- **Internationalisation:** Exports from the Basque Country increased in 2022, largely due to the good performance of exports of energy products. However, the increase in energy prices has also had an impact on imports, which have increased to a greater extent, causing the positive international trade balance to shrink. Moreover, if exchanges with the rest of the State are taken into account, it is observed that, despite the increase in sales to other autonomous communities, the total balance for goods and services is in deficit and that deficit increased in 2022.

In the seven dimensions of wellbeing analysed, the following results stand out:

- **Life satisfaction:** Life satisfaction fell across the board in the first year of the pandemic, with no major differences in the level of satisfaction between men and women.
- **Material life:** The average disposable income of Basque households remains well above the European and Spanish averages but has deteriorated to a greater extent than in other territories in the context of the pandemic. In addition, the level of inequality has increased slightly, as has energy poverty (although to a lesser extent than in Spain). The proportion of people at risk of poverty or exclusion has slightly decreased in 2022 and remains one of the lowest among the territories considered.
- **Employment**: Following the rise in unemployment due to the crisis that began with the pandemic, unemployment fell in 2022 to below the 2019 level. Job satisfaction has remained stable in recent years and the gender wage gap continues its downward trend.
- **Social life:** Satisfaction with leisure time has increased in recent years, but trust in people fell in the first year of the pandemic, although the level of trust in the Basque Country remains higher than in other regions. The rate of property crime, a measure of personal security, is similar in the Basque Country and Spain and lower than in the other areas studied.
- **Learning:** The evolution of learning indicators has been positive, with a continued reduction of the gap with other European territories in terms of the population with higher-than-compulsory education and the Basque Country consolidating its position as the territory with the best levels of lifelong learning among those analysed.
- **Health:** In terms of health outcomes, the Basque Country is very well positioned, ahead of the other territories in both the objective measure of life expectancy and the subjective measure of self-perceived health status. It is also one of the territories analysed with the fewest premature deaths due to air pollution.

- **Environment:** The levels of GHG emissions and air pollutants are improving, but at the local level GHG emissions are still far from reaching international targets, and the Basque Country's consumption-related emissions (carbon footprint) have hardly been reduced between 2018 and 2020. On the other hand, although the recycling rate is higher than that of Spain, there is still a long way to go in terms of circularity and waste reuse.

## The relationship between competitiveness and environmental sustainability

The challenges that the Basque economy will face in the process of sustainability transition are multiple and will generate dilemmas and trade-offs to which the different institutions and public entities, companies and other private entities and the public will have to respond. These dilemmas range from the allocation and prioritisation of available resources between different purposes to the acceptance that in the process of change there will be winners and losers (and therefore measures needed to compensate the losers) or that some strategies, policies and measures will generate a certain degree of social rejection.

The challenges that the Basque economy will face in the process of sustainability transition are multiple and will generate trade-offs to which public entities, companies, and citizens will have to respond

In any case, to guarantee an effective and efficient transformation process (with the minimum socio-economic cost) and to materialise the multiple opportunities expected, the policies, strategies, action plans and regulatory and normative frameworks applied in the Basque Country must be stable and adapted, as far as possible, to the Basque economic reality. In this sense, the Basque Government is proposing a sustainability transition strategy based on consolidating and increasing the strong technological and industrial capacities generated in the Basque Country over the years and on policies and action plans for technological and industrial development, innovation and the energy transition that aim to: (i) respond to global challenges; and (ii) create a local supply of clean technologies, services and innovative solutions that support the decarbonisation of industrial sectors and the Basque economy as a whole.

In fact, one of the main conclusions of this report is that the success of the sustainability transition in the Basque Country will depend crucially on the capacity to advance in changes, transformations and adaptations that simultaneously allow Basque companies to compete in international markets, increase the attractiveness of the territory and generate positive economic, business and wellbeing outcomes. The concepts of 'environmentally sustainable transition' and 'competitiveness for wellbeing' are therefore inseparable. Aligning the drivers of competitiveness with sustainability transition has implications for businesses and for the territory:

- **Firms**: Increase the use of renewable energies, adapt processes to increase energy efficiency and efficiency in the use of materials and other resources, increase circularity, and diversify and innovate in value propositions that put environmental sustainability at the centre (i.e. goods and services with a small environmental footprint). In this context, SMEs may need special support to drive the necessary changes.

- **Territory**: Create the right conditions for a sustainability transition that balances the environmental, economic and social dimensions. This means, on the one hand,

advancing the energy transition and decarbonisation in accordance with the specific strategies and roadmaps established, based on pillars on which there is consensus to promote a change in the energy mix in the medium term (horizon 2030). On the other hand, it means promoting innovation ecosystems, skills, sustainable finance, etc., that favour the deployment and adoption of clean technologies (respecting the principle of technological neutrality, based on a level playing field and even tax treatment that guarantees and strengthens the competitiveness of industry), digitalisation and the transformation of the economy in an environmentally sustainable way. It also means helping citizens to develop a sophisticated vision and demand that contributes to the consolidation of markets for environmentally sustainable goods and services.

Taken together, all this means finding a (complicated) balance in terms of: (i) the actors involved; (ii) the issues addressed in strategies, policies and action plans; (iii) the territorial levels involved; and (iv) a pace of transformation that combines short-term and long-term changes, incremental and structural reforms, and more rapid and gradual transitions.

Orkestra's framework identifies six dynamic levers on which different actors in the territory can act

Orkestra's framework for analysing competitiveness for wellbeing identifies six dynamic levers through which different actors in the territory can act to positively influence competitiveness and wellbeing outcomes, promote structural change in the medium to long term, and achieve an economy and society with a low or zero environmental footprint. Each of these levers could be analysed in separate reports due to their complexity and the multiple dimensions that characterize them. In this report we have focused analysis on some of the most important dimensions in the context of a sustainability transition.

## Leveraging natural capital

Natural resources are not only inputs to the economy, but they also bring about competitive advantages and areas of opportunity

Despite the fact that the Basque Country has limited natural resources and an environmental legacy inherited from the past, the natural capital available can contribute to improving the sustainable competitiveness of the territory and its companies through: (i) reducing dependence on external resources (whether energy, biotic, mineral or water); (ii) creating business activities related to environmental sustainability; and (iii) developing an industry based on renewable organic materials and nature-based solutions. In other words, natural resources are not only *inputs* to the economy, but also generate competitive advantages and areas of opportunity.

During the last decades, the Basque Country has advanced on different fronts by implementing regulations and tools related to clean energies and technologies, environmental protection and biodiversity, soil recovery and the circular economy, among others. The remaining challenges are numerous and include:

- Increasing renewable energy resources (and the necessary financing).
- Showcasing the value of available natural resources.
- Achieving a stable and sustainable supply of raw materials in general, and critical raw materials in particular, by moving towards a system where circularity prevails.
- Having legislation that supports the processes of separation, classification, reuse and disposal of all waste.

- Achieving proper management of water resources, which will also have a positive impact on biodiversity.
- Progressing in the reduction of air pollutant emissions and restoring soil and water quality.
- Developing tools and technologies for monitoring, forecasting and data analysis to manage resource and waste flows.

## Leveraging physical capital

The Basque Country has a series of infrastructures in the fields of energy, transport, communications, etc., which provide an adequate basis for promoting sustainability transition in the coming years. The physical capital of the Basque economy will enable processes such as the promotion of renewable electricity and other decentralised energy resources, the electrification of the economy, the diffusion of new types of renewable energy and energy technologies, the implementation of sustainable mobility models, the digital transformation of the different sectors, or progress in the circularity of the economy.

Nevertheless, the Basque economy faces infrastructure-related challenges that must be overcome to ensure the success of the sustainability transition and avoid bottlenecks that jeopardize the materialisation of the business and technological opportunities that this profound transformation brings. These challenges, which are accompanied by numerous opportunities (including the consolidation of technological and industrial capabilities around the development of these infrastructures), can be summarized as follows:

The Basque economy faces infrastructure-related challenges that must be overcome to ensure the success of the sustainable transition

- Ensuring social support and acceptance of the necessary energy, transport and communication infrastructures.
- Strengthening and updating holistic and integrated infrastructure planning.
- Promoting the complementarity of the different energy sectors in order to increase efficiency and realize synergies between them.
- Increasing the resilience of critical infrastructure in the Basque Country to disruptive climate events.
- Facilitating the financing of infrastructure investments.

## Leveraging finance

The financing lever is an integral part of the sustainability transition, not just a resource for it. Therefore, it is important to have a financial ecosystem composed of all relevant actors that facilitates the orientation of financial resources towards the challenges of sustainability transition, overcoming barriers such as lack of information and knowledge, governance difficulties or alignment of interests.

It is important to have a financial ecosystem made up of all the relevant players and which facilitates the channelling of financial resources towards the challenges of sustainability transition

The Basque Government, in the exercise of its powers and through several agencies (SPRI, Basque Circular Hub, Ihobe, EVE, Basque Ecodesign Center and others) and actions (issuing green bonds, acting as a risk taker), the Provincial Coun-

cils and the Municipalities must overcome the various obstacles and generate a leverage effect of public capital in the financing of the sustainability transition. This leadership role of public institutions must be complemented by actions to strengthen sustainable financial flows in the private sector. Thus, there are opportunities related to the development of a financial ecosystem specialized in the sustainability transition of industrial areas, which allows the development of innovative solutions and instruments and becomes a competitive advantage for the territory.

In this sense, the current initiative to promote a financial and investment cluster in the Basque Country is a key opportunity to increase the collective capacity for innovation and knowledge, which can be channeled towards the development of new financial instruments aimed at sustainable projects and infrastructures. In addition, a stronger local ecosystem in the field of sustainable finance will allow the Basque industrial fabric to compete more advantageously for European Next Generation funds or other external financial flows.

Therefore, the main challenge in terms of green finance for the Basque Country is to strengthen and guide the financial ecosystem in order to increase its capacity to:

- Generate financial flows in the territory that give continuity to the ambitious energy-environment policy and facilitate the decarbonisation and diversification initiatives of Basque companies.
- Maintain the pace of investment in infrastructure and R&D.
- Provide incentives for the business fabric to advance in the transformation of its production processes.

## Leveraging knowledge

The Basque Country has a base of institutions, policies, and knowledge with great potential to effectively advance in the sustainable transition

The Basque Country has a base of institutions, policies and knowledge with great potential to effectively advance in the sustainability transition. This is supported by analysis of different indicators related to R&D expenditure and funding, scientific excellence and sustainability-related patent performance.

With respect to inputs, the positive evolution of business R&D spending on production, distribution and rational use of energy and environmental control and protection is noteworthy. This evolution is also reflected in the upward trend in the financing of R&D programmes such as Elkartek and Hazitek Estratégico in the priority area of energy, and in the high and growing proportion of European funds with a green orientation won by actors in the Basque Country. All this leads to a greater allocation of resources to R&D activities related to sustainable technologies, processes and goods, highlighting the variety of innovative solutions (which are transferred to the business fabric) in the field of eco-design, the circular economy, the development of new materials or the implementation of new clean technologies, often in collaboration with RVCTI agents.

The intermediate fruits of these investments are evident in the analysis of patent data and scientific publications. Although the Basque Country generally performs

worse in patents than the EU-27 average, a greater (and growing) specialisation in clean technologies or technologies relevant to the green transition can be observed, particularly in areas such as energy, building efficiency, water and waste, technologies for the production and processing of goods, and oceans. The results in terms of scientific excellence also show a concentration of high-quality research results in areas related to sustainability transition.

In the coming years it will be important to reinforce the directionality of policies and the efforts of the RVCTI (as shown, for example, by the strategic orientation of the BRTA), channelling them towards knowledge, technologies and collaboration mechanisms that lead to tangible sustainability and competitiveness results. The main challenges are to:

- Consolidate a good positioning in knowledge related to sustainability, which will be a critical lever to take advantage of the opportunities of the transition.
- Strengthen knowledge transfer mechanisms to ensure that the intermediate results of patents and publications are translated into applications and innovations in Basque companies and society that simultaneously enable progress in competitiveness and sustainability.

## Leveraging human capital

The transition to environmental sustainability involves the creation of new jobs, as well as the redefinition and replacement of others. In order to achieve this, skills must be available to enable the proper performance of processes in 'green jobs'. We have estimated that 9.2 % of the employed population in the Basque Country had occupations with high green potential in 2022. The majority were people with an engineering background (4.1 %). The analysis also concluded that there are 26 occupations categorised as having a high green potential, mostly associated with the category of technicians and scientific and intellectual professionals. Training professionals in the Basque Country in the field of these occupations will be essential to ensure the competitiveness of the territory and its companies in the sustainability transition.

The transition towards environmental sustainability involves the creation of new jobs and redefinition and replacement of others, for which the promotion of the green skills needed in new 'green jobs' is critical

While many of the sustainability skills can be acquired through on-the-job training and other education system initiatives, others can be acquired through the formal education system. In this sense, university degrees in mechanical and civil engineering and in biology are among the courses that currently graduate a greater number of people who end up in occupations with high green potential. Vocational training includes qualifications in occupational risk prevention and analysis and quality control, among others.

The main challenge for the Basque Country today is twofold:

- Make efforts to match the green skills of the population with the demand for jobs that require them. This means promoting the development of green competencies and skills among the population, through the identified key qualifications, but also through training modules and others, moving towards a skills-based approach.

- Ensure that there are mechanisms for the continuous training of people employed in sectors and value chains negatively affected by the sustainability transition, in order to recycle their skills and abilities.

## Leveraging social and institutional capital

Without underestimating the critical importance of effective, efficient, transparent and stable institutions and regulatory frameworks, this report has focused on one specific aspect of the multiple dimensions covered by this concept. The role of collaborative governance has been analysed as a specific mechanism for finding solutions to the complex problems of sustainability transition, which affect different actors in different ways.

The Basque Country has deep knowledge and experience in collaboration between players, which constitutes an asset for the collaborative governance necessary to reach solutions to the problems related with sustainability transition

The Basque Country has a wide range of knowledge and experience of collaboration between very different actors (e.g. public and private institutions, companies in the same or different sectors, technological and knowledge actors, etc.) in areas such as cluster development, strategic infrastructure or R&D and innovation projects. Collaborative governance is an approach to governance that is being implemented in an innovative way in the Basque Country in a variety of contexts and that can make a decisive contribution to solving some of the main climate and environmental challenges.

The main challenge for the Basque Country in the field of inter-agent collaboration is how to continue developing and facilitating mechanisms, tools and processes to achieve solutions or approaches to specific problems related to sustainability transition that ensure greater support (or less resistance) from actors with very different interests and needs. There are several experimental collaborative initiatives between actors in the field of sustainability transition in the Basque Country that allow us to discover and understand the leading role that collaborative governance processes can play in the future. During the last decade Orkestra has collaborated in several action research projects with different agents of the territory, which show the importance of:

- Defining the problem and designing spaces to address it.
- Defining roles based on reciprocity and trust.
- Constructing shared visions and agendas for action.
- Managing the conflicts generated by non-aligned positions, interests or visions.

## Concluding thoughts

The analysis of this report points to six general recommendations

The analysis carried out in this report shows the enormous complexity of the process of sustainability transition and the multiple dimensions of the challenge of integrally transforming the entire Basque economy, in the context of a competitive global economy that is itself in a process of profound change. In addition to the specific conclusions presented above, our analysis suggests the consideration of six general recommendations:

1. **Implement an intelligent sustainability transition process based on a clear, shared and long-term strategic vision.** This implies making decisive

progress in decarbonisation, based on energy and technology pillars on which there is consensus, and establishing roadmaps that are ambitious but at the same time pragmatic and coherent with the Basque business and economic reality. This is achieved, for example, by moving forward in the short term in areas where emissions can be reduced without jeopardizing economic activity or creating new opportunities that do not compromise economic and social wellbeing, while simultaneously promoting profound transformations in sectors that still depend on fossil fuels. It will be important to use existing technological and industrial capabilities to develop new capacities, clean technologies and an innovative and competitive business fabric in areas such as decarbonisation or advanced environmental services. It will also be important to promote legal and regulatory frameworks for a sustainability transition that are simple, stable and transparent. These need to be smart, result-oriented, but with the flexibility and agility necessary for our companies to compete with companies in other parts of the world (e.g. China or the US).

2. **Focus R&D and innovation policies on achieving results that imply greater environmental sustainability, seeking synergies with economic competitiveness and advances in wellbeing**. Knowledge and innovation are key resources in identifying and taking advantage of the opportunities that sustainability transition opens up in multiple economic sectors and areas of life. Both policy experimentation, e.g. through pilot experiences, and policy learning, e.g. through the development of sophisticated evaluation mechanisms and processes to ensure the most effective use of available resources, will be important during the transition.

3. **Strengthen cross-cutting areas that facilitate a better alignment of the drivers of competitiveness and wellbeing with environmental sustainability**. Four key cross-cutting areas stand out:

   - The **ecosystem of innovation and knowledge generation and transfer** in the field of sustainability and especially in areas that are critical for the Basque economy (e.g. critical materials for industry).
   - The **skills, training and talent ecosystem**, which must increase its responsiveness in order to dynamically match the human capital of the territory with the skills required for the sustainability transition and demanded by businesses.
   - The **finance ecosystem**, critical to ensure the most appropriate tools and mechanisms for financing investments in infrastructure, projects and sustainable activities.
   - **Intermediary organisations**, such as Local Development Agencies and Cluster Development Organisations, have a key role to play, especially in supporting SMEs in addressing technological, process, regulatory and market changes so that they can take advantage of the opportunities of the transition and increase their competitiveness.

4. **Reinforce the central role of Basque citizens in the process of sustainability transition**. On the one hand, through greater knowledge and empowerment to make informed decisions about consumption, investment and participation in different initiatives (e.g. energy communities, self-consumption systems, etc.). On the other hand, through greater social support for sustainability transition and

greater understanding, awareness and acceptance of its implications. This implies not only increasing available information and education, but also designing and implementing systems and mechanisms to compensate and protect the most vulnerable segments of society.

5. **Continue to innovate in cooperation and collaborative governance schemes.** We must value the knowledge and experience accumulated in recent decades in the Basque Country on how to build shared visions and agendas among different actors in a collaborative manner, and how to manage the inevitable conflicts due to different visions and interests. In this regard, it will be important to incorporate collaborative governance mechanisms based on co-responsibility and reciprocity among agents in the future Basque Law on Energy Transition and Climate Change and the associated Roadmap.

6. **Consolidate a leading role in the global sustainability transition**. The Basque Country must continue to play a leading role in international initiatives in energy, technological innovation, sustainable industry and other areas where it can lead the way towards solutions for the reduction of the environmental footprint of economies across the planet and the implementation of the Sustainable Development Goals (SDGs) (e.g., the location in Bilbao of the permanent headquarters of the Secretariat of the United Nations Local Coalition 2030). One way to combine competitiveness and sustainability is the export (also to countries of the Global South) of knowledge, technologies and solutions based on digitalisation and clean technologies, through the leadership of Basque companies in international markets.

Despite the complexity of the process, there is great potential in the Basque Country to promote, coordinate and align the drivers of competitiveness with environmental sustainability to achieve desired economic, environmental, and social results

In conclusion, the main message of this report is that, despite the complexity of the process, there is great potential in the Basque Country to promote, coordinate and align the drivers of territorial and business competitiveness with environmental sustainability in order to achieve the desired economic, environmental and social results. It is essential to continue generating economic value and wellbeing through greater specialisation in sustainable technologies and activities, and a greater capacity for innovation in sustainability that places Basque companies and the Basque Country at the forefront of the sustainability transition.

But this cannot be done without taking decisions now. The sustainability transition has its risks and will involve costs and sacrifices, as well as facing dilemmas and unpopular or uncomfortable choices. However, advancing the transition with a clear and well-considered vision and strategy will make it possible to realize economic, industrial and entrepreneurial opportunities linked to the changes underway, which will have a net positive effect on the wellbeing of Basque citizens in the medium and long term.

# Bibliographic references


Aclima. (2023). Strategic Plan 2023-2026. 1743366.pdf (zone-secure.net)

AIE. (2020). World Energy Investment 2020, International Energy Agency, Paris, https://dx.doi.org/10.1787/6f552938-en

AIE. (2023). Critical Minerals Market Review 2023.

Álvaro Hermana, R. (2022). Energy efficiency and renewable energies in the residential and commercial sectors. Cuadernos Orkestra. Orkestra.

Basque Government (2016). Biodiversity Strategy of the Basque Country 2030 and First Action Plan 2020. Vitoria-Gasteiz.

Basque Government (2018). Basque Country 2030 Agenda: Basque contribution to the 2030 Agenda for Sustainable Development.

Basque Government (2019). Basque Country Circular Economy Strategy 2030).

Basque Government (2021a). 2030 Basque Agenda 2030 Priorities Program: Action Plan 2021-2024.

Basque Government (2021b). Circular Economy and Bioeconomy Plan 2024.

Basque Government (2021c). Basque Government Sustainable Finance Framework. March. Vitoria-Gasteiz.

Basque Government (2022a). Basque Country Land Protection Strategy 2030. Central Publications Service of the Basque Government (Ed.). Vitoria-Gasteiz.

Basque Government (2022b). Basque Alliance for the Bioeconomy.

Basque Government (2022c). Air pollutant emissions inventory (090226).

Basque Government (2023a). RIS3 Basque Country.

Basque Government (2023b). Preliminary draft of the Energy Transition and Climate Change Law. Vitoria.

Basque Government (2023c). Environmental Framework Programme

Basque Government (2023d). Transitioning Industrial Clusters towards Net Zero. Net-Zero Basque Industrial Super Cluster.

Basque Government (2023e). Territorial Plan for the renewable energy sector in the Basque Country. Document for initial approval. Document I - Report.

Basque Government (2023f). The European Commission selects the design of the Zorrotzaurre peninsula as an example of adaptation to climate change.

Basque Government (2023g). Basque Country Sustainability Bond – Investors Presentation 2023 – Ministry of Economy & Finance.

Basque Government (2023h). The European Commission recognizes Ihobe's eco-innovation guide and circular products catalog as examples to follow.

Basque Government and Ihobe. (2021). Diagnosis of the state of the marine environment of the Basque Country 2021. Bilbao.

Basque trade & Investment, Spri Group, Basque Government and Aclima. (2022). Study of the environmental sector in the Basque Country and its internationalization potential. July. Bilbao.

Basque Water Agency. (2020). Update of the study of water demand in the Basque Autonomous Community 2020. November URA.

Bellinson, R., McPherson, M., Wainwright, D. and Kattel, R. (2021). Practice-based learning in cities for climate action: A case study of mission-oriented innovation in Greater Manchester. UCL Institute for Innovation and Public Purpose, IIPP policy report (IIPP PR 21-03).

Berg, T., Carletti, E., Claessens, S., Krahnen, J. P., Monasterolo, I., and Pagano, M. (2023). Climate regulation and financial risk: The challenge of policy uncertainty. CEPR VOXEU Column 10/05/2023.

Bhatnagar, S. and Sharma, D. (2022). Evolution of green finance and its enablers: A bibliometric analysis. Renewable and Sustainable Energy Reviews, 162, 112405.

BNEF. (2023). Global Low-Carbon Energy Technology Investment Surges Past $1 Trillion for the First Time.

Caradonna, J. L. (2014). Sustainability: A History. Oxford University Press, New York. ISBN 978-0199372409. https://doi.org/10.1111/cag.12300

Cardenas Rubio, J., Warhurst, C. and Anderson, P. (2022). Green Jobs in Scotland: An inclusive approach to definition, measurement and analysis, Warwick Institute for Employment Research, University of Warwick. Coventry.

Claessens, S., Tarashev, N., and Borio, C. (2022). Finance and climate change risk: Managing expectations. VoxEU. org, 7.

European Commission. (2017). Methodology for establishing the EU list of critical raw materials. guidelines. Luxemburg ISBN 978-92-79-70212-9 doi:10.2873/040300.

European Commission. (2018). Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Progress in the implementation of the EU Forestry Strategy. "A new EU strategy for forests and forestry". COM(2018) 811 final. Brussels.

European Commission. (2019). Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions. "The European Green Deal". COM(2019) 640 final. Brussels.

European Commission. (2020a). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. EU Biodiversity Strategy to 2030. Reintegrate nature into our lives. COM(2020)380 final. Brussels.

European Commission. (2020b): Eco-innovation towards a circular economy in the Basque Country. Smart Specialisation Platform.

European Commission. (2022a). Just transition mechanism. Performance. Programme in a nutshell. Budget for 2021-2027.

European Commission. (2022b). Proposal for a Regulation of the European Parliament and of the Council on nature restoration. COM(2022) 304 final, 2022/0195 (COD). Brussels.

European Commission. (2022c). Green Skills and Knowledge Concepts: Labelling the ESCO classification. Technical Report.

European Commission. (2023a). A European Green Deal. Striving to be the first climate-neutral continent.

European Commission. (2023b): Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions. Towards a more resilient, competitive, and sustainable Europe. COM(2023) 558 final. Brussels.

European Commission (2023c). EU Voluntary Review on progress in the implementation of the 2030 Agenda for Sustainable Development. DOI: 10.2792/343208

European Commission. (2023d): Renewable energy targets.

European Commission. (2023e). Proposal for a Regulation of the European Parliament and of the Council establishing a framework to ensure the secure and sustainable supply of key raw materials and amending Regulations (EU) 168/2013, (EU) 2018/858, (EU) 2018/1724 and (EU) 2019/1020. COM(2023) 160 final 2023/0079 (COD). Brussels.

European Commission, Directorate General for Research and Innovation, Hollanders, H., Es-Sadki, N. (2023). Regional Innovation Scoreboard. Publications Office of the European Union.

European Council and Council of the European Union. (2023a). Fit for 55

European Council and Council of the European Union. (2023b). Chronology - European Green Deal and "Fit for 55".

Costa, A., J. García, X. López and Raymond, J.L. (2015). Estimació de les paritats de poder adquisitiu per a les comunitats autònomes espanyoles, Monografia No. 17, Departament d'Economia i Coneixement, Generalitat de Catalunya.

CPRM-Atlantic Arc Commission. (2023). About us.

Deia. (2022). The Basque Country has 40 energy communities in which a hundred municipalities are involved.

Direzione Studi and Ricerche. (2023). La vocazione Green delle professioni. A Green Rating index based on ESCO classification, Working Paper Series, N.1/2023.

EEA. (2020). State of nature in the EU. Results from reporting under the nature directives 2013-2018. EEA 10/2020. ISSN 1725-9177. DOI: 10.2800/705440

EEA. (2022). Premature deaths due to exposure to fine particulate matter in Europe (8th EAP).

Environment Bank. (2022). What is a habitat bank?

Eseficiencia. (2022). The Basque Government is promoting a campaign for the energy rehabilitation of housing.

European Parliament. (2019). The European Parliament declares a climate emergency.

European Parliament. (2020). European Green Deal. European Parliament resolution of January 15, 2020 on the European Green Deal (2019/2956(RSP)). Strasbourg.

European Parliament and Council of the European Union. (2021). Regulation (EU) 2021/1119 of the European Parliament and of the Council of June 30, 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ("European Climate Legislation").

Eurostat. (2023a). Material flow accounts [ENV_AC_MFA__custom_7647766]. Databrowser.

Eurostat. (2023b). Air pollutants by source sector (source: EEA). Databrowser.

Eustat (Basque Statistics Office). (2019). Area of land potentially contaminated and reclaimed for new uses. Basque Autonomous Community hectares.

Eustat (Basque Statistics Office). (2020a). People aged 16 and over in the Basque Country in favor of environmental measures according to socio-demographic characteristics (%). 2020.

Eustat (Basque Statistics Office). (2020b). People aged 16 and over in the Basque Country, by environmental opinions and attitudes, according to sex and age groups (%). Coefficients of variation. 2020.

Eustat (Basque Statistics Office). (2022a). Water consumption statistics.

Eustat (Basque Statistics Office). (2022b). Air Quality Statistics of the Basque Country. 2021.

Eustat (Basque Statistics Office). (2023a). Final energy consumption of the Basque Country by type of energy (Ktoe). 2000-2020

Eustat (Basque Statistics Office). (2023b). Summary of the material flow account of the Basque Country (Tm). 2005–2020.

EVE. (2022). Basque Energy 2021.

FAO. (2023). Ecosystem services and biodiversity.

Fernández Gómez, J. (2021). Energy efficiency in the industrial sector. Cuadernos Orkestra. Orkestra.

Fernández Gómez, J. and Larrea Basterra, M. (2021a). Opportunities of the European Green Deal for the Competitiveness of the Basque Country. Ihobe and Orkestra.

Fernández Gómez, J. and Larrea Basterra, M. (2021b). Fostering green financing at the subnational level. The case of the Basque Country. Ekonomiaz. Energy transition challenges in the Basque Country for the next decade. I-2021.

Fernández Gómez, J. and Larrea Basterra, M. (2022). Employment and green skills. Cuadernos Orkestra 01/2022.

Fernández Gómez, J. and Menéndez Sánchez, J. (2023). Development of the hydrogen system in the Basque Country in the medium term, Cuadernos Orkestra, 03/2023.

Froy, F., Heroy, S., Uyarra, E., and O'Clery, N. (2023). What drives the creation of green jobs, products and technologies in cities and regions? Insights from recent research on green industrial transitions. Local Economy, 37(7), 584-601. https://doi.org/10.1177/02690942231170135

Gartzia de Bikuña, B., Moso, M., Arrate, J. A., and Luján, S. (2008). Monograph on the Environment Aquatic in Bizkaia, 2008-2009. Unpublished report by Anbiotek SL, for REGIONAL PROVINCIAL COUNCIL OF BIZKAIA.94 pp. Erandio.

Geels, F. W. (2005). Technological transitions and system innovations: a co-evolutionary and socio-technical analysis. Edward Elgar Publishing. https://doi.org/10.4337/9781845424596

Hafner, S., Jones, A., Anger-Kraavi, A., and Pohl, J. (2020). Closing the green finance gap–A systems perspective. Environmental Innovation and Societal Transitions, 34, 26-60.

Hartwick, J. M. (1977). Intergenerational Equity and the Investment of Rents from Exhaustible Resources. American Economic Review, 67, 972–4.

Hazi. (2021). The Basque forest in figures 2021.

Ihobe. (2019). Ecological footprint of the Basque Country 2019.

Ihobe. (2020). Environmental profile of the Basque Country 2020. Contaminated soils.

Ihobe. (2021). Basque Green Deal, the Basque model for a fair and sustainable economic development.

Ihobe. (2022a). Circular economy indicators. Euskadi 2021. European monitoring framework.

Ihobe. (2022b). Ecoinnovation in the Basque Country. 105 industrial projects for new circular solutions. Bilbao: IHOBE, Public Environmental Management Company Legal Deposit: BI 01623-2022.

Ihobe. (2023). Strategic environmental monitoring report. The 10 keys in circular economy for 2024. Bilbao. July 2023.

Ihobe and Basque Government (2020). Climate resilience of the energy sector in the Basque Country. Klimatek Project 2017-2018. Bilbao.

IPCC. (2023). Climate change 2023. Synthesis Report. Summary for Policymakers.

Irigyen, L. (2023). The Basque Government ratifies its decision not to explore gas in the Basque Country, despite the energy costs. El Correo.

Izulain, A., Aranguren, M-J. and Wilson, J. R. (2023). Competitiveness for the welfare of the Basque Country 2040, Cuadernos Orkestra.

Kleimann, D., Poitiers, N., Sapir, A., Tagliapietra, S., Véron, N., Veugelers, R. and Zettelmeyer, J. (2023). How Europe should answer the US Inflation Reduction Act. Bruegel Policy Brief (23 February 2023).

La Moncloa. (2022). MITECO supports 45 energy community projects driven by more than 2,600 individuals, SMEs and local entities.

Larrea Basterra, M. y Álvaro Hermana, R. (2020). Circular Economy and Climate Change. Cuadernos Orkestra. Bilbao: Orkestra.

Larrea Basterra, M., Fernández Gómez, J., and Menéndez Sánchez, J. (2022). Hydrogen in the Autonomous Community of the Basque Country. Techno-industrial and environmental opportunities. Industrial Economics, 424, 59-73.

Lorenz Erice, U., Alkorta, M., Canto-Farachala, P., Oleaga, M. and Sisti, E. (2022). Benchmarking of foundations and their role in promoting sustainable development goals, Cuadernos Orkestra, 09/2022. Donostia-San Sebastián: Orkestra.

Martén Uliarte, I., and Fernández Gómez, J. (2022). The future of hydrogen as an energy carrier and sustainability. Madrid Association of Economists, 176, 77-83.

Mazzucato, M. (2018). Mission-oriented innovation policies: Challenges and opportunities. Industrial and Corporate Change, 27(5), 803-815.

Menon, R. (2021). What we need to do to make green finance work, Investing for Good Asia Digital Conference, Keynote speech, Financial Times, Singapore, 8th September.

Meyer, Y., Tobar, A., and Arrayago, M. J. (2019). Strategic environmental study for the revision of the Basque Autonomous Community land use planning guidelines. Ekos.

Meza, L. E. and Rodríguez, A. G. (2022). Solutions based on nature and the bioeconomy. Contribution to a sustainable and inclusive transformation of agriculture and post-COVID-19 recovery. ECLAC - Natural Resources and Development Series No. 210. United Nations: Santiago.

Mosquera López, S. and Fernández Gómez, J. (2023). Socialization of local renewable projects. Cuadernos Orkestra. Donostia-San Sebastián. Orkestra.

Muench, S., Stoermer, E., Jensen, K., Asikainen, T., Salvi, M. and Scapolo, F. (2022). Towards a green and digital future. Publications Office of the European Union. Luxemburg. https://doi.org/10.2760/977331

Naturklima. (2022). Gipuzkoa Climate Change Impact and Vulnerability Report 2022 - Critical Infrastructures.

Navarro, M. (2022). Well-being: delimitation and frameworks for its analysis. Orkestra Working Paper Series in Territorial Competitiveness, 2022-R01 (CAS). ISSN 1989-1288. Orkestra: Donostia-San Sebastián.

Neumayer, E. (2003). Weak Versus Strong Sustainability: Exploring the Limits of Two Opposing Paradigms. Fourth Edition. Cheltenham, R.U.: Edward Elgar Publishing. ISBN: 978 1 78100 707 5.

OECD. (2016). Fragmentation in Clear Energy Investment and Financing.

OECD. (2020). Managing environmental and energy transitions for regions and cities, OECD Publishing, Paris. https://doi.org/10.1787/f0c6621f-en

Orkestra. (2020). Basque Country Competitiveness Report 2020: Resilience before, during and after the pandemic. Orkestra-Basque Institute of Competitiveness. Deusto Foundation. Deusto University publications.

Orkestra. (2021). Basque Country Competitiveness Report 2021. Orkestra-Basque Institute of Competitiveness. Deusto Foundation. Deusto University publications.

Orkestra. (2022a). Basque Country Competitiveness Report 2022. The foundations of competitiveness in an era of uncertainty. Orkestra-Basque Institute of Competitiveness. Deusto Foundation. Deusto University publications.

Orkestra. (2022b). Financial ecosystem of the Basque Country: Diagnosis and opportunities. Cuadernos Orkestra 06/2022. Donostia-San Sebastián. Orkestra.

Pisani-Ferry, J., Tagliapietra. S. and Zachmann, G. (2023). A new governance framework to safeguard the European Green Deal. Bruegel Policy Brief (6 September 2023).

Ramsey, F. (1928). A mathematical theory of saving. The Economic Journal, 38, 543-59. https://doi.org/10.2307/2224098

Red Eléctrica. (2023). Installed capacity (MW) | Autonomous Community: Basque Country.

Richardson, K., Steffen, W., Lucht, W. et al. (2023). Earth beyond six of nine planetary boundaries, Science Advances, 9(13). DOI: 10.1126/sciadv.adh2458

Rockström, J., Steffen, W., Noone, K. et al. (2009). A safe operating space for humanity. Nature, 461, 472–5. https://doi.org/10.1038/461472a

Rodrigues, M., Fernández-Macías, E., and Sostero, M. (2021). A unified conceptual framework of tasks, skills, and competences. JRC Technical Report. Working Papers Series on Labour, Education, and Technology 2021/02. European Commission.

Ruiz-Gauna, I., Galarraga, I., and Greño, P. (2020). Financing climate and sustainability policies: the impact of sustainable bonds in the Basque Country. EKONOMIAZ. Basque Journal of Economics, 97(01), 83-111.

Saiz-Santos, M., Hoyos-Iruarrizaga, J., Martín-Diez, R., González-Pernía, J. L., Peña-Legazkue, I., Zabala-Zarauz, A., Chistov, V., González-Eguia, N., Basáñez-Zulueta, A. and Urbano-Pulido, D. (2022). Global Entrepreneurship Monitor. Basque Country. Executive Report 2021-2022. Bilbao, Spain: Euskal Ekintzailetzaren Behatokia. Basque Entrepreneurship Observatory, EEB-OVE.

Saiz-Santos, M., Hoyos-Iruarrizaga, J., Martín-Diez, R., González-Pernía, J. L., Peña-Legazkue, I., Zabala-Zarauz, A., Chistov, V., González-Eguia, N., Basáñez-Zulueta, A. and Urbano-Pulido, D. (2023). Global Entrepreneurship Monitor. Basque Country. Executive Report 2022-2023. Bilbao, Spain: Euskal Ekintzailetzaren Behatokia. Basque Entrepreneurship Observatory, EEB-OVE.

Sancho Ávila, J. M., Riesco Martín, J., Jiménez Alonso, C., Sánchez de Cos Escuin, M. C., Montero Cadalso, J., and López Bartolomé, M. (n.d.). In Ministry of Agriculture, Food and the Environment, and AEMET (Eds.), Solar Radiation in Spain Atlas using EUMETSAT SAF climate data.

Schoenmaker, D., and Schramade, W. (2019). Financing environmental and energy transitions for regions and cities. OECD seminar series: Managing Environmental and Energy Transitions for Regions and Cities. Seminar 5: Financing environmental and energy transitions for regions and cities).

Schot, J., and Steinmueller, W. E. (2018). Three frames for innovation policy: R&D, systems of innovation and transformative change. Research Policy, 47(9), 1554-1567. https://doi.org/10.1016/j.respol.2018.08.011

Solow, R. M. (1974). Intergenerational Equity and Exhaustible Resources. Review of Economic Studies, 41 (Symposium), 29–46. https://doi.org/10.2307/2296370

Solow, R. M. (1995). An almost practical step toward sustainability. Ekistics, 62 (370/371/372), 15–20. http://www.jstor.org/stable/43623526

Sustainalytics. (2023). Basque Government Sustainability Bond Framework Second-Party Opinion.

Tagliapietra, S., Veugelers, R. and Zettelmeyer, J. (2023). Rebooting the European Union's Net Zero Industry Act. Bruegel Policy Brief (22 June 2023).

TheCityUK. (2022). Green finance: A quantitative assessment of market trends, March.

Traag, V.A., Waltman, L. and van Eck, N.J. (2019). From Louvain to Leiden: guaranteeing well-connected communities. Sci Rep 9, 5233. https://doi.org/10.1038/s41598-019-41695-z

United Nations. (1987). Report of the World Commission on Environment and Development: Our Common Future.

United Nations. (2023). Sustainable Development Goals.

URA. (2023). Hydrological planning. https://www.uragentzia.euskadi.eus/planificacion-hidrologica/

Wettengel, J. (2023). What's next in Europe? – Timeline of European climate and energy policy. Factsheet. Clean Energy Wire.

World Economic Forum and PwC. (2020). Nature Risk Rising: Why the crisis engulfing nature matters for business and the economy. New nature economy series. Geneva.

Zhang, D., Zhang, Z., and Managi, S. (2019). A bibliometric analysis on green finance: Current status, development, and future directions. Finance Research Letters, Elsevier, vol. 29(C), pages 425-430. DOI: 10.1016/j.frl.2019.02.003

# Annex I

## Percentages of firms with more than 10 employees that innovate

| | | Basque Country | | | Spain | | Germany | | EU-27 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 2018 | 2020 | 2021 | 2018 | 2020 | 2018 | 2020 | 2018 | 2020 |
| **Innovators (% of total firms)** | Total | 40.6 | 39.5 | 40.3 | 31.1 | 33.4 | 67.8 | 68.8 | 50.3 | 52.7 |
| | Industry | 41.9 | 43.1 | 41.7 | 34.2 | 36.4 | 71.2 | 73.1 | 53.1 | 54.5 |
| | Services | 39.1 | 35.7 | 38.8 | 28.5 | 30.8 | 64.9 | 65.1 | 47.6 | 51.0 |
| | 10-49 emp. | 35.0 | 34.4 | 35.7 | 26.9 | 29.0 | 62.3 | 64.1 | 46.0 | 48.5 |
| | 50-249 emp. | 65.3 | 61.8 | 60.3 | 47.2 | 51.2 | 81.2 | 78.9 | 63.0 | 65.2 |
| | +250 emp. | 76.7 | 77.0 | 75.2 | 68.1 | 67.7 | 89.7 | 92.5 | 76.8 | 79.7 |
| **Product innovators (% of total firms)** | Total | 24.5 | 25.9 | 25.2 | 14.6 | 18.8 | 40.1 | 35.6 | 29.8 | 28.4 |
| | Industry | 23.4 | 27.3 | 26.1 | 16.6 | 20.9 | 43.4 | 36.0 | 32.4 | 29.5 |
| | Services | 25.8 | 24.4 | 24.3 | 12.8 | 17.0 | 37.3 | 35.2 | 27.3 | 27.3 |
| | 10-49 emp. | 20.2 | 21.8 | 21.7 | 11.8 | 15.3 | 36.3 | 31.1 | 26.5 | 24.9 |
| | 50-249 emp. | 42.9 | 43.7 | 39.4 | 24.7 | 32.5 | 46.8 | 44.1 | 38.6 | 37.8 |
| | +250 emp. | 60.2 | 58.4 | 64.6 | 40.5 | 48.3 | 66.3 | 62.7 | 55.7 | 54.7 |
| **Process innovators (% of total firms)** | Total | 34.1 | 30.9 | 31.4 | 23.8 | 27.0 | 55.4 | 56.2 | 41.0 | 43.5 |
| | Industry | 35.2 | 34.3 | 31.6 | 25.4 | 29.3 | 58.1 | 58.3 | 42.9 | 43.9 |
| | Services | 33.0 | 27.3 | 31.1 | 22.4 | 25.1 | 53.0 | 54.4 | 39.2 | 43.2 |
| | 10-49 emp. | 29.9 | 26.2 | 27.6 | 20.9 | 23.5 | 50.7 | 51.2 | 37.4 | 39.7 |
| | 50-249 emp. | 52.3 | 51.1 | 47.6 | 33.9 | 40.8 | 65.7 | 67.1 | 51.0 | 54.5 |
| | +250 emp. | 63.1 | 63.7 | 62.8 | 53.7 | 57.5 | 77.1 | 80.0 | 65.5 | 68.8 |
| **Sales of new products (% of total sales)** | Total | 14.9 | 14.9 | 13.7 | 16.1 | 21.7 | 14.8 | 14.0 | 12.9 | 13.0 |
| | Industry | 15.2 | 16.2 | 16.0 | 18.2 | 22.6 | 19.3 | 17.9 | 17.0 | 16.4 |
| | Services | 14.2 | 12.6 | 9.4 | 14.0 | 20.9 | 9.5 | 9.8 | 9.4 | 10.4 |
| | 10-49 emp. | 8.5 | 7.7 | 8.1 | 4.4 | 7.3 | 5.8 | 7.2 | 6.6 | 7.4 |
| | 50-249 emp. | 17.1 | 18.1 | 16.1 | 9.5 | 15.6 | 7.6 | 5.7 | 8.8 | 8.8 |
| | +250 emp. | 20.3 | 19.2 | 17.8 | 23.4 | 29.2 | 18.6 | 18.0 | 16.5 | 16.3 |

*Source:* Data for Spain, Germany, and the UE-27 come from Eurostat and those for the Basque Country from Eustat.

*Note:* The breakdown of EU-27 new product sales data by sector does not include the Netherlands.

# List of tables

# List of graphs

# List of figures

# List of boxes

# Glossary

| | |
|---|---|
| AEAT | Tax Agency |
| AIC | Automotive Intelligence Centre |
| AROPE | At risk of poverty and/or exclusion |
| BACH | Bank for the Accounts of Companies Harmonised |
| BAIC | Basque Artificial Intelligence Center |
| BERC | Basque Excellence Research Centre |
| BIM | Building Information Modeling |
| BRTA | Basque Research and Technology Alliance |
| CAPV | Basque Country |
| CBAM | Carbon Border Adjustment Mechanism |
| CCAA | Autonomous communities |
| CCM | Climate change mitigation |
| CDO | Cluster dynamising organisations |
| CIS | Community Innovation Survey |
| CNAE | National Economic Activities Classification |
| CO | Carbon monoxide |
| $CO_2$ | Carbon dioxide |
| $CO_2$ eq | Carbon dioxide equivalent |
| COP21 | Paris Summit of the Parties |
| CRC | Cooperative research centre |
| DCM | Domestic consumption of materials |
| DDESMA | Department of Economic Development, Sustainability and Environment |
| DE | Domestic extractions |
| EAR | Entrepreneurial activity rate |
| EEZ | Exclusive economic zone |
| EF | Emission factor |
| EGD | European Green Deal |
| Emp. | Employee |

| | |
|---|---|
| EPO | European Patent Office |
| ERTE | Temporary Employment Regulation Proceedings |
| ESCO | European Skills, Competences, Qualifications and Occupations |
| ESG | Environmental – Social – Governance |
| ESS | European Social Survey |
| EU | European Union |
| EVE | Basque Energy Agency |
| GDP | Gross domestic product |
| GHG | Greenhouse gases |
| GMCA | Greater Manchester Combined Authority |
| GVA | Gross value added |
| ha | hectare |
| HST | High-speed train |
| ICT | Information and communications technology |
| INE | Spanish National Statistics Institute |
| Int | Collects trade with foreign countries |
| IPCC | Intergovernmental Panel on Climate Change |
| IRA | Inflation Reduction Act |
| L | Litre |
| LFS | Labour force survey |
| LNG | Liquefied natural gas |
| LQ | Specialisation index |
| Manuf. | Manufacturing sector |
| mT | Millions of tonnes |
| Mt | Metric tonnes |
| MW | Megawatts |
| NCO | National Classification of Occupations |
| NIMBY | Not in my back yard |
| NGO | Non-governmental organisation |
| No. | Number |
| NZBISC | Net-Zero Basque Industrial Super Cluster |
| NZIA | Net-Zero Industry Act |
| PCTI | Science, Technology and Innovation Plan |
| PGSPE | General Public Safety Plan of the Basque Country 2020-2025 |
| PM | Particulate matter |
| PM2.5 | Particulate matter size 2.5 |
| PM10 | Particulate matter size 10 |
| PNPCI | Private non-profit companies and institutions |
| Pop. | Population |

| | |
|---|---|
| PPP | Purchasing power parity |
| R&D | Research and development |
| R&D&I | Research, Development and Innovation |
| RIS | Regional Innovation Scoreboard |
| RIS3 | Research and Innovation Strategies for Smart Specialisation |
| ROA | Return on assets |
| ROE | Return on equity |
| RVCTI | Basque Science, Technology and Innovation Network |
| SDG | Sustainable Development Goals |
| SME | Small and medium-sized enterprises |
| SPV | Special Purpose Vehicle |
| STEM | Science, Technology, Engineering and Mathematics |
| SUW | Solid urban waste |
| Tot | Includes international trade and trade with the rest of the country. |
| ttoi | Thousands of tons of oil equivalent |
| UE-12 | EU with 12 members |
| UE-27 | EU with 27 members |
| ULC | Unit Labour Cost |
| U.S.A. | United States |
| VE | Vocational education |
| WEF | World Economic Forum |
| % | Percentage |
| € | Euro |
| µg/m³ | micrograms/cubic metre |
| ºC | Degree Celsius |


Orkestra
BASQUE INSTITUTE
OF COMPETITIVENESS
DEUSTO FOUNDATION