EMPLOYMENT AND THE GREEN TRANSITION. EMPLOYMENT OPPORTUNITIES, LABOUR TRANSFORMATION AND TRAINING CHALLENGES IN SECTORS RELATED TO CLIMATE CHANGE AND BIODIVERSITY IN SPAIN

EXECUTIVE SUMMARY

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1. FOREWORD

In recent years, a significant set of regulations, plans and strategies has been launched at national level and through European structural and investment funds to achieve the green transition towards a green, sustainable, decarbonised and climate-resilient economy, with a 2030 horizon and a target of net-zero emissions by 2050. The Integrated National Energy and Climate Plan 2021–2030 (PNIEC), the National Climate Change Adaptation Plan 2021–2030 (PNACC), the Government of Spain's Recovery, Transformation and Resilience Plan (PRTR), and structural funds such as the European Regional Development Fund (ERDF), the European Maritime, Fisheries and Aquaculture Fund (EMFAF), and the European Social Fund Plus (ESF+) have already identified the main lines of action.

This transition is significantly affecting the employment landscape and economic activity in our country. A transformation and rethinking is taking place across all productive sectors, which represents a major economic opportunity with corresponding impacts on the labour market, not only in terms of employment, but also with regard to professional training.

The labour market will need to respond to these challenges through the creation of new jobs and the reorientation or transformation of existing ones, also taking into account the gender perspective and the inclusion of especially disadvantaged groups. In this regard, education and training processes, both initial and for people already in work, are essential, since qualification deficits are among the main bottlenecks in sectors closely linked to the transformation towards a sustainable, low-carbon and climate-resilient economy.

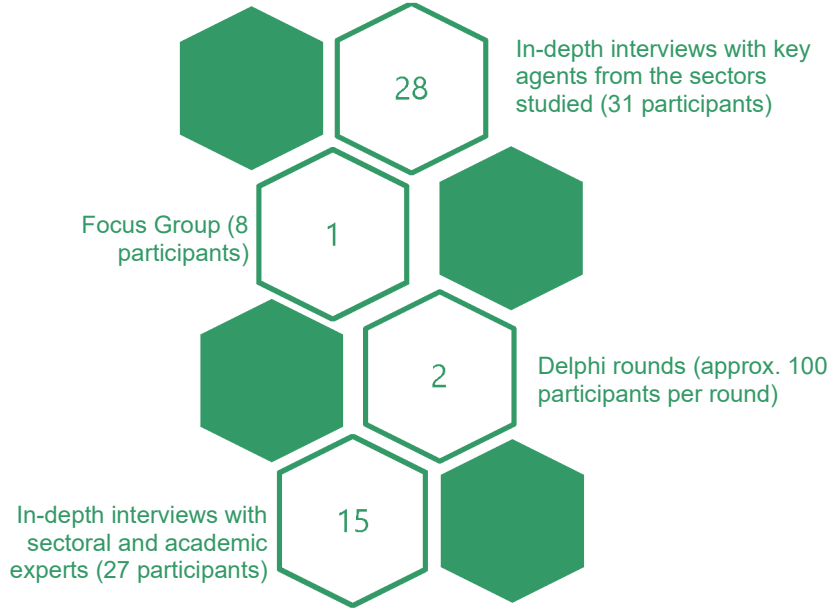
Job training processes are essential for the green transition.

Moreover, vocational training is one of the best tools for reducing labour inequalities and promoting social inclusion (for young people, women, and groups at risk of social exclusion, among others) and territorial inclusion (disadvantaged regions, territories facing demographic challenges, etc.). These training processes are especially important for reducing the gender gap and increasing the presence of women in the economic sectors that will drive the green transition.

Biodiversity Foundation (FB) and the Spanish Office for Climate Change (OECC), under the Ministry for the Ecological Transition and the Demographic Challenge, are aware of the importance of identifying employment opportunities associated with climate change mitigation and adaptation, as well as with biodiversity conservation and management, and of making visible the role of training and the improvement of vocational skills in achieving a green transition in Spain that is fair and inclusive for all people and territories. For this reason, they have promoted the development of this study: "Employment and the Green Transition. Employment Opportunities, Labour Transformation and Training Challenges in Sectors Related to Climate Change and Biodiversity in Spain."

This document presents a summary of the main results and recommendations of the study and includes some illustrative examples.

The content of the study was developed through a review of documentary and statistical sources and information provided by key sectoral agents and experts in training and employment. To this end, a consultative and participatory process was carried out with approximately 170 agents and experts, through in-depth interviews, focus groups, and the Delphi method.



In addition, a Seminar was organised, in which 8 workshops were held where the preliminary research findings were shared, validated and further developed.

This event involved the participation of 30 experts in education and training, employment, innovation, and cross-cutting aspects of the labour market, such as social and territorial vulnerability and the gender perspective.

For further information on the study's results and methodology, please consult the full report.

2. OBJECTIVE AND SCOPE OF THE STUDY

General objective:

To identify **employment opportunities, new professional skills, and the technical and vocational capabilities required for the green transition process**, in line with national legislation, strategies and plans, so that the labour market can effectively address the needs and challenges in the following two areas, while contributing at the same time to social and territorial inclusion in Spain:

- → **Climate change mitigation and adaptation (Climate Area).**
- → **Biodiversity conservation and the development of green infrastructure, ecological connectivity and ecosystem restoration (Biodiversity Area).**

Scope: Sectors and sub-sectors of activity forming the 14 main pillars of the green transition for the coming years (seven for each of the two areas defined above), which must respond to the needs of climate change mitigation and adaptation and of biodiversity conservation and management. The priority given to these sectors/sub-sectors is based on their potential for transformation, restructuring and job creation in Spain within the context of the ongoing green transition.

Although, for practical purposes, the study analyses these sectors by grouping them under a specific area and pillar of the transition, it should be noted that there are overlaps between the two areas and the different pillars, and that certain activities are necessary and relevant both for climate change mitigation or adaptation and for biodiversity conservation.

The study goes beyond the analysis of so-called "green jobs". Thus, all relevant or strategic activities for the green transition and the occupations that in some way have been or will be affected by it have been addressed, including some that are not normally included in standard definitions of green jobs.

Green jobs are typically defined as those occupations that contribute, among other objectives, to protecting ecosystems and biodiversity; reducing the consumption of energy, materials and water; decarbonising the economy; and minimising or preventing the generation of all forms of waste and pollution. However, this definition does not cover other types of professional activities considered in the study, which are nonetheless relevant to the green transition. One example is “Participation and governance technician”, a new or emerging job identified as relevant in this study, but not classified as a “green job”.

In addition, there is no consensus on a standard definition or measurement of green jobs, and a lack of consistent criteria for classifying certain occupations. This often makes it difficult to compare different studies on the subject and to make progress in research in a harmonised way.

Finally, the scope of this study includes both jobs that are considered emerging or newly created, and those that already exist but will require reorientation and adaptation in order to contribute to the green transition process.

3. MAIN EMPLOYMENT OPPORTUNITIES FOR THE GREEN TRANSITION

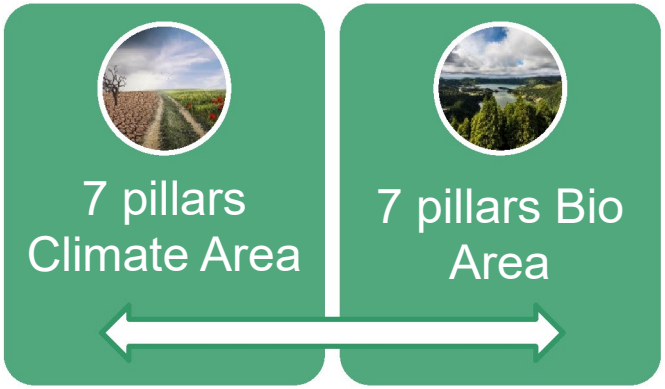
3.1. Green transition pillars for employment and skills development

The study has identified 14 priority (or most urgent) pillars (sectors) for delivering on the various regulatory and strategic frameworks in the fields of energy, climate and biodiversity. These have also been selected for their potential to create and/or transform jobs in Spain, taking into account both emerging or newly created jobs and those that already exist but will need to be reoriented and adapted for the green transition.

Each pillar has been assigned to one of the two study areas for methodological purposes, although several could clearly be placed in either. In other words, there are interconnections between the pillars associated with the Climate area and those linked to the Biodiversity area (for example, the circular economy pillar).

14 transition pillars

CC1. Energy renovation of buildings and energy efficiency
CC2. Construction of energy-efficient housing
CC3. Urban environment: Urban planning and sustainable mobility
CC4. Renewable energy production (photovoltaic and wind)
CC5. Climate emergencies: Protection and response to extreme events
CC6. Electrified means of transport (electric vehicle)
CC7. Circular economy



BIO 1. Urban renaturation
BIO 2. Management of natural heritage and protected areas
BIO 3. Ecological restoration
BIO 4. Sustainable nature-based tourism
BIO 5. Sustainable agricultural and livestock farming (including beekeeping)
BIO 6. Sustainable fisheries and aquaculture
BIO 7. Sustainable forestry management

For each of the green transition pillars analysed in the study, a value chain is presented. These were constructed using contributions from sectoral agents and describe the main phases involved in the work process leading to the final product or service. The study also identifies the professions or occupations involved at each stage.

The illustration, with the example of the value chain of the Urban Renaturation pillar, shows both the key links or stages specific to the sector and the cross-cutting areas of activity that apply to all sectors are shown. These include research, development and innovation (R&D&I), information and communication technologies (ICT), training, occupational health and safety, and waste management, treatment and the circular economy.

The main objective of this analysis was to identify the occupations involved in the various processes that form part of the productive activity of the 14 green transition pillars. This made it possible to subsequently identify the most relevant or strategic occupations for the labour market associated with the green transition.

For more information on the value chains of each pillar, consult the full report.

Illustration 1. Example of the value chain of the Urban Renaturation pillar.

MAIN LINKS IN THE CHAIN	
Environmental, social and economic studies of the urban area	• Environmental technician or consultant • Experts or consultants in other relevant fields: economists, sociologists, public health professionals etc. • Landscape architect • Urban planning technician • GIS operator or analyst • Professionals from technology consulting firms and companies specialising in information systems for data management and communication through digital platforms • Technicians from the competent public authorities
Financing (using internal or external resources)	• Urban planning technician • Landscape architect • Lawyer • Economist • Technician from the competent public authorities
Project design and drafting	• Landscape architect • Urban planning technician • Environmental technician or consultant • Municipal urban planning technician
Implementation of the renaturation project	• Municipal urban planning technician • Manager of parks and gardens or public green spaces • Gardening and tree management technician • Gardening/nursery companies • Professionals from civil works, construction, and landscaping/gardening firms
Citizen participation and governance processes	• Participation and governance technician • Mayor's office • Municipal urban planning technician
Evaluation and monitoring of the intervention	• Environmental technician or consultant • Experts or consultants in other relevant fields: economists, sociologists, public health professionals etc. • Landscape architect • Urban planning technician • Municipal urban planning technician
Management and maintenance of new or converted sites	• Municipal urban planning technician • Manager of parks and gardens or public green spaces • Gardening and tree management technician • Other municipal technical staff involved in the maintenance and conservation of renatured urban spaces • Gardening/nursery companies
Communication and promotion	• Mayor's office • Municipal urban planning technician • Communication professionals
Public education and activation of renatured spaces	• Environmental educator or Environmental education • monitor • Youth worker • Cultural manager • Urban planning technician • Landscape architect

CROSS-CUTTING LINKS	
R&D&I	• Research specialist in urban renaturation resources and solutions
ICT	• GIS operator or analyst • Professionals from technology consulting firms and companies specialising in information systems for • data management and communication through digital platforms
Training	• Training technician and teaching staff • Company staff
Health and safety	• Company staff • Occupational health and safety technician and other occupational risk prevention roles • Insurance companies • Material suppliers • Subcontractors
Waste management and circular economy	• Sustainability and circular economy • manager • Company staff

Source: Prepared by authors based on data extracted from Delphi 1

3.2. Occupations that will be more relevant or strategic for the transition

Based on the full set of occupations identified in the value chains for each pillar, the sectoral agents consulted have selected those which, in their view, will be strategic over the coming decade. From this subset, each stakeholder selected two or three occupations that they considered particularly relevant within their area of expertise, resulting in a list of 40 priority occupations for the green transition.

The prioritisation is based on the following criteria related to relevance for the transition:

- Higher employment demand.
- Potential for job creation in new sectors or in sectors undergoing reorientation.
- Difficulty in filling the position.
- Urgent need for reorientation or transformation of the occupation.
- Crucial occupation for the transition; without it, the transition cannot take place.

3.2.1. Priority occupations in the Climate area

TRANSITION PILLARS IN THE CLIMATE AREA	PRIORITY OCCUPATIONS SELECTED BY THE SECTORAL AGENTS CONSULTED					
EJE 1. Energy renovation of buildings and energy efficiency	1	Project manager in energy efficiency and building renovation	2	Architect or engineer specialising in energy efficiency and building renovation (site manager)	3	Skilled operator in installation and assembly of energy efficiency and environmental solutions (solar panels, airtight windows, electrician)
EJE 2. Construction of energy-efficient housing	4	Energy certification and sustainability technician	5	Financial technician specialised in renewable energy installations and energy efficiency	6	Energy technician in the public administration
EJE 3. Urban environment: Urban planning and sustainable mobility	7	Urban planning technician	8	Specialist technician in urban planning and mobility		
EJE 4. Renewable energy production (photovoltaic and wind)	9	Industrial or aerospace engineer in renewable energy systems	10	Project manager for renewable energy installations	11	Installer of photovoltaic solar systems (electrician, mechanic, electronics technician)
EJE 5. Climate emergencies: Protection and response to extreme events	12	Specialist in climate risk contingency plans or measures	13	Climate risk analyst	14	Specialist IT technician
EJE 6. Electrified means of transport (electric vehicle)	15	Engineer specialising in electric vehicle components	16	Assembly line operator in electric vehicle and component factories	17	Assembly operator in battery and charger manufacturing plants for electric vehicles
EJE 7. Circular economy	18	Expert in circular economy business model design	19	Operator in waste treatment and recovery plants	20	Eco-designer

3.2.2. Priority occupations in the Bio area

TRANSITION PILLARS IN THE BIO AREA	PRIORITY OCCUPATIONS SELECTED BY THE SECTORAL AGENTS CONSULTED					
EJE 1. Urban renaturation	21	Landscape architect	22	Participation and governance technician	23	Gardening and tree management technician
EJE 2. Management of natural heritage and protected areas	24	Research specialist in natural resources and ecosystems	25	Specialist technician in management and conservation of wildlife or natural areas	26	Specialist in sustainable and environmental communication (facilitator)
EJE 3. Ecological restoration	27	Ecological restoration specialist	28	Hydrology specialist	29	Consultant in Nature-based Solutions (NbS)
EJE 4. Sustainable nature-based tourism	30	Nature tourism or tourism promotion technician	31	Environmental educator or Environmental education monitor	32	Marketing and communication technician
EJE 5. Sustainable agricultural and livestock farming (including beekeeping)	33	Agronomist specialised in agroecology and biodiversity	34	Sustainable and/or organic farmer	35	Livestock farmer specialised in sustainable and/or organic farming
EJE 6. Sustainable fisheries and aquaculture	36	Research specialist in aquatic resources and ecosystems	37	Specialist in sustainability and marine biodiversity	38	Technician in the competent public administrations (natural heritage and/or protected areas management area)
EJE 7. Sustainable forestry management	39	Forestry technician or forestry engineer	40	Forestry worker or labourer		

These 40 priority occupations are also presented in the form of an occupational map[1], which is not intended to be exhaustive and is based on subjective input. Its purpose is to provide an overview of the cross-sectoral nature of these occupations.

This map identifies, using different colours:

- The pillars where the occupations were identified as priority by the sectoral agents consulted (in green).
- The pillars where the occupations, while not priority, are involved in the production or service delivery activities and therefore were mentioned in their respective value chains (in yellow).
- The pillars where, according to the criteria of the study coordinators (OECC, FB, IDEARA), these occupations play a significant role, even though they were not mentioned in the respective value chains (in salmon or orange).

[1] A more accessible version of the occupational map is available at l **INTERACTIVE OCCUPATIONS PANEL**.

Table 1. Map of priority occupations in the transition pillars analysed.

	Occupation	Climate area pillars (CC)							Bio area pillars (BIO)						
		CC1	CC2	CC3	CC4	CC5	CC6	CC7	BIO1	BIO2	BIO3	BIO4	BIO5	BIO6	BIO7
1	Project manager in energy efficiency and building renovation														
2	Architect or engineer specialising in energy efficiency and building renovation (site manager)														
3	Skilled operator in installation and assembly of energy efficiency and environmental solutions (solar panels, airtight windows, electrician etc.)														
4	Energy certification and sustainability technician														
5	Financial technician specialised in renewable energy installations and energy efficiency														
6	Energy technician in the public administration														
7	Urban planning technician														
8	Specialist technician in urban planning and mobility														
9	Industrial or aerospace engineer in renewable energy systems														
10	Project manager for renewable energy installations														
11	Installer of photovoltaic solar systems (electrician, mechanic, electronics technician)														
12	Specialist in climate risk contingency plans or measures														
13	Climate risk analyst														
14	Specialist IT technician														
15	Engineer specialising in electric vehicle components														
16	Assembly line operator in electric vehicle and component factories														
17	Assembly operator in battery and charger manufacturing plants for electric vehicles														
18	Expert in circular economy business model design														
19	Operator in waste treatment and recovery plants														
20	Eco-designer														

	Occupation	Climate area pillars (CC)							Bio area pillars (BIO)						
		CC1	CC2	CC3	CC4	CC5	CC6	CC7	BIO1	BIO2	BIO3	BIO4	BIO5	BIO6	BIO7
21	Landscape architect														
22	Participation and governance technician														
23	Gardening and tree management technician														
24	Research specialist in natural resources and ecosystems														
25	Specialist technician in management and conservation of wildlife and/or natural areas														
26	Specialist in sustainable and environmental communication (facilitator)														
27	Ecological restoration specialist														
28	Hydrology specialist														
29	Consultant in Nature-based Solutions (NbS)														
30	Nature tourism or tourism promotion technician														
31	Environmental educator or Environmental education monitor														
32	Marketing and communication technician														
33	Agronomist specialised in agroecology and biodiversity														
34	Sustainable and/or organic farmer														
35	Livestock farmer specialised in sustainable and/or organic farming														
36	Research specialist in natural resources and aquatic ecosystems														
37	Specialist in sustainability and marine biodiversity														
38	Technician in the competent public administrations (natural heritage and/or protected areas management area)														
39	Forestry technician or forestry engineer														
40	Forestry worker or labourer														

Pillars where the occupations were identified as priority by the sectoral agents

Pillars where the occupations were not selected as priority but are present in their value chains

Pillars where other entities (OECC, FB and IDEARA) consider that the occupations are involved due to their possible cross-sectoral or transversal role, even though they were not identified in their value chain

Source: Delphi, round 1.

Finally, for each of the 40 priority occupations, a job profile has been developed, describing the main responsibilities of the position and the professional profile[2], based on the contributions of the sectoral experts consulted and drawing on their experience in the sector.

This profile should be interpreted as a representation of the "ideal" professional that companies would like to hire for each of the positions analysed, in terms of: key knowledge and general and technical competences required, skills and abilities needed to carry out the activity, relevant training, and recommended languages.

As an example, the following presents the job profile for the occupation “Ecological restoration specialist”, within the pillar Ecological restoration (BIO3).

To consult the job profiles for all 40 priority occupations, refer to the full report.

Illustration 2. Job profile for the occupation: Ecological restoration specialist

27 ECOLOGICAL RESTORATION SPECIALIST

MAIN RELATED GREEN TRANSITION PILLARS:

PILLAR BIO3. Ecological restoration.
PILLAR CC5. Climate emergencies: Protection and response to extreme events.

RESPONSIBILITIES OF THE POSITION:

Lead the recovery of an ecosystem that has been degraded, damaged or destroyed, by initiating or accelerating processes that facilitate recovery, based on understanding the ecosystem’s own capacity for stabilisation and self-regulation in the short, medium and long term.

PROFILE DEFINED BY SECTORAL AGENTS CONSULTED:

General and technical knowledge or competences required for the position in view of upcoming changes and demands arising from the green transition process:

- Global knowledge of the biosphere.
- Environmental and social economics.
- Ecology (aquatic and terrestrial).
- Community ecology, agroecology and Agroforestry sciences.
- Conservation Biology.
- Bioengineering.
- Management of conflict species: invasive species, conflict-causing fauna, etc.
- Ecological restoration engineering.
- Efficient ecological restoration. Costs and benefits of ecological restoration.
- Techniques for restoration and regeneration of soils and ecosystems.
- Ecosystem services. Assessment of ecosystem potential in a given area and planning of the necessary services.
- Diagnosis and evaluation of restoration projects.
- Knowledge of habitat at field level and field-applied restoration techniques.
- Modelling. Map interpretation. Spatial planning, GIS and geomatics.
- Basic knowledge of statistics and database management.
- Public participation techniques.
- Knowledge of drafting reports and articles.
- Planning tools.
- Digital skills in tools applied to the position (AI, BIM etc.).
- Sustainable waste management.
- Occupational risk prevention related to the position.

Soft skills:

- Organisational and decision-making skills.
- Ability to interact and social skills (communication, dialogue and empathy, negotiation, facilitation, team management, conflict mediation).
- Ability to respond to contingencies.

[2] Set of competences (knowledge, skills and abilities) required for the worker to carry out the tasks associated with their job

Access to professional practice:

Formal training:

- VET/Cycles: Higher Technician in Landscaping and Rural Environment.
- Certificate of professional competence: Gardening and landscape restoration (AGAO0308M).
- University degree (for positions of greater technical complexity): in branches of Science (Geology, Biology, Environmental Science, Marine Science, etc.) or Engineering (Agri-environmental, Agri-environmental and Landscape, Forestry and/or Natural Environment, Civil, Civil and Territorial, etc.).
- University master's degree: Ecological Restoration; Conservation and Restoration of Ecosystems and related fields (Marine Biology, Wildlife Management, Conservation and Biodiversity Management, etc.).

Other possible routes of access: having professional competence recognised through work experience and/or non-formal training.

Languages identified as potentially most in demand: English.

REFERENCE PROFESSIONAL QUALIFICATION (National Catalogue of Professional Qualifications, CNCP):
AGA003_3 – Gardening and landscape restoration

ASSOCIATED CNO-11 CODE (National Classification of Occupations):

2426	Environmental protection professionals
2437	Environmental engineers

THE OCCUPATION ACCORDING TO THE SECTORAL EXPERTS CONSULTED:

Occupation profile:

Criteria for the occupation's relevance to the transition	Current situation in the labour market	Trend or future evolution of employment demand	Main barriers or obstacles to job creation
☐ Higher employment demand. ✓ **Potential for job creation in new sectors or in sectors undergoing reorientation.** ☐ Difficulty in filling the position (imbalance between supply/demand). ☐ Urgent need for transformation/reorientation. ☐ Crucial occupation for the transition process; without it, the transition cannot take place.	☐ Already exists and DOES NOT REQUIRE transformation/reorientation. ✓ **Already exists, but REQUIRES transformation/reorientation.** ☐ New or emerging.	✓ **It will increase a lot.** ✓ **It will increase.** ☐ Remains stable. ☐ It will decrease. ☐ It will decrease a lot.	☐ Legal, regulatory and/or administrative factors. ☐ Availability of financing. ✓ **Cultural factors (awareness or society's commitment to sustainability or ecological transition).** ☐ Lack of trained professionals.

Expected improvements in job quality for this occupation in the coming years (*):

Wage conditions	Job stability	Availability of training aligned with the required knowledge	Gender equality/gender parity in the position	Equal employment opportunities between territories (rural/urban)	Equal employment opportunities between regions (more developed/less developed)
Remain either high or very high	**High or very high**	**High or very high**	**High or very high**	**High or very high**	**High or very high**

(*) Scale: 1. Very low; 2. Casualties; 3. Remain stable; 4. High; 5. Very high; 9. Don't know

4. TRAINING ANALYSIS

4.1. Diagnosis of the Spanish training system and identified training needs

According to the experts consulted, most of the occupational profiles expected to be in demand during this ecological transition correspond to existing occupations that require transformation to meet new demands.

Formal education and vocational training for employment are the main channels for acquiring the professional skills required for this transition and for ensuring that the labour market has access to adequately trained professionals.

→ Higher technical qualifications (university degrees and higher-level VET programmes). In the case of university degrees, demand will focus on technical studies related to engineering (forestry and/or the natural environment, agri-environmental, chemical, etc.), architecture, environmental sciences, biology, geology, or multidisciplinary profiles with teamwork skills and knowledge of participatory methodologies. Technological training will also gain importance, with high value placed on knowledge of computing and telecommunications, both at university level and in higher-level VET programmes in the IT and communications branch.

→ Less skilled, intermediate-level jobs. There will also be demand for intermediate-level VET qualifications in the agriculture, safety and environment, tourism, construction, and installation and maintenance branches, to cover jobs requiring lower qualifications.

Occupational skills that will be in demand:

- Knowledge related to the environment and sustainability, as cross-cutting or intersectoral training that affects all sectors. The green transition involves issues such as energy efficiency, ecological footprint (carbon, water), and the management, transformation and utilisation of all types of waste. Regardless of the sector or sub-sector, workers will need to acquire basic environmental and sustainability knowledge, incorporating a social dimension to help them understand and respond to the specific demands of the market.

- Digital skills, enabling workers to use basic or job-specific IT applications related to the green transition.

- Specific technical knowledge. Each sector of the economy requires specific technical knowledge in order to align with the green transition. This specific training should be delivered through universities, vocational education and training (VET), or vocational training for employment, including non-formal training programmes and professional certificates. The latter are the instruments most closely aligned with the real skills required in each sector.

- Soft skills. Workers will be expected to possess certain social skills, workplace attitudes and cross-cutting professional attributes. These include abilities and skills such as creativity, resilience, adaptability, active listening, negotiation skills, empathy, and communication skills, all of which should be included in the different types of training provision.

Can the current Spanish education and training system meet the qualification and retraining needs arising from the green transition?

The Spanish education and training system is not adequately prepared to meet the future demands of the labour market, either in quantitative terms (because of the volume of jobs that will be generated) or in qualitative terms (due to the new knowledge and professional skills that are already being required or will be required in the coming years).

- There will be a growing need for more technical profiles, with training in STEM (Science, Technology, Engineering and Mathematics). STEM subjects are becoming essential to achieving a successful green transition and applying technological advances to productive activity. For example, such knowledge is expected to be needed in the pillars of renewable energy production, energy-efficient building renovation, low-consumption construction, and electric vehicles.

  Experts highlight the importance of promoting and encouraging STEM education among students to meet the expected demand for these roles.

- There is currently a mismatch between the qualification levels of Spain's workforce and the anticipated demands of the labour market. According to forecasts for Spain by the European Centre for the Development of Vocational Training (CEDEFOP), by 2025 there will be growing demand for medium-level qualifications (49%) and high-level or advanced qualifications (37%), while only 14% of jobs will require low-level qualifications. Employment opportunities will be concentrated mainly among graduates of intermediate-level VET. However, only 24% of people currently hold a medium-level qualification, which is half the level projected to be needed within three years.

Figure 1. Qualification level of the working population in Spain, 2022 and forecast for 2025

Source: Prepared by authors based on data from the Labour Force Survey (Q1 2022) and CEDEFOP.

- The proportion of young people enrolled in VET programmes in Spain (12%) is significantly lower than in the EU (25%) and the OECD (29%). VET plays a strategic role in supporting the green transition, enhancing the competitiveness and development of the Spanish production system, and improving employability. However, there is a shortage of graduates from intermediate-level VET programmes.

Over the coming years, it will be essential to increase the number of people graduating from VET pathways. New vocational education and training areas must also be developed, or existing ones expanded, particularly in fields such as automation or those related to the natural environment and environmental protection.

- At present, 27% of the female workforce and 37% of the male workforce lack any form of recognised professional qualification.

- There is insufficient agility in adapting training provision to labour market needs, to expectations created by recently approved regulations, and to social and cultural changes linked to addressing climate change and protecting biodiversity and natural resources. A more robust and responsive training system is needed, one that focuses on key capabilities and is able to swiftly adapt, so it can update training programmes and academic curricula or study plans in line with the new reality and labour market demand. To achieve this, organisations involved in designing training provision must adopt a more proactive approach and identify emerging employment opportunities.

- Training also needs to be reinforced so that workers can be reskilled once they are already in employment.

- In the academic field, there is a lack of multidisciplinary professional profiles. Across all sectors, there is a shortage of professionals with combined knowledge and skills relating to climate change and biodiversity conservation and management. These are priority areas for the green transition, and there is a need for specialists who can analyse challenges and develop solutions from both perspectives.

- Lack of systematic analysis of the qualifications that will be needed for new types of jobs. The green transition calls for a structured and ongoing analysis of labour market changes and professional training needs, beyond isolated or one-off studies.

- Territorial limitations. In major cities, the labour market is more capable of adapting to future demand for these jobs. However, in smaller towns, and especially in rural areas, adapting employment will be more challenging as the training on offer and the reskilling needs are different. According to the experts consulted, employment-related training in rural areas should mainly be delivered through training centres and workshop schools. It is therefore considered necessary to strengthen links between academic institutions and these training centres.

- Lack of generational replacement in some occupations. This is due, on the one hand, to the demographic structure of our country and, on the other, to the fact that there are professions that younger or local populations are unwilling to pursue. As a result, some professions are shrinking over time or their positions must be filled by people from abroad.

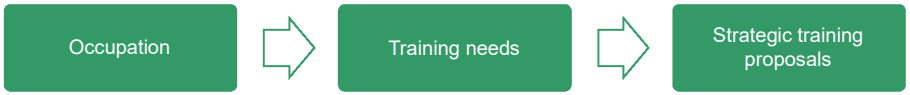
Identified training needs

The demand for new, emerging or expanding skills, unmet by the Spanish training system, generates training needs.

This study presents the training needs identified by sectoral agents in the different transition pillars for each of the 40 occupations analysed and considered essential to the green transition.

Some of these training needs relate to general knowledge of sustainability or the environment, or to technical or activity-specific skills. Others are linked to cross-cutting or intersectoral knowledge (such as data analysis, citizen participation techniques and governance, language skills, report writing and scientific writing, among others), to digital skills, or to the acquisition of social skills.

Based on the identified training needs, a series of strategic training proposals are defined that should be implemented to ensure that workers can acquire the knowledge and professional skills needed to carry out their jobs properly. In some cases, these proposals are complemented by specific technical skills included in the European multilingual classification of Skills, Competences, Qualifications and Occupations (ESCO).



Below is an example of some of the training needs identified for two of the 40 priority occupations selected by sectoral agents, one from the Climate area and one from the Bio area. The training needs for the 40 occupations can be found in the full study report.

Illustration 3. Example of training needs for the green transition and strategic training modules proposed by sectoral agents in the Climate area.
Occupation: Urban planning technician

	Training needs for the green transition	Strategic training modules
URBAN PLANNING TECHNICIAN (PILLAR CC3)	¬ Sustainable, people-oriented urban systems. ¬ Territorial planning to meet societal needs. ¬ New European Bauhaus. ¬ Knowledge of the most appropriate resources and processes in a climate change scenario. ¬ Knowledge of renewable energies. ¬ Mediation in urban interest conflicts.	ơ Sustainable urban or urban renewal planning and design. ơ Spatial planning and public space management. People-centred urban planning. ơ New European Bauhaus. ơ Energy transition and climate change. Environmental and social challenges. ơ Energy efficiency systems/solutions (active and passive) in all types of buildings (energy efficiency technologies, *Passivhaus* or passive house, embodied energy, renewable energy in buildings, insulation for zero-energy consumption). ơ Social skills: Communication and mediation techniques.

Source: Prepared by authors on the basis of Delphi, Round 2 and ESCO

Illustration 4. Example of training needs for the green transition and strategic training modules proposed by sectoral agents in the Bio area.
Occupation: Ecological restoration specialist.

ECOLOGICAL RESTORATION SPECIALIST (PILLAR BIO3)

Training needs for the green transition

- Techniques for restoring the ecological permeability of green infrastructure.
- Ecological restoration engineering.
- Integration of social, economic and ecological aspects of ecological restoration. Costs and benefits.
- Wildlife management, green infrastructure, Nature-based Solutions.
- Knowledge of habitats at field level and field-applied restoration techniques.
- Environmental economics.
- Knowledge of the ecology of terrestrial and aquatic systems.
- Statistics, databases.
- Modelling, mapping and connection to digital systems (Artificial Intelligence – AI, BIM, etc.).
- Knowledge of drafting reports and articles.
- Participation techniques.

Strategic training modules

- Efficient techniques for restoration and regeneration efficiency of soils and ecosystems.
- Costs and benefits and implementation in the field.
- Ecology (aquatic and terrestrial).
- Management and statistical exploitation of databases.
- GIS software (ArcGIS, GvSIG, QGIS, etc.).
- New applied technologies: *Building Information Modelling* (BIM), AI, etc.
- Drafting and presentation of reports and scientific articles.
- Methodologies and techniques for the development of citizen participation and participatory processes.
- Social skills: Communication and mediation techniques.

Source: Prepared by authors on the basis of Delphi, Round 2 and ESCO

4.2. Key actors and strategic training instruments and resources in the development of skills and capabilities

Type of actor	Actors	Instruments and resources
Public and private entities with specific powers in the area of training and employment	¬ Vocational education and training (VET) centres. Training providers accredited for vocational training for employment. ¬ Universities. ¬ INCUAL, SEPE and FUNDAE. ¬ General Council for Vocational Education and Training. ¬ Postgraduate schools. ¬ Foundations with employment-oriented training programmes.	♂ National Catalogue of Professional Qualifications. ♂ Catalogue of Training Specialities. ♂ Sectoral Reference Plan. ♂ Vocational training for employment initiatives. ♂ SEPE Employment Observatory. ♂ Dual VET. ♂ The new VET Act. ♂ Professional Chairs (mainly joint and inter-university departments bringing together specific expertise in the field of the natural environment and processes of change and depopulation). ♂ Work placements. ♂ Training funding support.
Other public administrations/ entities	¬ Ministries with relevant powers. ¬ Regional governments with relevant powers. ¬ Local authorities (provincial councils and municipal governments). ¬ Biodiversity Foundation (FB). ¬ Research Institutes. ¬ Rural/Local Development Groups.	♂ Calls for public grants from various levels of government. ♂ Specific support programmes for training, such as the Biodiversity Foundation's Empleaverde programme, co-funded by the ESF.
European institutions	¬ European Commission. ¬ CEDEFOP.	♂ European Social Fund Plus (ESF+) for the 2021–2027 period. ♂ Other European funds (ERDF, EAFRD, EMFAF, Just Transition Fund, Next Generation EU)

Type of actor	Actors	Instruments and resources
Private initiative	¬ R&D&I companies or clusters. ¬ Specialised applied research centres. ¬ Rural Development Groups (RDGs). ¬ Business or professional entities with specialised knowledge (e.g. GBCe for construction). ¬ Professional associations. ¬ Employers' organisations. ¬ Trade unions. ¬ Large companies.	♂ Training plans of large companies supervised by professional associations/councils.

Source: Prepared by authors on the basis of contributions from the experts consulted.

5. STRATEGIC TRAINING GUIDELINES

5.1. Map of strategic training content for the green transition

The study also presents a list or map comprising 117 training content items that will be necessary to advance the green transition.

This strategic content map is constructed by cross-referencing the 40 priority occupations for the transition with the proposed training modules intended to address the identified training needs. This results in a visual presentation of the various contents, classified by type — identified by colour — according to the type of knowledge or skills they aim to provide, as well as their scope (i.e. which occupations require them). This resource is intended to help configure a training pathway capable of meeting the training needs of each occupation.

The strategic content is initially presented as training modules, although they could also be considered as teaching units forming part of other training modules.

As an example, the strategic training content proposed for three selected occupations within the ecological restoration pillar is shown below.

To consult the full list of strategic training content for all 40 occupations, please refer to the full report or to the study's interactive occupational panel.

To consult the full list of strategic training content for all 40 occupations, refer to the full report or to the study's Interactive panel of occupations.

General cross-cutting training related to sustainability and the environment	• Training aimed at acquiring basic, minimum sustainability and environmental knowledge for all workers.
Other cross-cutting or intersectoral training	• Training on cross-cutting or intersectoral knowledge not linked to sustainability and the environment (e.g. language or mathematics skills etc.).
Specific or technical training	• Training specific to the occupation or activity that enables the performance of job-related tasks.
Training in digital skills	• Training that enables workers to use basic or job-specific IT applications.
Training in soft skills	• Cross-cutting training aimed at acquiring personal abilities or attributes: social skills, organisational skills, etc.

Table 2. Map of strategic training content for the green transition in the ecological restoration pillar.

PROPOSED STRATEGIC TRAINING CONTENT	PRIORITY OCCUPATIONS IN THE PILLAR		
	27 Ecological restoration specialist	28 Hydrology specialist	29 Consultant in Nature-based Solutions (NbS)
Sustainability and environmental management.			
Green and blue economy.			
Governance methodologies and techniques, and methods for promoting citizen engagement and participatory processes.			
Psychology and Sociology of Citizenship.			
Management and statistical exploitation of databases.			
Drafting and presentation of reports and scientific articles.			
Other foreign languages: French, German (English is not identified as a training need).			
Mathematical models for risk analysis and/or climate change models. Interpretation of predictive impact models.			
Landscape ecology and urban, peri-urban and natural biodiversity.			
Design of urban and peri-urban green spaces and their social and economic appraisal.			
Management and sustainable use of natural resources and ecosystem services.			
Green transition: impact of climate change and biodiversity loss on the natural environment. Mitigation and adaptation challenges.			
Spatial planning and sustainability.			
Environmental legislation and legislation on protected natural areas.			
Efficient techniques for restoration and regeneration efficiency of soils and ecosystems. Cost-benefit analysis and practical application (with potential for tailored courses by ecosystem).			
Ecology (aquatic and terrestrial).			
Efficient techniques for Nature-based Solutions. Costs and benefits and implementation in the field.			
Calculation of ecological footprint.			

PROPOSED STRATEGIC TRAINING CONTENT	PRIORITY OCCUPATIONS IN THE PILLAR		
	27 Ecological restoration specialist	28 Hydrology specialist	29 Consultant in Nature-based Solutions (NbS)
Calculation of water footprint.			
Biodiversity, conservation of habitats and species, and environmental protection (flora and fauna species, protected areas and species, impact mitigation and adaptation measures, etc.).			
Marine environment and protected aquatic areas.			
Green transition: impact of climate change and biodiversity loss on the aquatic environment. Mitigation and adaptation challenges.			
Impact prevention, ecosystem rehabilitation and restoration measures.			
Trends in the relevant sector (national and international). Holistic perspective.			
Invasive species of flora and fauna.			
GIS software (ArcGIS, GvSIG, QGIS, etc.).			
Building Information Modelling (BIM).			
Artificial Intelligence (AI) applied to the management of terrestrial and marine ecosystems.			
Social skills: Communication and mediation techniques.			
Skills for collaborative work and collective intelligence.			

Source: Prepared by authors on the basis of Delphi data, round 2.

5.2. Recommendations for improving the Spanish training system

Finally, the study proposes a diverse set of actions for improving the Spanish training system, identified by the consulted experts, that can help meet the demands for training and professionals in the context of the green transition.

General recommendations:

- **Incorporate, as soon as possible, a core, cross-cutting subject on sustainability and the environment in formal education**. Its aim is to help improve public knowledge in this area in order to foster broad social awareness that supports progress in the green transition.
  - → This should be integrated from primary education through to university and vocational education and training, ensuring that all citizens acquire these essential foundational skills from an early stage.
  - → It should adopt a technical-social approach, addressing both the scientific aspects of environmental issues and their cultural, economic, and governance-related dimensions.
- **Strengthen training in** soft skills. Social skills are being overshadowed by the continuing process of digitalisation.
- **Update the subject-specific knowledge of teaching staff** delivering university, VET, and vocational training for employment programmes, both in the areas they teach and in relation to the changes introduced by or required for the green transition. This updating is essential to ensure a fully prepared teaching workforce capable of delivering relevant training content.
- **Integrate occupational risk prevention into training and update its content.** Occupational risk prevention should form an integral part of academic curricula and operational activities, while also incorporating new topics linked to environmental challenges.
- **Promote and encourage STEM education** (Science, Technology, Engineering and Mathematics) among young people. Academic guidance should be introduced early to familiarise students with STEM pathways and highlight the employment opportunities these fields offer. There is currently a shortage of graduates in these disciplines, with some vacancies going unfilled due to a lack of qualified candidates.

Key initiatives promoting STEM studies
• Alianza STEM collaborative platform, led by the Catalan Department of Education and the Universitat Rovira i Virgili.
• Alianza STEM portal of the Ministry of Education and Vocational Training, which brings together a range of strategies and user resources.
• Projects designed to encourage interest in STEM disciplines: STEMadrid, promoted by the Region of Madrid; Plan STEMcat, of the Catalan Government; Inspira STEAM in the Basque Country or Stembyme of Fundación Telefónica.
• Scientific Summer Campuses, a programme coordinated by FECYT and the Ministry of Education and Vocational Training.

- **Strengthen practical learning methodologies:** including learning by doing and, where appropriate, reintroducing or establishing “master–apprentice” models, for example, in construction and agriculture, where practical training is particularly relevant. For certain occupations, gamification and augmented reality techniques are recommended, as they may shorten learning times and allow for realistic simulation exercises.
- **Broaden and simplify public access to training opportunities:** through modular offerings (microtraining) or online provision.
- **Create a collaborative public–private ecosystem involving public administrations, social actors and companies** for the development of training capacities. Promote shared spaces for the development of proposals for new qualifications and curricular changes, involving ongoing collaboration and dialogue between companies in each sector (through their representatives), institutions in the fields of training and employment, trade unions, and other key actors linked to climate change mitigation and adaptation and biodiversity conservation.

  This could even extend to collaboration with other European countries to share information and experiences, and to learn how they are dealing with these challenges.

Recommendations for university education:

- **Embed more practical content into degree curricula.** Graduates often enter the labour market with a solid theoretical foundation but insufficient practical experience. They typically acquire this experience either on the job or through internal training schemes provided by employers.
- **Adapt higher education programmes to meet the labour market demands arising from the green transition.** There is a need for higher education provision capable of responding quickly, efficiently and comprehensively to the specific or technical training needs of the labour market. At the same time, higher education provision must include the retraining and reskilling of existing occupations in line with the labour skills that will be required, so that the labour market has access to graduates suited to the new or emerging occupations that will be in demand.
  - → Strengthen university degrees and curricula with additional training modules to ensure students acquire specific knowledge on sustainability, climate change, biodiversity conservation and management, as well as on the new production and consumption models associated with the green transition.
  - → Complement university education with cross-cutting socio-economic modules that foster the development of a systemic perspective among students.
  - → Expand the range of specialised programmes.

- **Promote more partnerships with companies (joint master's programmes and other private qualifications).**
- **Strengthen the connection between VET training and university degrees, particularly in engineering,** for example through collaboration agreements between universities, VET centres and companies, creating a professional campus where cooperative work can be developed.
- **Make occupational risk prevention a mandatory component of university curricula.**

Recommendations for vocational education and training (VET) and professional certificates:

- **Urgent and swift review of existing degrees and expand the current offering.** The current Vocational Education and Training System is not particularly flexible; any adaptation of the training offer to labour market needs is slow, as it must follow strict procedures. The new VET Act, Organic Act 3/2022 of 31 March on the organisation and integration of vocational education and training, already establishes as a core principle the incorporation into these programmes of the changes driven by the green economy and sustainability, and their permanent and agile adaptation to such changes. To this end, it is proposed to:
  - → Expand the National Catalogue of Professional Qualifications (CNCP) to reflect new labour market requirements in the relevant field of study. Although the CNCP was recently updated through the revision of eight existing qualifications and the inclusion of 49 new professional qualifications, few of these are specifically related to the focus of this study.

The experts consulted suggest several new qualifications that could be added:

- Promotion and technical management of sustainable mobility.
- Installation and maintenance of self-consumption photovoltaic systems.
- Maintenance of electric and hybrid vehicles.
- Carbon credit trading.
- Restoration of degraded natural areas.
- Design, installation and management of Nature-based Solutions.
- Underwater ecotourism.
- Marketing associated with sustainable development.
- Regenerative agriculture.
- River restoration.

  - → Offer qualifications that meet the emerging demand for professionals in the coming years. According to the experts consulted, although there are already VET programmes and professional certificates in the fields of construction and renewable energy, these are insufficient. The offer could be strengthened, for example, by adding training in building rehabilitation and energy efficiency, new construction systems or sustainable construction. Similarly, while there are currently VET specialisation courses in electric vehicle manufacturing, there are no dedicated training cycles or professional certificates.

Under the Vocational Education and Training Modernisation Plan, new qualifications will soon be offered in these areas and others such as: Smart Manufacturing, Digitalisation of Industrial Maintenance, Cybersecurity in Production Environments, Cybersecurity in IT Environments, 5G Infrastructure Implementation, Artificial Intelligence and Big Data, BIM (Building Information Modelling), and the circular economy.

→ Incorporate skills associated with sustainability and the environment into all training programmes. The green transition cuts across all sectors. All VET programmes and professional certificates should include general socio-technical content on sustainability and the environment.

- **Enhance the attractiveness of VET, particularly at intermediate level** The European Centre for the Development of Vocational Training (CEDEFOP) foresees a growing demand for intermediate level qualifications in Spain: 49% of total employment by 2025 and 65% by 2030. Only with additional measures to strongly promote VET socially will Spain be able to balance the qualification levels of its workforce with future labour market needs.

→ It is essential to change the social perception that still exists of VET as a second-choice option.

→ Implement a personalised, modular VET offer. This is one of the action lines included in the Strategic Plan for Vocational Education and Training and could make this type of education more appealing.

→ Establish a curriculum progression system through staged professional qualifications (from the bottom up). Some experts[3] argue that it would be effective to promote an education system in which the vast majority of students progress from compulsory education to university through VET. This connection would strengthen the VET sub-system, help correct the imbalance in qualification levels among the working population, and enable students entering university from higher-level VET programmes to do so with both academic and practical training acquired in companies. It would also help address one of the main concerns raised by companies and experts consulted in this study regarding university graduates: the need to improve their practical knowledge.

- **Strengthen Dual VET.** Dual VET is viewed very positively by the panel of experts consulted, as it offers practical content not present in university education. This training model has not yet been fully developed in Spain, although it is one of the key elements of the new VET Act.

[3] https://www.icai.es/articulo-revista/los-profesionales-de-niveles-intermedios-fp-clave-para-nuestro-desarrollo-inmediato-y-futuro/

Recommendations for Vocational Training for Employment:

- **Adaptation of training specialities within vocational training for employment not linked to professional certificates.**

  → Review the non-formal specialities in the Catalogue of Training Specialities to include those that address the demand for new professional knowledge in the context of the green transition.

  → Review the Sectoral Reference Plans and update them in line with labour market demands and the green transition.

  This adaptation is more flexible than previous ones and could therefore respond more quickly to new training needs arising from the green transition. It is also crucial for the transformation of existing occupations and jobs in sectors currently in decline. For example, in the case of fossil fuels, the workforce will need to retrain for other sectors with greater potential within the green transition framework.

- **Promote vocational training for employment by improving awareness of available opportunities.** There is still very limited awareness among workers, job-seekers and companies of the various options and alternatives offered by vocational training for employment.

Recommendations for the system for the assessment and accreditation of professional skills:

- **Commit to the ongoing assessment and accreditation of professional skills acquired through work experience.** Royal Decree 143/2021 of 9 March, amending Royal Decree 1224/2009 of 17 July on the recognition of professional skills acquired through work experience, introduces changes that simplify procedures, extend timeframes and reduce requirements. Through its implementation, the aim is to reduce the high number of people in Spain without professional qualifications or with low qualification levels and to reverse CEDEFOP's forecast ratios regarding the qualification levels of jobs in demand over the coming years. In addition, this accreditation allows beneficiaries to re-enter the education system and have more opportunities in the labour market.

  It is recommended to strengthen the team of professionals responsible for these tasks and to increase outreach efforts targeting potential beneficiaries.

5.3. Recommendations for improving active labour market policies

General recommendations:

- **Encourage the recognition of some occupations in these fields,** among others that of "Environmental Educator" and "Landscape Architect". In the case of the occupation of “Environmental educator,” the experts consulted consider that it receives little economic, social or institutional recognition and is sometimes mistaken for volunteer work. Unqualified practice has also been detected, making it necessary to professionalise the role through specialised training. With regard to the occupation of “Landscape architect,” there has been a longstanding call for its recognition as a profession, as is the case in France or the United Kingdom.

- **Expand research into the new job profiles** that will be required in the coming years as a result of the green transition. This study identifies 40 occupations as relevant for the coming years, but many others still need to be analysed.

- **Develop Experimental Employment Programmes** for some of the newly identified occupations, for example, “Assembly line worker in battery and electric vehicle charger factories.” A pilot project would make it possible to assess the effectiveness of the training and, if validated, propose the design of a professional certificate for the occupation.

- **Develop occupational observatories adapted to the green transition.** The following improvements need to be implemented in the existing occupational observatories:

  - Anticipate future changes and requirements in the labour market resulting from the green transition. In order to design training provision in advance and ensure that professional profiles are in place to respond quickly to new demands.

  - Consider new or emerging occupations in the green transition. For example, those identified in the study among the 40 priority occupations analysed, as well as new occupations identified by the experts consulted:

    - Sustainability advisor for buildings.
    - Energy community manager.
    - Lawyer specialising in environmental law.
    - *Passive house project manager.*
    - Field technician in underwater or scientific diving.
    - Technician in agricultural digitalisation.
    - Arborist.
    - Hydrogen specialist.
    - Carbon credit trader.

Engage professional associations in efforts to improve short-term skills development. Professional associations understand the training needs of their sectors and could quickly deliver the training content required for specific occupations, tailored to market needs

- **Promote mentoring programmes.** Professionals pioneering a given occupation could mentor those just starting out, acting as guides or advisers.
- **Raise awareness of the value of vocational education graduates among businesses.** Many of the jobs could be filled by VET graduates instead of university graduates.
- **Promote awareness and understanding of sustainability and environmental education among the general public.** According to experts, society is the main driver that must call for the changes required for this transformation.

Recommendations for reducing or eliminating the gender gap:

- **Training and awareness-raising in equality and gender perspective.**
  - → Promote awareness-raising and training campaigns targeting all production sectors, as well as other actors related to employment, training and the labour market, such as educational institutions, trainers, career counsellors and lawmakers.
  - → Promote awareness-raising campaigns aimed at society at large.
- **Encourage and highlight the participation of women in STEM jobs and in occupations in male-dominated sectors.** The aim is to promote female employment in STEM roles and other jobs in male-dominated sectors, showing girls, young women and women in general that these kinds of jobs (engineering, construction, energy, fishing, livestock farming, etc.) are within their reach and not dependent on gender.
  - → Highlight female role models representing the broadest possible range of professions in the classroom through awareness-raising and curriculum materials.
  - → Use inclusive, non-sexist language in teaching activities.
  - → Organise visits by female scientists and technologists to schools and colleges to promote STEM careers among girls and young women.
  - → Implement initiatives to raise awareness of women's employment in male-dominated professions (campaigns, workshops, research projects, etc.).
  - → Develop pilot programmes for the employment of women in male-dominated professions.

Below are a number of example initiatives developed to promote women's training and access to STEM jobs.

Interesting initiatives developed to promote women's training and access to STEM jobs

- Chair for the Promotion of Women in STEM Careers in Professional Training for Sustainable Mobility. Developed by the Universidad Pontificia de Comillas, its aim is to increase the percentage of women studying STEM-oriented professions.
- Virtual community "Ganaderas en Red", by Fundación Entretantos, which highlights and promotes the work of women livestock farmers and empowers this group.
- Conduct campaigns to encourage women to pursue STEM careers. For example, "Put a woman scientist in your life", by Rafael Dieste Secondary School.
- Forklift and tractor driving courses for women at risk of social exclusion, developed by Acción contra el Hambre.
- Granjas Next Generation, led by Alma Natura, B Corp, CEMAS, Danone and the Polytechnic University of Valencia. This is a training programme in livestock and agriculture aimed at empowering rural areas through a collaborative digital platform that seeks to equip rural actors with strategic skills in sustainable farming and livestock practices.
- UFIL Cuenca, developed by the Polytechnic University of Madrid and the City Council of Cuenca. This programme seeks to promote female entrepreneurship in the forestry bioeconomy.

- **Strengthen positive action measures that promote the recruitment of women and/or their access to training** in occupations or courses with lower female participation.
  - → Incentives for companies to hire women. For example, reducing a percentage of the social security contribution.
  - → Measures to facilitate access to and retention in a job or training course, such as support for work-life balance (flexible or reduced working hours, childcare facilities at the workplace or training centre, etc.).
  - → Promote bootcamps[4] to reduce the gender gap in technology or STEM jobs. Some companies develop bootcamps with initial contracts in the company.
- **Put in place measures to reduce the digital divide,** which is greater for women [5].
- **Promote the disaggregation of employment and training statistics by gender.** It is important to adopt a gender perspective when providing data and information to analyse whether there are gender differences in the labour market or in training and whether specific solutions or measures need to be implemented.
- **Gather information from different countries** where the adaptation of policies and measures implemented have proven to be effective in this area.

[4] An intensive learning methodology focused on acquiring practical, specific knowledge related to the development of digital or technological skills, mainly programming. The bootcamps are completely practical and follow the motto *"learning by doing"*.
[5] https://www.inmujeres.gob.es/actualidad/noticias/2020/Julio/SociedadDigital.htm

Recommendations for reducing social vulnerability[6]:

- **Develop mechanisms to guide and support workers whose jobs will disappear as part of the green transition.** Training and tailored support programmes should be promoted for these groups (e.g. workers from coal mining operations) to facilitate their professional reorientation within a new labour market. At the same time, incentives are proposed to promote the hiring of these profiles, as in the case of integrated employment programmes, aimed at improving the employability of specific groups of job-seekers such as young people, women or the long-term unemployed.

- **Support the creation and operation of social economy initiatives, such as cooperatives or "worker-recuperated enterprises" [7].** These initiatives promote the employability of people with low qualifications or barriers to employment, while also helping to retain population in rural areas and promote generational renewal.

- **Review and streamline the processes for recognising and validating foreign academic qualifications**, to facilitate the labour market inclusion of migrants, especially those from outside the European Union. It is currently a complex bureaucratic process that imposes limitations on access to employment.

- **Facilitate the accessibility of employment-oriented training for vulnerable groups.** Efforts must be made to design resources and training proposals adapted to the specific needs of vulnerable groups.

- **Promote the development of training or work placements for young people to help them build a network of contacts** that facilitates access to employment.

Recommendations for reducing territorial vulnerability:

- **Promote training in rural areas to address their specific skills needs in the context of the green transition.** Some initiatives that should be promoted:

  → Agricultural training schools and training programmes that combine learning with employment[8]. In addition to helping retain population, these support people with low qualifications or limited access to employment. Another example of work-linked training is the Rural Family Colleges.

  → Rural universities. These institutions focus on the arts, sciences and humanities, with a strong emphasis on environmental and agricultural issues, although they may also expand to other disciplines.

[6] Groups experiencing social vulnerability in employment include young people, persons with disabilities, women, long-term unemployed persons, foreign nationals, people with low qualifications or those facing barriers to employment.

[7] Work integration social enterprises for vulnerable groups, operating in the circular economy. Beneficiaries go through these enterprises, where they follow a training and employment pathway for up to three years to enter the labour market. This activity then offers them a promising employment opportunity.

[8] The Training Programmes Combining Work and Employment (PFAE) are public programmes aimed at unemployed individuals without specific professional qualifications, designed to support access to employment through structured learning and practical experience in a given occupation.

- → Mobile classroom training, which provides opportunities to upskill and improve the employability of individuals living in rural areas that would otherwise not be served by training provision.

- → Rural community education centres. Associative initiatives, typically based in a province or local area, that promote non-formal education and social programmes in rural settings.

- **Create a flexible training offer that better reflects the needs of each territory.**

  - → Adapt training to make it attractive to local populations, helping to retain people and prevent the outmigration of skilled individuals.

  - → Design learning pathways adapted to the profile and educational level of the local population. It is essential to consider the specific needs of each area and the characteristics of its population.

  - → Promote online training. With adequate broadband connectivity, rural areas could gain access to online training content, helping to eliminate barriers and overcome obstacles in regions with limited in-person provision.

- **Develop training-and-employment projects tailored to territorial needs**, with support from local organisations and public sector agents.

- **Promote initiatives to facilitate access to land:** such as land banks or lease schemes, to support entrepreneurship in these areas.

Interesting initiatives developed to reduce territorial vulnerability

- Shepherd training schools. Initiatives developed to preserve and pass on the shepherding profession to younger generations and to adapt extensive livestock farming to current challenges. Training is primarily practical, with experienced shepherds acting as mentors and instructors, sharing knowledge, providing guidance and supporting participants throughout the project.
- Cooperatives for the processing and/or marketing of agricultural products.
- Rural Campus Programme: an initiative developed by the Ministry for the Ecological Transition and the Demographic Challenge, in collaboration with the Ministry of Universities and the Conference of Rectors of Spanish Universities (CRUE). It enables university students to undertake placements in companies, institutions or associations located in municipalities with fewer than 5,000 inhabitants, lasting three to five months. The aim is to provide students with valuable experiences while revitalising rural areas and supporting future entrepreneurship among young people in Spain's smaller towns and villages.

6. ANNEXES

6.1. Methodological note

QUALITATIVE TECHNIQUES	
In-depth interviews with key actors in the fields of study	***No. of interviews:*** 28 ***Objective:*** to identify employment opportunities associated with specific sectors and activities in both study areas; to determine the occupations with the greatest potential for growth in the context of the green transition; to define the specific knowledge and skills required; to assess job quality expectations in these sectors; and to identify barriers to change. ***Participants:*** 31 social actors and other key actors in the Climate and Bio areas.
Focus Group	***No. of focus groups:*** 1 ***Objectives:*** to complement the information on employment opportunities and the impact on employment of European structural and investment funds; to identify the most in-demand occupations associated with sectors with development potential and the specific knowledge required or likely to be required; to explore employment and its quality in these activities; and to identify possible barriers to access, retraining or the creation of new jobs. ***Participants:*** 8 experts in employment in general and in the selection or recruitment of specific profiles in these fields.

QUALITATIVE TECHNIQUES	
Delphi method	***No. of rounds:*** 2 ***Objective of 1st round:*** to identify the phases of the value chain in each sector and the occupations or professions expected to have the highest demand for employment in the coming years, or that are strategic or priority roles within the sector or pillar for advancing the green transition, and to characterise them (current situation, trend or future outlook, factor defining their relevance, expectations regarding improvements in job quality, and factors that act as barriers or constraints to their creation). ***Objective of 2nd*** round: to identify the "ideal" job profile in demand for the three most relevant occupations in each area, the upskilling and training needs identified for each, and an evaluation of the available training offer. A total of 40 relevant occupations were defined. ***Participants:*** 97 key sectoral actors from the 14 transition pillars analysed in round 1 of the study, and 98 in round 2.
In-depth interviews with sectoral experts and educators	***No. of interviews:*** 15 ***Objectives:*** to compare the occupational profiles and training needs of the occupations defined by the Delphi panel of sectoral actors; to assess possible resources available in the Spanish labour market; and to propose training pathways and actions for future public employment policies in the context of the green transition. ***Participants:*** 27 experts

6.2. Regulatory and strategic reference frameword in Spain for the green transition

- **Cross-cutting instruments for the two study areas**
  - The Spanish Government's Recovery, Transformation and Resilience Plan (PRTR).
  - Just Transition Strategy.
- **Instruments related to climate change mitigation and adaptation**
  - Strategic Energy and Climate Framework.
    - Climate Change and Energy Transition Act 7/2021. □ National Integrated Energy and Climate Plan (PNIEC) 2021–2030.
    - National Climate Change Adaptation Plan (PNACC) 2021–2030.
    - Long-Term Strategy for a Modern, Competitive and Climate-Neutral Economy by 2050 (ELP 2050).
  - Long-Term Strategy for the Energy Renovation of the Building Sector in Spain (ERESEE 2020).
  - Safe, Sustainable and Connected Mobility Strategy 2030.
  - Sustainable Mobility Act.
  - Spanish Urban Agenda (AUE).
  - Spanish Circular Economy Strategy and its First Action Plan 2021-2023.
- **Instruments related to the conservation of biodiversity, green infrastructure, connectivity and ecological restoration**
  - Strategic Plan for Natural Heritage and Biodiversity to 2030.
  - Conservation strategies for wild fauna and flora species.
  - National Strategy for the Conservation of Pollinators.
  - Spanish Strategic Plan Against Illegal International Trafficking and Poaching of Wildlife Species.
  - Spanish Forestry Strategy.
  - Spanish Strategy for the Conservation and Sustainable Use of Forest Genetic Resources.
  - Wetlands Strategic Plan 2022-2030.
  - Sectoral Plan for Nature and Biodiversity Tourism.
  - National Strategy for Green Infrastructure and Ecological Connectivity and Restoration.
  - National Plan of priority actions for hydrological-forestry restoration, erosion control and desertification prevention.
  - National River Restoration Strategy.
  - Marine Strategies.
  - Biodiversity, Science and Knowledge Strategy.

6.3. Impact of the green transition on employment and at social and territorial level

Potential employment by 2030

The green transition will inevitably result in job losses in certain sectors (as activities with high CO_2 emissions and high resource consumption decline or disappear), but these losses will be more than offset by new employment opportunities.

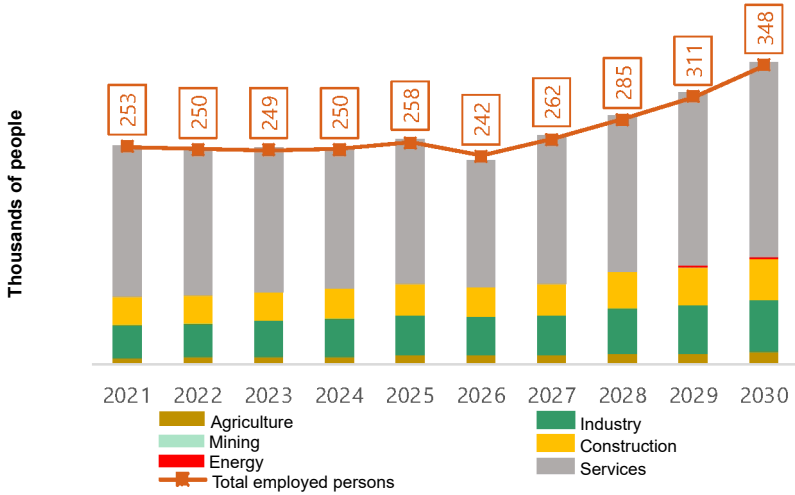
In Spain, the impact on employment will be determined primarily by the implementation of national plans and the influence of various European funds related to energy, climate, sustainability and biodiversity.

For example, the employment forecasts of the National Integrated Energy and Climate Plan (PNIEC) 2021–2030 and the Recovery, Transformation and Resilience Plan (PRTR) are particularly noteworthy.

Impact projections of the National Integrated Energy and Climate Plan (PNIEC) 2021-2030:

- Mobilisation of 241 billion euros in the Spanish economy between 2021 and 2030, from public, private and mixed investment.
- Annual GDP growth expected to be between 16.5 and 25.7 billion euros.
- Generation of annual net employment of between 253,000 and 348,000 people/year, mainly through investments associated with the deployment of renewables, distribution networks and sustainable transport-mobility and the promotion of energy savings and efficiency.
- By macro-sector, employment in industry is projected to increase by 38,000–61,000 jobs/year and in construction by 33,000–48,000 jobs/year. In the services sector, growth is more significant, 148,000–228,000 jobs/year, driven by services linked to new investments and changes in consumption patterns.

Figure 2. Employment projections by sector. Period 2021-2030.



Source: PNIEC. 2021-2030. January 2020.

Impact projections of the Recovery, Transformation and Resilience Plan (PRTR) 2021–2026:

- Mobilisation of more than 140 billion euros in public investment by 2026.
- Strong concentration of investment and reforms in the first phase of the Next Generation EU plan (2021–2023): around 70 billion euros in grants from the European Recovery and Resilience Facility.
- Estimated creation of over 800,000 jobs by 2023, at the end of the first implementation phase: 12 jobs per million euros invested. If the leverage effect of public investment on private investment is factored in, the projected job creation rises significantly and could reach 1.5 million new jobs in the coming years.

A first coherent package of investments, to be executed almost entirely between 2021 and 2023, is aimed at addressing Spain's main challenges, aligned with the transition pillars identified in this study for the Climate and Bio domains. In these pillars, demand is estimated at over 700,000 jobs in the coming years, based on the various national plans, programmes and strategic investment projects.

Job creation estimates are based on projections included in the Strategic Projects for Economic Recovery and Transformation (PERTE) related to these transition pillars and for the rest of the programmes, considering the ratio set out in the PRTR: 12 jobs per million euros invested.

Table 3. Potential employment in the transition pillars analysed for 2023/2024.

STRATEGIC INVESTMENT PLANS, PROGRAMMES AND PROJECTS UNDER PRTR 2021-2026	PLANNED INVESTMENT FOR 2021-2023	ESTIMATED EMPLOYMENT BY 2023/2024
Housing Renovation and Urban Regeneration Programme	€6,820	81,840
Emergency Plan for Safe, Sustainable and Connected Mobility in Urban and Metropolitan Areas	€6,536	78,432
PERTE renewable energies (PERTE ERHA)	(*) €16,370	(**) 280,000
PERTE for the development of the electric and connected vehicle (PERTE VEC)	(*) €24,009	(**) 142,000
PERTE Circular Economy	€492	5,904
Conservation and restoration of ecosystems and biodiversity	€1,642	19,704
Coastal and Water Resource Protection	€2,091	25,092
Modernisation and competitiveness of the tourism sector	€3,400	40,800
PERTE Agri-Food	€1,003	(**) 16,300
Total Employment		**702,684**

(*) sum of public and private investment

(**) Employment estimated by PERTE through transformative measures

Source: prepared by authors

Assessment and expectations regarding job quality. Gender perspective and social vulnerability

The progress of the green transition of the economy is expected not only to generate potential employment, but also to improve its quality: job stability, equal opportunities in access to employment, and the rights of workers taking up new jobs, with particular attention to those most affected by socio-economic transformations.

Employment analysis from a gender perspective

- Women account for 46.3% of the employed population (Q1 2022, Labour Force Survey – EPA, National Statistics Institute – INE).
- At the sectoral level there are significant imbalances, with gender gaps in sectors such as construction, extractive fishing, energy and forestry management.
- This gender gap is also found in the educational field: girls and young women opt for science and health studies, while boys prefer technical studies.
- According to the 9th edition of the CYD Ranking[9], 36% of students enrolled in STEM degrees (Science, Technology, Engineering and Mathematics) are women. There is a clear lack of women in the more technical engineering degrees.

Employment-based analysis of social vulnerability

- An ageing workforce: 49.3% of employed people are aged 45 or older (Q1 2022, EPA – INE). This presents a major challenge for generational replacement in ageing occupations and sectors (e.g. construction, extractive fishing, agriculture), while at the same time creating serious employability difficulties for inactive individuals over 45.
- Youth unemployment is higher than the national average of 13.65%, with a rate of 18.34% among 25–29-year-olds, 26.75% among 20–24-year-olds, and 46.43% among 16–19-year-olds.
- Temporary employment is high, with a rate of 24.2% (1 in 4 employees has a temporary contract), compared with the European average of around 13-14%. This is particularly significant in sectors such as agriculture (with a temporary employment rate of 50.8%) and construction (31.4%). Certain jobs in these and other sectors combine several vulnerability factors, such as temporary contracts, lack of stability and low wages.

Impact of the green transition on job quality

A just transition in employment requires suitable solutions for all individuals and groups, and a sustainable transition plan for the regions and people affected by job losses.

- In general terms, the ability of the labour market to provide companies or hiring organisations with a sufficient number of qualified workers is a determining factor in job quality.

[9] https://www.fundacioncyd.org/ranking_cyd_2022/

When there is an excess of candidates for a given position, the employer can dictate the working conditions; when the opposite occurs, the conditions are more favourable and can even be influenced by the candidates themselves.

- As with any process of change, the green transition may produce unequal effects on different groups and sectors, which should be monitored and mitigated. In terms of job quality, while working conditions in some sectors, such as renewable energy or energy renovation of buildings, are adequate, others, such as the agricultural sector, are less favourable, with a prevalence of precarious employment (low wages and high levels of temporary contracts) and very low economic, social and institutional recognition.
- Most job creation and workforce relocation driven by the green transition will be concentrated in medium- or high-skilled occupations[10].
- Its impact will be greatest in occupations that are currently dominated by men, since many of the sectors linked to the transition have a strong demand for STEM qualifications[11].
- Forecasts suggest that, unless specific measures are taken, both horizontal and vertical segregation will persist due to existing gender stereotypes. The percentage of women in employment may decline unless action is taken to enhance their professional skills in those sectors where new jobs are being created. It is essential to adopt suitable corrective policies and to strengthen coordination between social actors.
- There are other threats to job quality in the coming years, related to temporary employment, labour mobility, the generational wage gap (not gender-based but age-related), and high training and digital requirements, all of which will limit the integration of certain groups.
- For the labour market integration of disadvantaged groups (young people or people over 45, low-skilled individuals, and those living in rural areas), experts believe that sustainable construction, renewable energy and sustainable or organic agriculture are sectors that could play an important role in supporting a just transition. They could also provide employment opportunities for individuals who have lost their jobs in sectors affected by the closure of coal mines or coal-fired power plants, for example.

Territorial impact

- There are regional disparities in job creation potential in the specific case of energy production. This mainly affects areas linked to mining (with particularly vulnerable regions in the Autonomous Regions of Castile and Leon, Asturias and Aragon) and thermal power plants, where the discontinuation of certain activities leads to job losses and an urgent need to retrain or redirect workers in declining occupations towards more sustainable activities.
- Attention must also be drawn to those regions especially affected by changing temperatures and rainfall patterns as a result of climate change, due to their impact on certain economic activities and regional development.

[10] *"Skills for green jobs: an update. Spain".* CEDEFOP. 2018.
[11] "The science and technology sector seeks STEM women for leadership positions". In: La Vanguardia, Madrid, 08/03/2022.