GREENS MATCH – MATCHING GREEN SKILLS SUPPLY WITH GREEN LABOUR MARKET NEEDS

STATE OF THE ART REPORT

PARTNERSHIP

	Cámara de Comercio e Industria de Zaragoza Pso. Isabel La Católica 2, 50009 Zaragoza +34 976 30 61 61 (Ext. 212) pfernandez@camarazaragoza.com www.camarazaragoza.com
	EEO Group S.A. Mavrokordatou 1-3, 10678 Athens +30 210 9769560 edamianou@eeogroup.gr www.eeogroup.gr
	Fundación Cultural Privada Empresa-Universidad de Zaragoza Fernando el Católico, 59, esc, dcha, 1º Izda, 50006 Zaragoza +34 976 35 15 08 (Ext. 7 o 4) investigacion@feuz.es www.feuz.es
	IHK-Projektgesellschaft mbH Puschkinstr. 12b, D - 15236 Frankfurt (Oder) +49 (0)335 5621 – 2100 schaefer@ihk-projekt.de www.ihk-projekt.de
	Inovamais – Serviços de Consultoria em Inovação Tecnológica, S.A. Rua Dr. Afonso Cordeiro,567, 4450-309 +351 229 397 130/140 sarabrandao@inovamais.pt www.inovamais.pt

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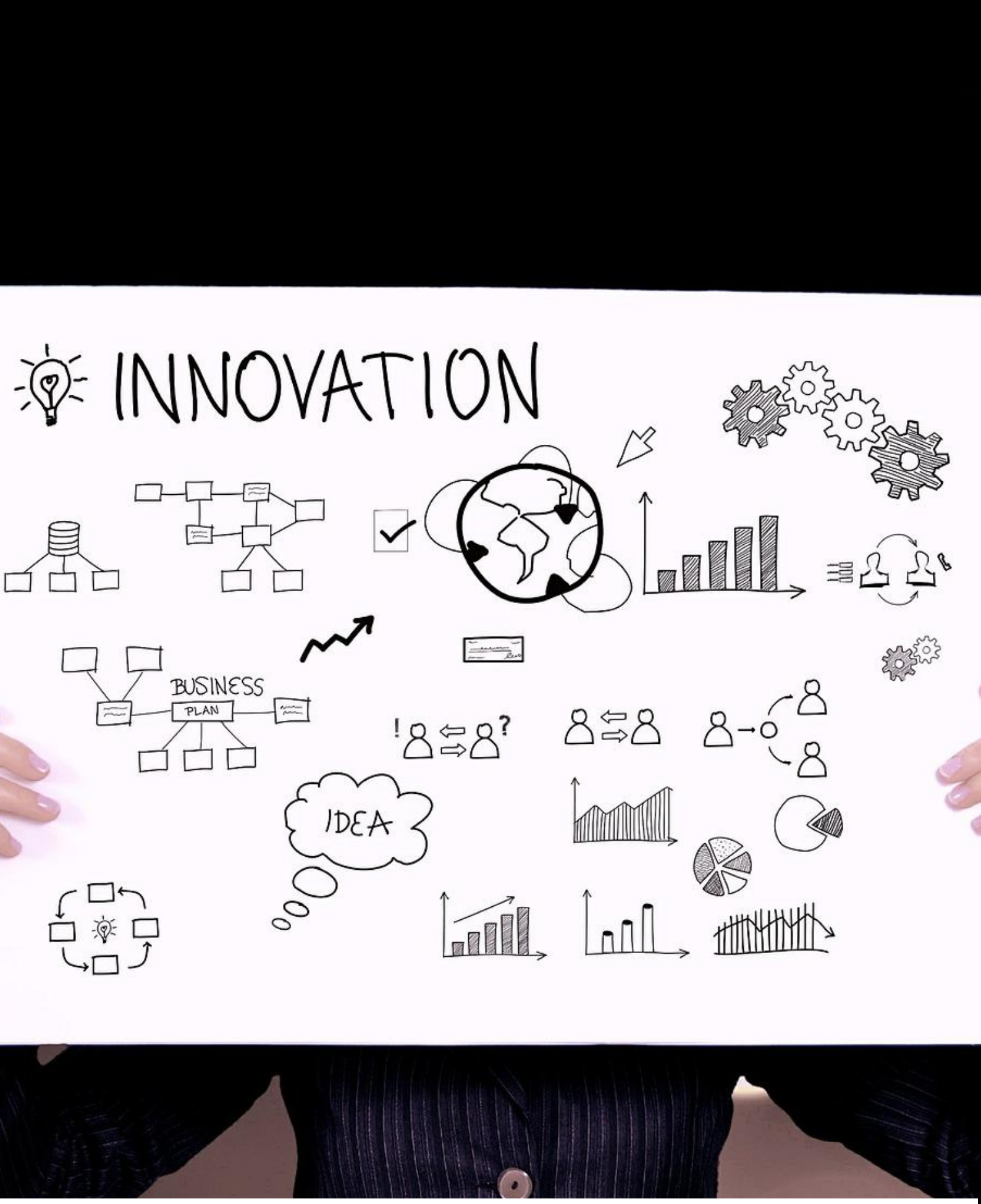
CONTENTS

1. INTRODUCTION 5
1.1. THE MEANING OF GREEN ECONOMY 6
2. THE SIZE AND ROLE OF GREEN ECONOMY 7
2.1. GERMANY 8
2.2. SPAIN 9
2.3. GREECE 10
2.4. PORTUGAL 11
3. NATIONAL GREEN STRATEGIES 13
3.1. GERMANY 14
3.2. SPAIN 15
3.3. GREECE 19
3.4. PORTUGAL 20
4. THE ACTORS OF GREEN ECONOMY 22
4.1. GERMANY 23
4.2. SPAIN 23
4.3. GREECE 26
4.4. PORTUGAL 27
5. GREEN BUSINESS IN THE COUNTRY 30
5.1. GERMANY 31
5.2. SPAIN 34
5.3. GREECE 37
5.4. PORTUGAL 42
6. FRAMEWORK OF GREEN JOBS AND TRAINING 46
6.1. GERMANY 47
6.2. SPAIN 48
6.3. GREECE 55
6.4. PORTUGAL 56
7. REFERENCES 59
7.1. GERMANY 60
7.2. SPAIN 60
7.3. GREECE 63
7.4. PORTUGAL 64



1. INTRODUCTION

1. INTRODUCTION

More than 20 million European jobs are already linked to the environment in some way and as the European Union (EU) gears up for a greener future that figure is only going to increase. The EU is committed to growing the economy while protecting the earth and its precious resources. Among the priorities laid down in Europe 2020, the EU's new economic strategy, stress the need for smart, sustainable and inclusive growth. That means building a competitive low-carbon, resource-efficient economy and safeguarding the environment by preventing degradation, biodiversity loss and the unsustainable use of resources.

It is important to stress that green jobs are not just hi-tech jobs for the educated elite. For sure Europe needs scientists, researchers and engineers to develop cutting-edge technologies that will save energy and resources. However, the work is also carried out by people with intermediate level training: Vocational Education and Training (VET). It is essential therefore that these workers get the training they need to exploit the latest green technologies and applications.But according to the Communication from the Commission (COM (2010) 682 final) "An Agenda for new skills and jobs: A European contribution towards full employment" the problem is not the lack of training, but the need of matching skills supply with labour market needs.In the Commission Staff Working Document (SWD) 2012 92 final, "Exploiting the employment potential of green growth" it is highlighted that special attention has to be paid to small and medium enterprises (SMEs) and to their needs. Often SMEs are not aware of training schemes offered by private and public training providers and/or are sceptical about such programs, however, are open to in-house informal training (e.g. tutorship, mentorship, apprenticeship, work-based learning, etc.) as a preferential ways of recruiting skilled workers.

To reach this objective of bridging the gap between green education and green work, a consortium of 5 organisations from 4 countries (Germany, Greece, Portugal, and Spain) linked to education and training (FEUZ – Fundación Cultural Privada Empresa-Universidad de Zaragoza; INOVA+ – Serviços de Consultadoria em Inovação Tecnológica, S.A.; and EEO Group – EEO Group S.A.) and to employment (COCI – Cámara Oficial de Comercio e Industria de Zaragoza; and IHK – IHK Projekgesellschaft mbH), developed the project GREENS MATCH project – "Matching Green Skills Supply with Green Labour Market Needs".

1.1. The meaning of green economy

According to UNEP, green economy encloses the concept of a resource efficient economy that promotes low carbon emissions and pollution while at the same time protecting the environment and reducing environmental scarcity.The main focus is put on promoting and developing investments that will boost the economy globally while also increasing environmental awareness and quality. These sectors combined, are set to advance the economic performance from a national to global level and will lead to poverty eradication and sustainable development. The key is to form the appropriate conditions in order to invite public and private investments to incorporate and adjust environmental and sustainable criteria that will improve their economic performance.However, the transition of traditional economy to green and eco-growth is a long distance road. It requires the transformation and enrichment of various sectors and professions as they need to reposition their activities towards a more eco-friendly economic mode. As a result, the development of a green business strategy forms an essential part of this transition as it assists businesses to adapt to the increasing legislative, social and environmental requirements and help them to improve cost effectiveness through the efficient use of natural, environmental and other resources.

2. THE SIZE AND ROLE OF GREEN ECONOMY

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2.1. GERMANY

The emerging green markets include environmentally friendly energy generation, energy efficiency, resource/material efficiency, sustainable mobility, sustainable water management and sustainable waste and closed cycle management. Both globally and in Germany, such markets have already become important economic factors.

"Following the March 2011 Fukushima Daiichi nuclear accident in Japan, Germany decided to accelerate the phasing-out of nuclear power. It adopted a range of policy measures – the Energiewende, or energy transition – with the goal of reaching 60% of final energy consumption and 80% of gross electricity consumption through energy generated from renewable sources by 2050 (from about 12% and 20% respectively in 2011). Consolidation and implementation of an ambitious environmental policy framework has helped reduce the carbon, energy and resource intensities of the German economy. The increase in renewable energy generation, coupled with energy efficiency improvements, has helped Germany decouple greenhouse gas (GHG) emissions from economic growth. Emissions declined by 12% between 2000 and 2011 to 26.4% below the 1990 level, well beyond Germany's Kyoto Protocol commitment. Within this framework, Germany also intends to cut greenhouse gas (GHG) emissions by 40% by 2020, and by at least 80% by 2050.

Germany's long-standing, effective waste management policy has resulted in increasing rates of material recycling and waste recovery. However, some concerns remain, including ambient air quality in some cities, freshwater quality, and access to wastewater treatment in some federal states. A large proportion of land is under some form of nature protection, but relatively high population density, dispersed settlements and a variety of industrial and agricultural activities continue to exert strong pressures on ecosystems and biodiversity.

Germany has already moved to modernise its economy and society in keeping with ecological criteria: Between 1990 and 2010, its energy productivity grew by 38.6 percent, while its resource productivity grew by a total of 46.8 percent. It has also made good progress in controlling air pollution: During the same period, emissions were reduced by 56.4 percent, with respect to their corresponding levels in 1990. In addition, Germany now recycles some 90 percent of all construction waste and 63 percent of municipal and production waste.

Germany has extended the use of economic instruments, such as taxes and charges, to tackle environmental challenges. However, potential synergies among instruments have not been fully exploited and policy coherence could be strengthened. Energy taxes do not consistently reflect all environmental externalities. For instance, diesel is taxed at a lower rate than petrol, but it has higher carbon content and generates more emissions of local pollutants such as particulate and nitrogen oxides. Environmentally harmful subsidies, such as those encouraging the use of fossil fuels and private cars, remain large (of the order of 1.9% of GDP in 2008, according to recent studies). To meet its ambitious goals, Germany needs to improve the consistency and cost-effectiveness of its policy mix, including by reforming environmentally harmful subsidies and extending the use of green taxes."

2.2. SPAIN

Growing evidence of the global effects of climate change and the need for policies to adapt and mitigate these have been major drivers of green employment policies on a global scale .In recent years, in line with the EU approach, Spain has amassed an extensive body of legislation governing the environment and numerous aspects related to sustainability. When all of these have been fully implemented ecological reconversion processes will be generated, creating a significant number of green jobs.

Proposals for action have reached a large number of areas of activity. The programs adopted in recent years seek to develop renewable energies, achieve greater sustainability in transportation and mobility, attain greater energy efficiency in construction and increase the recovery rate of materials through waste management, among others.

These programmes have been threatened by the rate of unemployment in Spain since 2008, which have prompted the authorities to pave the way for reforms that give high priority to employment. This means that the programmes deployed are accompanied by specialised studies that include numeric or qualitative estimates of the impact expected that the measures proposed will have on the level and quality of employment in addition to other macroeconomic and sector variables of interest, such as production, Gross Value Added (GVA) and Greenhouse Gas (GHG) emission levels.

These measures have already affected the development of renewable energies, particularly wind and solar energy.

Whilst signs of recovery have been noticeable since the second half of 2013 – offering opportunities to millions of unemployed people in their ongoing search for work and a dignified life – and much remains to be done in terms of consolidation, it is undeniable that the Spanish economy is showing clear signs of stabilisation, and we can say that we are optimistic for its future.

Spain has made impressive progress in many aspects of its environmental performance:

1. The carbon intensity and dependency of the economy has declined, mostly due to the increasing share of renewables in the country's electricity generation and more stringent energy efficiency measures.
2. Emissions of major air pollutants and air concentration of particulates have fallen significantly, although exposure to urban air pollution from ozone is still higher than the EU average.
3. Despite pressures from the tourism and construction sectors, Spain has significantly expanded the protection of its stunning coastal and inland landscapes. The majority of bathing waters, important assets for tourism, are of excellent quality due to increased investment in wastewater treatment.

In recent years…

- The Energy intensity of the economy in Spain was lower than the EU average and has decreased by 14.2% between 2003 and 2012.
- Between 2008 and 2011 the total material consumption has been reduced by 36.2%.
- In recent years Spain has increased the number of member organizations to EMAS (Eco-Management and Audit Scheme), and since 2012 the EU country with the largest number of them.

- The Climate Project Carbon Fund are confirmed as an effective tool to reduce emissions of greenhouse gases with only two years since its implementation.
- There were 8 applications in 2003 for Spanish patents on renewable energy, while in 2012 that number rose to 98.
- Environmental taxes have increased by 0.24% over the last ten years (2003-2012), with a trend of sustained growth until 2007 and a subsequent sharp decline. As% of GDP, the decline has been continuous since 2003.

2.3. GREECE

According to OECD study on Greece, eco-growth and the sector of R&D have not been so far, as developed as in other EU countries. However, as referred by the Eco-Innovation Observatory, some sectors such as green tourism, banking services as well as renewable energy are some of the sectors that are currently being developed in the country with positive potential in the future. The public's awareness in important environmental issues such as climate change and energy scarcity is ranked among the highest in the EU while at the same time, the country is considered as one of the first European countries with alternative sources potential (sun, air, water) due to its geographic position and climate.

Nevertheless, despite the steps towards the adoption of new strategies and innovations, the Greek economic crisis has negatively hit the green economy sector as the public deficit influenced both businesses and the labour market. Although green economy has gained important attention lately, there are still many steps to be taken as the crisis constitutes a severe brake to the government's development plans.

Furthermore at an international level, up until recently, Greece has been presented as a weak player in global environmental strategies which is also evidenced by the country's temporary elimination in the actions of the Kyoto Protocol. This has led to doubts on whether the country will be able to achieve the lower carbon emissions goal until the year 2020, especially after 2008, when it held the highest greenhouse gas generation amongst all European countries.

Additionally to the above, political commitment and dialogue, in terms of environmental-friendly policies, have also proven to be disappointing. Greece has only recently started to plan the transition to green economy and use of its natural resources in an eco-friendly path. However, it should be noted that various political initiatives have already been presented, such as the target of 40% of the country's total electricity production to come from renewable energy sources by 2020. In addition, another positive indication is that over 200 registered NGOs and environmental organizations operate in Greece (Karantinos, 2009) which is a good supportive mechanism to green economy and strategies in the country.

Despite the difficulties faced, Greece has proven to be quite decisive to change its negative image and engage innovation. A study by OECD refers that Greece has stepped forward to the use of alternative energy sources and eco-friendly services. According to the European Commission, the crisis has given the opportunity to Greek SMEs to adopt new, modern and innovative practices that are linked to eco-growth and the green economy. More specifically, 31% of the Greek SMEs have turned green, while 60% of the green companies are practicing green activities more than three years.

In addition, the Greek government is determined to exploit the natural resources of the country in the sector of renewable energy and has set environmental goals that is planning to achieve

by 2020. Moreover, the public opinion fully supports the concept of boosting the economy by protecting the environment, according to Eurobarometer Report in 2009. More importantly, it seems that Greek businesses are trying to use the crisis for their benefit via the adoption of new concepts and implementation of modern eco-business ideas.

Even though all initiatives remain bounded by the state and are being developed at a national level, there is still room for progress as green investments are expected to be increased in the future.

2.4. PORTUGAL

The Global Green Economy Index™ (GGE) is one of the available measures to evaluate the performance of the countries on key dimensions such as “leadership and climate change”, “efficiency sectors”, “markets and investment” and “environment and natural capital”. The GGEI performance index measures the economic performance of 60 countries using underlying indicators and datasets on each one of these key dimensions

Portugal is a case where better communications are clearly needed to advance global understanding of its green economy and associated market opportunities. Overall, Portugal’s performance result exceeds its perception one and this gap is observed throughout the four dimensions of the GGEI. And while Portugal tends to perform better than it is perceived, the country lacks one area with superior performance, making it difficult to identify priority areas to focus on from a communication point of view. One place to start could be its Markets & Investment opportunities, as Portugal performs ahead of many EU states as a target for renewable energy investment.

3. NATIONAL GREEN STRATEGIES

3. NATIONAL GREEN STRATEGIES

3.1. GERMANY

The Renewable Energy Sources Act (EEG) is the key instrument supporting electricity production from renewable sources, notably by means of feed-in tariffs recovered through a surcharge on electricity bills. Since the EEG's inception in 2000, electricity generation from renewables has more than tripled. By stimulating large-scale demand for renewables technology, the EEG has helped accelerate learning and innovation and has reduced technology costs. Debate over the social and economic impacts of EEG has intensified as retail electricity prices have continued to rise alongside the share of renewable energy. Households and firms serving the domestic market have absorbed most of the costs of energy transition, while firms facing international competition have been shielded from the EEG surcharge.

A predictable regulatory framework is essential to secure investor confidence and to stimulate the considerable investments needed to expand the electricity network and storage capacity. Germany's record in developing grid infrastructure is inconsistent; planning and licensing procedures present major stumbling blocks. The 2011 Network Expansion Acceleration Act aims to overcome these obstacles.

"With the transformation of its energy system, its Closed Cycle Management

Act (A) and its Resource Efficiency Programme (B), the Federal Government has taken key measures towards a green economy:

A. With its new Closed Cycle Management Act, Germany has taken another major step towards true closed cycle management. In such a system, waste is a resource, and economic and ecological interests go hand-in-hand. Efficient use of ever-scarcer resources and energy sources plays a key role in the global competition between national economies. The new act combines the objectives of reliability, resource efficiency, legal certainty and close interaction with citizens. True closed cycle management, with high recycling rates, can be achieved when citizens, municipalities and private-sector waste-management companies all accept joint responsibility for achieving it. The key aspects of such responsibility include application of the polluter-pays principle, internalisation of ecological and social costs, stringent legal requirements and proper enforcement of such requirements.
B. Germany has set up its Resource Efficiency Programme (ProgRess). The aim of the programme is to make extraction and use of natural resources more sustain-able and to reduce the pertinent environmental burdens to the greatest possible degree. Resource-efficiency policies will help us accept our global responsibility for the ecological and social consequences of resource use. ProgRess describes new approaches, measures and examples for enhancing resource efficiency. In the process, it takes account of the entire value chain: It is aimed at safeguarding a sustainable supply of raw materials, enhancing resource efficiency in production, making consumption more resource-efficient, expanding resource-efficient closed cycle management and making use of cross-sectoral instruments. To achieve those aims, it relies on market incentives, information provision, advising, education, research and innovation, and it seeks to strengthen relevant voluntary measures and initiatives on the part of industry and society. Examples of such measures include expansion of efficiency advising for small and medium-sized companies; support for environmental management systems; intensified orientation of public procurement to use of resource-efficient products and services; support for voluntary product labelling and certification systems; expansion of closed cycle systems; and intensification of

technology/knowledge transfers to developing and emerging countries." (source: http://www.bmub.bund.de/fileadmin/ Daten_BMU/Pools/Broschueren/broschuere_green_economy_en_bf.pdf)

"National Research Strategy BioEconomy 2030 and Policy Strategy Bioeconomy:

The development of an internationally competitive bio-based economic management or even bio-based economy is an important pillar of the Green Economy. The Federal Government created a research policy basis back in 2010 in the "National Research Strategy BioEconomy 2030" and set the initial course for a process of change towards a bio-based economy. In terms of coherent policy-making, these decisions were supplemented by the "National Policy Strategy on Bioeconomy" with further policy framework conditions and Action fields (industrial and energy policy, agricultural, forestry and fisheries policy, climate and environmental policy, and research and development policy). Whilst the bioeconomy uses and further develops biological processes and resources and in doing so makes them more efficient, technology, economy and ecology are systemically and sustainably linked – in line with the aims and guidelines of a Green Economy" (source: http://www.bmbf.de/pub/Green_Economy_Research_Agenda.pdf).

3.2. SPAIN

The **Spanish Group for Green Growth**, formed by companies and the Central Administration, is created with four specific objectives:

- Discuss how public policies might be more effective.
- Increase the weight of Spain in international forums.
- Create opportunities for growth and employment.
- Improve collaboration and synergies between business and administration in the fight against climate change.

Last May 25th the Spanish Group for Green Growth published the **"Barcelona declaration"**.

It comprises a group of companies in Spain which aim to convey to society and government their vision of an economic growth model that is compatible with the efficient use of natural resources.

Social and environmental sustainability is essential to ensure the economic sustainability of business, and it is something that our stakeholders—shareholders, clients and suppliers—are demanding. They understand that the response to this demand must be shared with other players, particularly with government.

This approach inspires them to define a Green Growth model for Spain, and identify our country's potential and the necessary conditions for it to be realised. A model which is compatible with the ultimate goal of economic growth and job creation.

Green Growth is linked to those economic activities which help preserve the quality of our environment, primarily through the efficient use of resources.

Efficient use means working together to protect biodiversity, the quality of air, soil and water and, of course, reduce greenhouse gas emissions linked to climate change.

In 2015, the debate on climate change at a national and international level makes us keenly aware of the need to publicly position ourselves and to implement initiatives in our companies to

analyse the climate footprint and adopt abatement and offsetting measures. Working together to achieve emission reduction targets must be perceived as a task shared by citizens, companies, and also the public administrations.

The goal is to respond to the challenge of sustainable development, a concept which is currently the subject of discussion in many international forums, inspiring policies in developed and emerging countries. It is a concern that will lead to demand for new goods and services, in which public-private partnerships will be essential. The world must evolve towards a low carbon economy. In view of this challenge, the economies that lead the transformation will be the first to leverage the opportunities that green growth is already beginning to provide. Spain's business sector has an enormous opportunity to position itself and to lead the change in the growth model, in Spain and around the world.

Spain today and tomorrow

As economies develop, services gain steadily in importance with respect to the production of goods, as observed in Spain in the last few decades. Tourism, infrastructure development and management, energy supply, waste management, financial services, and telecommunications, among others, become increasingly important, and are strengths recognized at international level, coexisting with the great potential of the industrial sectors, such as automobiles, textiles and agro-food. Following the difficulties of the last few years, we believe that the low-carbon economy will be an effective method for mitigating vulnerabilities in both services and industry and for strengthening the business fabric.

Many positive elements have been identified in the current economic positioning. One of the basic approaches must be to promote the best capacities to drive global leadership, especially in connection with the framework of the green or low-carbon economy, and respond to the demands of the future, in and outside Spain.

Along these lines, the group highlights the potential of renewable energies and sustainable generation technologies; tourism, where excellence means quality, and Spain ranks second in the world in biosphere reserves with exceptional biological diversity; massive use of information and communication technologies, which is changing the way we live and is already providing more eco-efficient solutions, such as Smart Cities; the capacity to manage and develop water, energy and waste infrastructure, which is the main response required by the global population's growing urban concentration; organic agriculture, in which we are already the leading producer in Europe... and many other examples which place them at a perfect starting point.

However, to be able to convert this potential into growth and jobs, a shared commitment is needed to create specific conditions. Along these lines, the following recommendations are proposed:

1. **Recognise the green economy as a source of economic growth and prosperity**

The green economy is and will be a central element of economic growth, and not merely a complementary or aesthetic aspect. As prices gradually factor in negative environmental externalities, the green economy will increasingly make sense.

The Spanish economy has notable strengths which make green growth an opportunity. However, the cooperation of government at all levels is required, as is a commitment by civil society.

2. **Approve policies which strengthen the green option**

The concepts of low-carbon economy and Green Growth must be integrated transversally into all economic policies, contributing to enhancing their efficiency. When talking of building refurbishment, sustainable mobility, decarbonising energy, a circular economy approach to waste management, and many other issues, it's necessary to define public policies which promote this development in all areas.

3. Establish a regulatory framework which is stable, predictable and transparent

Promoting the green economy requires that the commitment be included in stable, predictable and transparent sector regulations as a special condition for mobilising the necessary private capital.

4. Eliminate red tape and ensure institutional coordination

Administrative paperwork should be reduced as much as possible and better coordination between the various levels of the Administration is required, at national and European Union level, to align objectives and instruments. A disparity of legislation may lead to legal uncertainty that hampers investment in these areas.

5. Promote research, innovation and technology as drivers of growth

Knowledge and technology are key sectors for economic growth. The creation of knowledge and its use to conceive new and improved products, processes and services to compete in the global markets is a source of wealth and prosperity for the Spanish economy.

6. Promote information and awareness-raising

Citizens must be seen as the protagonists of any green growth strategy. In this regard, transparency, traceability and reliable product information (e.g. labelling) will be essential for the success of Spain's green economy.

7. Develop funding capabilities and eliminate barriers

Financial market trends in connection with the green economy must be leveraged and the barriers to competitive access to funding must be mitigated. The financial sector has a key role to play in the transition to a low-carbon economy. In order to ensure that sufficient funds are available at an affordable cost, it is vital to minimise the funding risk associated with the investments, which are generally sizeable and long term. Accordingly, public-private partnerships are essential.

8. Advance towards a low-carbon economy with the contribution of all sectors

The energy sector will play a decisive role in decarbonising the economy, in the framework of a model where not only the energy mix but also more efficient consumption of resources plays a key role. However, the energy sector alone cannot achieve those objectives; areas such as transportation and building, and information and communication technology solutions, among others, will make a decisive contribution and offer new opportunities.

9. Incentivise public-private partnerships

Solutions for major environmental problems require closer cooperation between the public and private sectors. Creating a stable, transparent environment with legal certainty will be vital for the leveraging the opportunities of the low-emission green economy.

10. Revise taxation so that it supports green growth

Taxation is an essential tool for supporting the chosen growth model. It would be advisable to revise our tax model so as to promote sustainable consumption and a low-carbon economy.

3.3. GREECE

Green growth is one of the key targets set by the Greek Ministry of Environment, Energy and Climate Change. Under the framework of green economy, it launched in 2010 the **Greek Strategy for Green Growth of the Real Economy**. Its main target is a new development model that will maximize the green potential of the agriculture, tourism, manufacturing, construction, and energy sectors. Furthermore, the changes made to the existing development model will assist to the better management of the current economic and social crises that beset the country.

The strategy aims at shaping Greece in a competitive economy which will be able to stand by the other European countries in a global level. The promotion of green strategies for businesses will also create better quality jobs that will be enriched with the appropriate green skills. The Green Growth strategy will encourage and assist businesses to minimize their impact on the environment while also adapt to the new market conditions.

The Greek Strategy for Green Growth of the Real Economy is analyzed in the following action pillars for the period 2010-2015:

- **Combating Climate Change by moving towards a competitive economy of low carbon consumption.**

  This pillar focuses on a number of policies on the environmental protection, energy efficiency, the country's potential of renewable energy sources (RES) and gas as well as ensuring energy supply, providing reliable energy products and services to businesses and consumers, and promoting environmentally friendly production and consumption patterns through Green Procurement.

- **Natural resource protection and environmental enhancement**

  The main target is the management and protection of natural resources: water resources, forests, and biodiversity and natural landscapes. Risk management and environmental crises prevention form also part of the pillar. More than 11.000 jobs are expected to be created.

- **Improve quality of life with respect to the environment**

  The third pillar promotes actions that will facilitate the quality of life for citizens via improving air quality and noise, managing the waste efficiently and enhancing sustainable mobility for all citizens. In addition, urban regeneration and recycling are also part of the pillar. The main point is that the quality of life is directly linked to the environment. By adopting a greener and healthier lifestyle, biodiversity is equally improved.

- **Enhancement of environmental governance mechanisms and processes**

  The final pillar aims at improving and further developing the mechanisms and processes of the planning system while also promoting a general reform of the environmental legislation by simplifying it and strengthening its enforcement mechanisms. Furthermore, the sector of environmental research and innovation is also promoted as well as the environmental accountability and volunteerism. All of these sectors ensure the policy cohesion and easy access to environmental information for all citizens.

3.4. PORTUGAL

On the last trimester of 2014, the Portuguese Ministry of Environment, Spatial Planning and Energy presented and submitted to public consultation an ambitious "Commitment for the Green Growth". Systematizing the main global challenges (including the climate crisis, the degradation and increasing shortage of water resources, biodiversity loss and demographic effects on the resources resulting on the increasing consumption of energy, water and food), the document provides also an analyse on the national potential *versus* constraints to green growth.

The document comprises a vision for the green growth at a national level: **"To boost in Portugal a green economic growth with national impact and international visibility, stimulating green economic activities, promoting an efficient use of resources and contribution for sustainability"**.

Three key assumptions are, therefore, implicit:

- To enhance green economic activities that contribute for the GDP and employment increase (Growth) Specific goals: Increase green GAV, enhance green exports and generate new green jobs.
- To efficiently manage the resources, increasing productivity and reutilization, as well as decreasing the carbon intensity (Efficiency) Main goals: extend the materials productivity, Increase the incorporation of waste on economy, support the urban rehabilitation, enlarge the energetic efficiency, and enlarge the hydric efficiency.
- To focus on activities of environmental protection, for instance through the increase of renewable energy and valorisation of biodiversity (Sustainability) Main goals: Reduce CO_2 emissions, reinforce the weight of renewable energies, improve the status of bodies of water, improve the air quality and promote the biodiversity.

In total, 83 initiatives were designed and organised in ten sectorial pillars including:Water; Waste; Agriculture and forest; Energy; Transports; Extractive and processing industry; Biodiversity and services related to ecosystems; Cities and territory; Sea; Tourism.

Additionally, six thematic (strategic) pillars were considered to be leveraging factors, including:

- **Financing** – mainly linked to the Portugal 2020 Programme and the assumption of using European Structural Funds, guiding investments and financial instruments towards the support of sustainable projects;
- **International promotion** – mostly related to a communication campaign aimed to promote at an international level the bran Portugal – Green Growth Nation;
- **Taxation** – associated with a Green Taxation Reform with budgetary and legislative modifications;
- **Innovation** – generally connected with the promotion of eco-innovation programmes, supporting productivity, competitiveness and an efficient use of resources, but also related to the creation of the Plan D (Disruptive Technologies) to support projects with a higher technological risk;
- **Information** – mainly linked to the initiative iGEO (aimed to promote the integration and re-use of information by the Public Administration) and to pedagogical programmes targeted to different audiences;

- **Public procurement** – mostly related to “public green purchasing” and to the inclusion and strengthening of sustainable criteria in public procurement.

In particular, regarding the framework provided by the “Portugal 2020” (and in alignment with the Europe 2020 Strategy), it must be highlighted the role of the Operational Programme (OP) for Sustainability and Use of Resources Efficiency of the Cohesion Fund. With a budget of around 2.2 billion euros, this OP aims to anticipate and adapt to global changes in the fields of energy, climate change and efficient use of resources, in a dynamic perspective - combining competitiveness and sustainability.

Three thematic objectives related to sustainable grow are covered by the OP and presented as strategic axis, including:

- **Axis I – To support the shift towards a low-carbon economy in all sectors**: related to the implementation of the National Energy Efficiency Action Plan and the National Renewable Energy Action Plan, and aimed to contribute for enhancing the national economic competiveness, reducing the energetic dependence, and decreasing the energetic and carbonic intensity;
- **Axis II – To promote the climate change adaptation, risk prevention and management**: related to the implementation of the climate policy instruments, namely the National Strategy of Climate Change Adaptation, and the risk prevention and management instruments;
- **Axis III – To protect the environment and promote resource efficiency**: related to the implementation of the strategies for the waste sector (Strategic Plan for Solid Urban Waste) and water sector (National Strategy of Water Supply and Sanitation).

4. THE ACTORS OF GREEN ECONOMY

4. THE ACTORS OF GREEN ECONOMY

4.1. GERMANY

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- Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)
- The Federation of German Industries (BDI)
- Federal ministry of education and research (BMBF): Framework Programme Research for Sustainable Development (FONA) (http://www.fona.de/en/index.php)
- GIZ (German association for international cooperation): https://www.giz.de/en/html/about_giz.html
- DIHK (association of German Chambers)
- Forum Nachhaltige Entwicklung der Deutschen Wirtschaft e. V. (Forum for the Sustainable Development of German Business)
- Deutscher Naturschutzring (German League for Nature, Animal Protection and Environment)
- Bundesverband der Verbraucherzentralen (German National Association of Consumer Advice Centers)
- and others.

4.2. SPAIN

These three points (State, company and social dialogue) are the main actors regarding green economy. More specifically, there are many ministries, companies and organizations that are in charge of its promotion and spreading, which are mentioned below.

Ministry of Industry, Energy and Tourism

The Ministry of Industry, Energy and Tourism provides services included in these areas and tries to promote its development. Its connection with green economy is focused on the creation of certain compensatory support schemes to contribute to the growth in this sector.

This ministry provides, for instance, compensatory support for CO2 emission, as well as other kind of supports to enhance energetic efficiency in SMEs or big companies from the industrial sector, with the aim of achieving the reduction in consumption set by the guidelines of the EU.

Ministry of Public Works

This ministry is in charge of transport infrastructures (land, sea and air transportation), as well as the access to housing, building, urban development, ground and architecture. It plays an important role, as it boosts green economy through congresses, such as the congress titled Vías para el empleo verde ("Lines for green jobs"), held in Murcia (Spain) the 5th of Jun, Day of the Environment, in 2012. This project is carried out through Programa empleaverde, from the Foundation Biodiversidad and the Foundation of Spanish Railways, from 2009.

Ministry of Agriculture, Feeding and Environment

The Ministry of Agriculture, Feeding and Environment is responsible for suggesting and executing the mandates from the Government concerning cattle, agricultural and fishing resources, as well as the food and agriculture and rural development industry. The issues referring to environment also fall to this ministry.

In its web page, there are many reports that contribute to the spreading of the green economy and jobs. Green jobs, according to a publication of the SGAPC, are defined as those "agricultural, manufacturing, research and development, administrative and services activities that contribute, essentially, to preserve or restore environmental quality". Thus, they work to spread this concept and its tendencies thanks to publications and press releases, as well as congresses, such as the one titled Emprendimiento/ Empleo Verde, Economías de proximidad y circuitos cortos de comercialización ("Entrepreneurship/ Green jobs, Economies of proximity and short circuits of commercialization") which will be held in Segovia (Spain) in September 2015.

Ministry of Employment and Social Security

This ministry is in charge of carrying out and executing the policy of the Government regarding employment and Social Security. In addition, it executes the policy of the Government with respect to immigration, emigration and foreigners.

The Ministry of Employment and Social Security is specially focused on promoting green jobs. It writes reports to diffuse this issue, as well as the situation of green jobs in Europe. In these reports, some institutions and organizations mentioned here are involved, for instance, Foundation Biodiversidad. Examples of reports are La Fundación Biodiversidad (FB) y la Estrategia de Emprendimiento y Empleo Joven 2013-2016 ("Foundation Biodiversidad and the Strategy of Entrepreneurship and Youth Employment 2013-2016"), or Evolución del empleo y de la situación social en Europa 2011 ("Development of employment and social situation in Europe 2011").

Ministry of Education, Culture and Sports

The Ministry of Education, Culture and Sports is responsible for executing mandates from the Government in matters related to education, culture and sports. To give an example, functions like protecting Spanish historical heritage, carrying out programs about professional qualifications or granting economical subsidies.

This ministry takes care of preparing reports spreading the concept of green jobs, as well as promoting it, explaining why it is that important in our current society. Examples thereof are reports such as Justificación ("Justification") for the proposal of a University Master's Degree in Landscapes and Bioenvironmental Engineering, or Alegaciones al informe de ANECA de 30/05/2013 ("Declarations to the report from ANECA of 30/05/2013").

SEPE

SEPE goes for Servicio Público de Empleo Estatal or "Public Service of State Employment", previously named INEM (National Employment Institute); it is an organization created in 2003 that performs functions devoted to encourage employment and to design and develop actions related to it. It performs in Spain and it is closely related to the promotion of green economy, more specifically of green jobs, through agreements, such as the one from the 10th Jun 2014, to boost green jobs or to regenerate them, such as in the agreement of the 26th July 2012 in Andalucía (Spain).

Foundation Bioversidad

The main function of the Foundation Biodiversidad is not only focused on environmental and social management of the organization, but also on its environmental and social assignments. Its strategy is based on 5 basic axes: terrestrial biodiversity, marine and coastal biodiversity, climate change and environmental quality, green economy and jobs and international relationships.

Its performance in the area of green economy is carried out through many programs and projects, like Programa empleaverde, whose goal is to get the most out of environmental and sustainability matters to create jobs and support green companies, or for example the project Red emprendeverde (which we will explain further below), a platform for those entrepreneurs who want to specialize in this area through the creation of new companies.

Other projects are Iniciativa Española Empresa y Biodiversidad (Spanish Initiative Company and Biodiversity) and Premios Europeos de Medio Ambiente a la Empresa (European Environment Rewards for Companies).

Escuela de organización industrial (Industrial Organization School)

This school was founded in 1955 by the Ministry of Education and the Ministry of Industry. It aims to promote the modernization of the Spanish industry and its economy, as well as to provide information about the business area.

It enhances green economy by a large section on its page web where people can find activities, like, as a sample, lectures, workshops, contests and roundtables in which this issue is tackled. They also organized a Week of Green Jobs in Sevilla (Spain), in 2011, and they spread this concept thanks to its web page and books.

Autonomías

Political and administrative division in Spain is distributed by autonomías, or self-governed regions. Each one of these autonomías has its own Government, which has authority to carry out some measures regarding green economy.

In the case of Aragon, it is the Department of Agriculture, Cattle Raising and Environment which is responsible for managing the issues related to these sectors and, therefore, to promote green economy. One of the programs this department is currently carrying out deals with the enhancement of green purchasing and hiring, set off through the passing of the Aragonese Strategy for Climate Change and Clean Energies and its Plan of Action.

Apart from this department, other institutions tied to this organization are also essential. The Aragonese Institute of Employment (Instituto Aragonés de Empleo), institution attached to the Department of Public Administration of Aragon (Departamento de la Administración Pública de Aragón) which is in charge of executing employment legislation and professional training, and its projects, such as the Reciclaje y tratamiento de residuos (Reclycing and treatment of wastes) in Cinca Medio (Spain), or the Social and Economic Board of Aragon (Consejo Económico y Social), independent advisory body by which the Aragonese society takes part in socio-economical decisions about the community, with its research about the green sector in our region are some of them.

4.3. GREECE

Ministry of Environment, Energy and Climate Change (www.ypeka.gr)

The Ministry of Environment, Energy and Climate Change has been established in order to confront the continuous environmental problems and to adopt a new development model – the model of Green Development- that will secure a better quality of life for every citizen. It works to achieve the protection of the natural environment and resources, the improvement of quality of life, the mitigation and adjustment to the implications of climate change and the enhancement of mechanisms and institutions for environmental governance.

Ministry of Rural Development and Food (http://www.minagric.gr)

The Ministry of Rural Development and Food works in collaboration with farmers and other stakeholders with a view to promoting sustainable agriculture, food safety and security, the viability of the sector and the prosperity of rural areas in Greece. The ever changing international environment affects our policy making and strategy for agriculture and rural development, taking into account the competitiveness of our products and the restructuring of the countryside.

Hellenic Institute of Entrepreneurship and Sustainable Development (http://iea.org.gr/)

The Hellenic Institute of Entrepreneurship and Sustainable Development is an organisation bringing together individuals and legal persons active in the fields of Entrepreneurship and sustainable development in order to promote the competitiveness of Greek businesses and the activation of citizens through volunteering actions for a better environment.

The Institute focuses on organizations, enterprises, legal persons and individuals, providing the opportunity to subscribe and access an integrated set of services in the context of active participation, reaping simultaneously significant benefits.

National Center for Sustainable Development (http://greekregistry.eu/)

The National Center for Sustainable Development was established by the Ministry of Environment, Energy and Climate Change with the following purposes:

- provision, classification and editing of objective, reliable and comparable information on the environment for both public and private users
- scientific contribution to the elaboration, implementation and evaluation of policies, programs and measures relating to the environment with thin the framework of international and European activities and networks of the country
- dissemination of information and organisation of awareness-raising activities about the environment and sustainable development
- geological study of the country and investigation of underground resources (mineral, geoenergy, undergournd water, raw materials etc.)
- scientific contribution to the exploitation and utilization of the underground resources of the country.

The European Centre for Environmental Research and Training (EKePEK) (www.ekepek.gr)

The European Centre for Environmental Research and Training (EKePEK) was established on February 2002 following a decision of the Senate of Panteion University of Social and Political

Sciences. It closely collaborates with the European Union, the United Nations, regional organizations, International Non Governmental Organizations and Local Administration entities. EKePEK's primary objective is to engage in research and to study issues related to International and European politics, as well as institutions relevant to environmental management and protection, taking into consideration the social and economic parameters of sustainable development. Furthermore, it provides consultancy, evaluation and assessment services, it organizes summer courses and postgraduate training programs and it closely collaborates with other academic institutions.

In order to achieve its goals, EKePEK has set up a library and record files, it undertakes and carries out research programs, it organizes series of courses, seminars, conferences and other scientific manifestations, it publishes papers, books and the proceedings of the conferences it organizes. Additionally, EKePEK runs stage programs for young scientists and develops any kind of activity related to its objectives.

4.4. PORTUGAL

The Portuguese Ministry of Environment, Spatial Planning and Energy is the governmental division responsible for the definition, coordination and execution of the policies related to environment, territory planning, cities, housing, climate, nature conservation, energy, geology, and eco-innovation, assuming a perspective of sustainable growth and social and territorial cohesion. It is also responsible for ensuring the planning and coordination of the application of national and community founds towards the valorization of the environmental and energetic resources.

The Ministry actions are structured in different services, including the ones integrated in the direct administration of the State, including the following central services:

- Secretary-General of the Ministry of Environment, Spatial Planning and Energy;
- Inspection-General of the Ministries of Environment, Spatial Planning and Energy and Agricultures and Sea;
- Director-General for the Territory;
- Director-General for the Energy and Geology.

Additionally, the policies are also pursued by several other bodies indirectly administrate by the State (Table 1), by regulators and advisory bodies (Table 2) as well by the entities within the State-owned company sector.

State

The Portuguese Environment Agency (APA) is a public institute, within the scope of the Portuguese Ministry of the Environment, Territory Management and Energy. Its mission is to propose, develop and monitor, on an integrated and participated manner, the public policies for the environment and sustainable development, in close cooperation with other sectorial policies and public and private entities.

The Institute of Housing and Urban Renewal (IHRU) is a public institute, within the scope of the Portuguese Ministry of the Environment, Territory Management and Energy. The Institute acts as a policy and financial instrument in the areas of patrimonial management, housing,

rental housing and urban rehabilitation.

The National Laboratory for Energy and Geology (LNEG) is an R&D institution oriented to meet the needs of society and business. The Laboratory aims at a sustainable research in a sustainability frame through the generation of knowledge of the territory. In line with what is done internationally, the Laboratory does Science in Energy and Geology viewing the application in advanced solutions to leverage our economy.

Green regulators and advisory bodies.

The Water and Waste Services Regulation Authority (ERSAR) is in charge of regulating public water supply services, urban wastewater management services and municipal waste management services. These activities are essential public services, but consumers can't choose between operators due to the lack of competition in the water and waste sector. Therefore, protecting the consumers is one of ERSAR's main missions. ERSAR established its own regulation model and regulates over 500 operators.

The Energy Services Regulatory Authority (ERSE) is responsible for regulating the electricity and natural gas sectors. ERSE is a public corporate body with administrative and financial independence and possesses its own assets. The aims of ERSE's activities are: to protect the interests of consumers; to ensure the existence of conditions of economic and financial balance by the activities of the regulated sectors exercised in the public interest, when managed properly and efficiently; promoting as regulator and accordance with applicable law, competition in the energy markets; to encourage efficient energy use and protection of the environment.

The National Water Council(CNA) is an advisory body aimed to support the elaboration and implementation of projects related to the use of water and comment on measures that allow a better articulation of the actions. The Council integrates representatives from different Ministries, Autonomic Regions and Municipalities; from scientific, economic, professional and non-governmental organisations which are best representatives in water use; and from invited participants with relevant knowledge.

The National Council of the Environment and Sustainable Development (CNADS) is an independent body that aims at advising Government members responsible for the environment and the sustainable development, public entities and NGOs on all matters associated with the environment and sustainable development. It is also a forum for the design and implementation of environmental and sustainable development policies.

5. GREEN BUSINESS IN THE COUNTRY

5. GREEN BUSINESS IN THE COUNTRY

5.1. GERMANY

The greening of the economy has nevertheless led to the creation of an environmental sector which is directly engaged in the production of environmental goods and services. In Germany this is fostered by the rise of an internationally competitive green technology sector. However other, domestically oriented, sectors have emerged such as renewable energy, recycling and waste management, and energy consulting. Specialised industries are growing in the course of technological and economic development, as can be seen with information technology. Green industries appear to be in an early phase of this process. The environmental technology sector comprises six leading areas in which German companies are well positioned: environmental friendly energy generation and storage, energy efficiency, resource and material efficiency, recycling, sustainable water management, and sustainable mobility. In many of these areas high market shares have been achieved both nationally and internationally. Growth rates have hit a high and employment has expanded. The renewable energy sector has established itself well and a further expansion of the market for renewable energy is being pursued with policy decisions. Nevertheless, policy makers are planning to reduce financial subsidies for solar energy, especially for the supply of electricity fed into the grid. An increasing growth of photovoltaic generation led to an excess supply and a big drop in prices in recent years. The price decline results in dead-weight losses and enormous additional costs within the Renewable Energy Law (EEG). The cut of subsidies will probably lead to outsourcing production to China and result in job cuts, especially in Eastern Germany, where the solar sector has been established as a major industry. The policy has missed the opportunity to attach conditions to the subsidies and now a correction of former development seems to be unavoidable. The solar sector will thus experience a restructuring process with less production and more knowledge-intensive work.

“Environmentally friendly power generation, storage and distribution

The energy sector plays a pivotal role in the transformation to a green economy. Globally, it is responsible for the majority of the greenhouse gas emissions that harm the environment. Reducing these emissions in the face of growing global demand for energy in the years ahead is one of the critical challenges in the battle against global warming. The challenge can be mastered only through an enormous shift to carbon-free and low-carbon energy sources in the power generation sector (see below). At the same time, the use of fossil fuels must be made more climate-friendly, because coal, gas and oil will continue to dominate the global energy mix for decades to come. Technologies that can minimize resource consumption and harmful emissions in fossil-based power generation are therefore absolutely vital in the medium and long term. Energy storage is another key to energy-sector decarbonisation: Storage capacity needs to grow considerably if reliance on renewable energy sources such as photovoltaic and wind power is to increase.

Energy efficiency

Along with low-carbon and carbon-free power generation, energy efficiency is a second mayor key to energy-sector decarbonisation. In addition, increasing energy efficiency is the only way to limit growth in absolute energy consumption. This lead market addresses the most important

areas for action to improve energy efficiency. The structure of its market segments reflects those consumer groups that harbor the greatest potential for energy savings: industry, commerce, the service sector and the real estate industry. The market segment for energy-efficient production processes focuses on the core processes in a variety of industries. With this central focus, it offers companies ways of optimizing their processes and thus reducing their energy consumption. The technology lines in this market segment cover important industries such as basic chemicals, retail and logistics, automotive engineering, food production, metal etc. An additional market segment covers energy-efficient appliances. The focus here is on ways in which companies and private consumers can save energy in operation of electric appliances. The latter break down into white goods, consumer electronics, lighting and information and communication technology (green IT).

Material efficiency

The lead market for material efficiency encompasses technologies and methods that reduce the consumption of non-energy resources (metals such as iron and copper and non-metallic resources such as minerals, for example) and materials. Resource efficiency is the overriding theme in both energy efficiency and material efficiency. The technologies and methods employed in achieving energy efficiency constitute a lead market in their own right. Resource efficiency refers to efficiency in extracting raw materials, while material efficiency means efficiency in processing raw materials. The production of goods in industry and commerce is the principal arena in which the technologies in this lead market are applied. The market segments for material efficient processes and cross-application technologies target potential savings in this segment. Curbing the consumption of raw materials is an important way to preserve and protect natural resources. As a rule, the extraction of raw materials places a heavy burden on ecosystems and often does considerable harm to the environment. The relationship between growing demand for raw materials, the increasing extraction thereof and the resultant risks and damage to ecosystems is the conceptual basis on which we decided to include the protection of natural resources as a separate market segment in the lead market for material efficiency. This market segment also covers the renaturation of sites adversely affected by raw material extraction, and it includes environmentally friendly methods of extracting raw materials. However, many of the technologies involved have yet to progress beyond the developmental stage.

The market segment for material-efficient processes uses examples to show how companies in various industries can both cut costs and protect the environment by improving their production processes and substituting renewable materials for finite resources. In the market segment for cross-application technologies, biotechnology, nanotechnology and organic electronics are described insofar as they apply to material efficiency. Cross-application technologies is the name given to technologies that are relevant to a wide range of industries rather than one specific industry, and bio-technology, nanotechnology and organic electronics all fit into this category. All three are keys to the ongoing development of material-efficient products and processes and therefore form the focus of our discussion of the market segment for cross-application technologies. Food production and water resources are not discussed in the context of this lead market. Renewable resources constitute the third segment of this lead market. Replacing (finite) fossil resources with renewable resources has an important part to play in fostering the sustainable use of resources. Accordingly technology lines such as feedstock for the chemical industry and natural cosmetics have been assigned to this market segment. The former line includes products and processes that help industry move away from oil and toward

renewable resources – for example, in production of organic chemicals and carbon compounds. Natural cosmetics form a separate technology line and include cosmetic products that are produced using renewable resources. One distinctive feature of natural cosmetics is that they contain no paraffin, silicones or any other petroleum-based products. The market segment for climate-adapted infrastructure encompasses technologies that are used for protection from storms, heat, fire and flooding. The basic idea is that preventing damage caused by extreme weather events not only protects human life, but also helps to attenuate demand for materials by safeguarding buildings and infrastructure.

Sustainable mobility

The transformation to a green economy requires concepts and technologies in the transportation sector that meet our basic need for mobility while also making due provision for the demands of resource efficiency and climate protection. The main objectives of sustainable mobility are to reduce both greenhouse gas emissions and other burdens on the environment caused by rising traffic volumes. Capping dependency on oil – still the most important resource in the context of mobility – is a key factor in the decarbonisation of the transportation sector. These are the requirements that determine how the lead market for sustainable mobility breaks down into market segments. The market segment for alternative drive technologies comprises electric, hybrid and fuel cell drive systems. As these technologies develop, penetrate the market and increasingly present a genuine alternative to conventional combustion engines, the hope is that dependency on oil-based fuels can be rolled back in the medium to long term. The technology lines in the alternative fuels market segment serve the same goal.

Although alternative drive technologies will gain a larger footprint on the market in the years ahead, vehicles powered by conventional drive systems will still make up the bulk of the global vehicle fleet for the foreseeable future. Combustion engines must therefore become more efficient if CO2 emissions are to be minimized in the transportation sector. The products and technologies needed to do so are subsumed under the market segment for technologies to increase efficiency. The market segment for transportation infrastructure and traffic management illustrates how innovative measures and technologies can reduce mobility-related emissions. Smart transportation concepts that link up individual modes of transportation have an important part to play here.

Waste management and recycling

A sustainable waste management and recycling industry that helps to conserve resources by limiting the volume of waste aligns perfectly with the principle of the “waste hierarchy”: reduce, reuse and recycle. These “three Rs” are the expression of a clear set of priorities: The best way to protect the environment and reduce resource consumption is to avoid creating waste in the first place. The principle of sustainable waste management and recycling calls for reusing as much waste as possible. The recycling of materials and the recovery of energy are instrumental in reducing resource consumption, with recycling of materials taking precedence over recovery of energy from materials. Waste that cannot be recycled must be disposed of in an environmentally friendly manner. The tremendous importance of waste avoidance and recycling is mirrored in the ideal of the full-cycle concept. This model of closed material cycles follows the principles seen in natural ecosystems that produce no waste, instead converting all materials into reusable resources. The key tenets of this model are reflected in the segments that make up the lead market for waste management and recycling. The services and infrastructures

subsumed under the market segments for waste collection, transportation and separation lay the foundation for waste management and recycling: Without them, it would be impossible to reuse and recycle materials. The waste recycling market segment comprises the technology lines mechanical recycling and feedstock recycling. Mechanical recycling refers to processes in which the chemical composition of the materials is not altered. One example is the re-melting of plastic waste to produce granulate. Feedstock recycling treats substances in a way that changes their chemical structure – deriving oils, waxes and gases from plastic waste, for example. One widespread form of energy recovery is thermal waste treatment, which involves incinerating waste and using the energy released by this process to supply heat and generate power. The use of organic waste in biogas plants is another variation on the same theme. The landfill market segment brings together those technology lines that support the environmentally friendly disposal of waste that cannot be used for material recycling or energy recovery.

Sustainable water management

Against the backdrop of rising demand for water worldwide, the products, services and processes in the lead market for sustainable water management rise to the challenge of ensuring the sustainable management of water resources. In other words, they seek to meet the basic needs of current generations without jeopardizing the basis of life for those who come after us. This goal can be realized only with the aid of efficient environmental technology. The lead market for sustainable water management breaks down into four market segments that, together, model the key stages in the water management cycle. The market segment for water production and treatment models the first stage in this cycle. It incorporates products and processes to develop and extract fresh water resources, monitor groundwater and plan, build and operate water treatment plants. The water system market segment spans all elements in the water distribution system that facilitate the transportation of fresh water from water treatment plants to consumers. In the other direction, it covers the transportation of wastewater from consumers to wastewater treatment plants. Wastewater treatment is itself another segment of the market for sustainable water management. The market segment for efficiency of water usage covers a broad spectrum of technologies, including products and processes that help us to handle water resources efficiently. Examples include water measurement instruments and water management systems. The technology lines in this market segment reflect the different groups of users: private households, industry and commerce, and agriculture."

5.2. SPAIN

There is already in Spain a significant set of greens jobs, developed infrastructures and a mature business network.

At the sectorial level the following trends have been identified:

Renewable energies

They have reported (2012 data) 148.394 jobs, over 88.209 direct jobs and 60.185 indirect jobs.

Upon verification, towards 2020 a 20% market share of the primary energy will belong to renewable energies, and then the sector would obtain 124 265 direct jobs, that is an additional 81.5%, At the technological level, the greatest growth in employment would be observed in the manufacturing and installation stage in solar thermal energy, reaching 378%. Thus it is expected that this energy will consolidate in the domestic market in the coming years.

These projections haven't been revised, not even after the introduction of the Royal Decree-Law 1/2012, in spite of the current context of the severe economic crisis. There are sector estimations that predict a reduction in at least 20.000 jobs, 10.000 of them just in photovoltaic solar energy. This will be due to the abandonment of the project after the suspension of the pre-allocation of payment proceedings and the suppression of the economic incentives for new production facilities for electric energy based on cogeneration, from renewable energy sources and waste products, as provided in the Royal Decree.

In general, in the renewable sector jobs show better indicators that those related on the rest of energetic sector or the average of the whole economy. There are data for Germany and Spain showing the prevailing permanent jobs and full-time in renewable energies**,** with a poor participation in temporary contracts.

As noted, the prevalent contract is the indefinite term (83.7%). This category is followed by the temporary contracts (14.1%), training (0.9%) or self-employed persons (1.2%).

The average annual salary from the analyzed companies rise to 32.817 Euros, 52% higher than the national average and 37% higher than the average industrial wage, which is fully consistent with their higher qualifications workers, their better productivity, research, development and innovation efforts (RDI) and their exporting tendency. In Spain, the representation of women in renewable business is 26.6% and 73.4% for men.

Sustainable transport

The **sustainable transport** is one of the Green economy basic pillars, among other reasons because this sector is one of the principal contributors to the total of Gas emission of Greenhouse effect (GEI). Eurostat's (European Communities Statistics Office's) statistics or last two decades indicate that the contribution of the sector to the total of CO_2 emissions represents in Spain more than eight percentage points superior that the average of the EU-27.

In Spain, the negative effects of the transport, including the environmental pollution, the accident rate and the traffic congestion are particularly high.

Modal distribution, with clear predominance of the road, for goods and travellers movements. Besides the preference to the use of the particular car, 12.8% by buses and less than 1% by motorcycle. In addition transport growth continues focusing on the road, On the other hand, aviation goes towards railway and maritime transport.

In the transport sector, green jobs are the result of applying policies of sustainable mobility generating of employment in conditions of decent work. The opportunities for creating green employments are in improvement of the process of production and supply of services of the sector: promotion of quality public transport, plans of sustainable mobility and the improvements in the efficiency of vehicles.

Assessing exclusively the travellers transport have registered 261.466 employments in the sustainable transport in 2008 (Foundation *Conde del Valle de Salazar* in collaboration with *Comisiones Obreras –CCOO*, (Union), 2010). This category includes the movements by train, underground, streetcar, buses, taxis and rent of cars.

For his part, the OSFB (2010) express that in the area of the sustainable transport, the employment might increase in 40% with a view to 2020, from 560.000 current employments up to 770.000 employments in activities of services, manufacturers and construction of infrastructures. Those estimations are based on the economic Report of the prime minister 2009

and they include both the public sector and the private one, certain activities of the industry like the manufacture of railway material and the naval civil construction and the production of vehicles of low emission, which estimated employs 85.000 persons.

A plan of expansion of sustainable manners, including the bicycle and the movements by foot, throws as result that about 2020 will have generated 122.000 employments more than if the plan was not implement.

The genre inequality and permanent risk that as for health and safety face the workers of the sector continue being the principal deficits of decent work. A series of measures orientated to improving the workers preparation, included the vocational training, it would improve the work conditions of hundreds of thousands of workers and it would be a significant advance towards the sustainable mobility for the path of the just transition.

Waste management

The **waste management** is a key sector of the green economy, not only for being the sector of activity that major volume of employments generates inside the green economy, but for the implications of its develop into crucial questions as the health and hygiene of the persons. Nowadays the sector uses 110.000 workers according to the most conservative estimations, 26% of the whole employment generated by the green economy.

On the potential as generator of employment, according to a study elaborated by the ISTAS-CC.OO., in Spain they might be generated up to 14.000 employments if a System of Deposit Return and Return of packages of drinks (or SDDR).was implemented in the country.

The fact that the study is related to the market of packages exclusively implies that there is a significant margin of improvement in the creation of employment if the aims of recycling of urban residues were extended.

In relation to other characteristics of the generated employment, besides, it would be a question of stable employment.

Other projections of the future employment of the sector are the presented ones for the Chair ECOEMBES.

Being based on recent studies the direct employment has been projected in the management of the urban residues until 2016 and one indicates that, at present, the principal niche of green employment in Spain is precisely the waste management, indicating equally forecasts of growth and professionalization.

The direct employment volume to be creating about 2016 would reach according to these projections 27.850 jobs of direct work.

From the fieldwork realized in the sector, the document of DARED-FB (2010) informs that, according to the type of contracting, 98% of the employment is constant full-time. Only 1.9% of the workers contracted of form continues is part-time, and the percentage of employment that corresponds to discontinuous employment is scarcely perceptible (0.1%)

Basic industry

The**basic industry** is a sector of importance in the Spanish economy that provides with inputs to other sectors of activity as the transport, other industries, including the energetic, the energy

and the construction.

The way of contributing sustainability to the industries of the iron and the steel, aluminium, cement and of the paper is the recycling. By means of the reutilization of the materials there saves itself energy and the whole rest of the materials incorporated in the products. The statistics of green employments in the base industry present major difficulties to the moment to individualize the branches of activity analyzed in this report. In general, for the production of iron, steel, aluminium, cement, paper and pulp, the options to create green employments is by means of the recycling.

The measures of transformation of the industry to levels more sustainable need of an adjustment in the professional capacities of the workers. Nevertheless, a strategy of training does not exist yet for the industry in this aspect.

Some examples:

Network(Net) Emprendeverde. It is the initiative with which the *FoundationBiodiversidad* develops her activity as managing entity of the Social European Fund (ESF) in the frame of the Operative Program Adaptability and Employment 2007-2013. Across it, the Foundation uses as bridge between the employment policy and the Environment policy with a double objective:

- That the environment and the sustainability are the bases for better employments and more competitive companies.
- That the workers and companies are key actors in the improvement of the environment

Network Emprendeverde,the first picking platform to entrepreneurs specialized in the green business.

Greenbiz, delegation in Spain ofEcopreneur.eu, an European network of networks to stimulate the creation of employment in the area of the green economy, to support the innovation and the sustainable business.

5.3. GREECE

Greece is ranked low among the EU-28 countries in terms of eco-innovation performance, showing particular difficulties in the implementation of new ideas. As illustrated in the overall 2013 Eco-IS on an EU-28 average of 100, the country scores only 66. This places Greece eight from the bottom in the EU-28 ranking of eco-innovative countries.

Policy in Greece focuses on the promotion of renewable energies and energy efficiency measures which can promote eco-innovations. The country is still heavily reliant on importing fossil fuels for its electricity production. However, the government aims to derive 20% of final energy consumption from RES by 2020.

The recent financial downturn has provided the impetus for a comprehensive and structural reform, aimed at the development of a healthier investment and business environment, including among others faster licensing procedures, a better focused investment law and the liberalisation of a number of markets. The uncertainty of the economic and social environment seems to have further enhanced the openness of the Greek businesses and society to new concepts; the country seems to be performing better in the promotion of new products or processes, as well as to organizational innovation. Greece shows also relatively better performance in company level eco-innovation activities targeting energy and material efficiency

improvement. Furthermore, Greece ranks among the five top EU performers in energy productivity of its economy. Food and chemical industries are showed to be more active in promoting eco-innovative products and processes.

In **2012**, the Organization for Economic Cooperation and Development (OECD) awarded **six innovative green projects** developed by Greeks as part of its annual Global Forum on Eco-innovation. Amongst them, the Greek company **Intelen**, which has already built a reputation for itself in Europe and the United States for its innovative designs and research into the energy used in business and home computing, presenting energy meters that can record the consumption of buildings in real time.

Green rooms and roofs are the concept behind the work of **Kard Architects**. With the help of a special software program, people can create energy saving models, water management systems, composting models and at the end of the process, the software produces a profile of the qualitative and quantitative benefits for a building.

The company **Brite Hellas** had the novel idea of making glass panes that produce photovoltaic energy. These contribute to increasing the energy efficiency of buildings and reducing airborne pollutants, while their manufacture is environmentally friendly and they are recyclable.

There is a wide array of options and solutions for turning business practices and processes greener or for starting new green business operations. Although by no means exhaustive, the following sections provide examples of green business opportunities along with real best practices developed by Greek SMEs in the **Agro-food**, **Recycling & Waste**, **Transportation & Logistics** and **Vehicle Manufacturing** sectors.

Agro-Food

The sector refers to the large-scale production, processing, and packaging of food, using modern equipment and methods. It includes a wide variety of manufacturing industries, such as food and beverages, wood furniture, tanneries, etc. Food processing is the largest industry of the sector, producing just below one fourth of the total added value in Greek manufacture (30% of total turnover) and providing work for more than 25% of total employees in Greek manufacture (Ministry of Rural Development, 2012).

Good practice examples in this sector are the following:

ELVA Olive Press is the first ecologic olive press operating in Greece. Its eco-innovative character is systemic, addressing almost every stage of the production process: it covers its energy needs exclusively from renewable energy sources; the produced waste, both in liquid and solid form, is turned into compost which is sold in the market; while for heating purposes it uses the core of the olive. Elva Olive Press (established near the city of Chania, Crete) is based on a technology developed, in collaboration with Eco-Organic Ltd., at the Laboratory of Organic Chemistry and Environmental Engineering - Department of Chemical Engineering, of the NTUA. The laboratory has been working for many years on methods of processing and exploitation of olive waste. The result of this research is an integrated technology that solves the problem of treatment and disposal of olive wastewater in an environmentally sound manner. The olive wastewater produced from the pressing of the olives, is being led to an oxidation unit where it is being processed. The method is based on the detoxification of the olive wastewater using the Fenton oxidation processes; the latter use ferrous iron and hydrogen peroxide and makes the olive waste free from toxic elements by converting it from a hardly biodegradable waste, into a friendly subject for microbial action. The treated waste is absorbed in its entirety in a process of

intense aerobic composting, with the rest of the olive press products (olive leaves) giving a high quality compost, ideal for organic farming.

The process produces compost, which has already been introduced to the market in 30kg packages. The compost's brand name is "Humo-olea". It is purely herbal, coming from the overhead portion of the olive tree. Humo-olea is aerobic compost, fully stabilized and mature, with high rates of germination and has been approved for use in organic agriculture. So far it has been used in several cultivations with excellent results. Although a marketing and promotion strategy has not yet been implemented, Homo-olea has already won a share of the market, mainly because of its excellent quality and the environmental objective that serves.

PELOPAC S.A. (http://www.pelopac.gr/index.php) develops and produces authentic, natural Mediterranean and Greek foods for contemporary grocery, deli and food service applications, under several major brands and private labels and the famous “Flavors of Greece” brand. The company specializes in developing new and custom products in collaboration with its clients. Over the past few years, it has introduced over 100 unique new items and has won a number of awards for taste and innovation. The products (olives, antipasti, spreads, meze, glazes, sauces, snack packs) use premium ingredients and follow Mediterranean cooking traditions. An estimated 15% of the products are certified organic under the EU 834/07 and USDA NOP Standards and all the ingredients are GMO-free, as required by Greek legislation.

The primary ingredients are carefully selected from the produce of local and regional agriculture and are processed and preserved in traditional ways. Strict quality assurance procedures and production methods ensure the outstanding quality of the products. Certifications include ISO 22000 (HACCP), BRC Global Standard Food (Classification: A), Organic certification accordance with Reg. (EC) 834/2007 and Sedex Members Ethical Trade Audit (SMETA).

Apart from the award-winning products, the company wishes to actively contribute to overall social and environmental welfare and sustainable growth. In this spirit, it has developed an environmental program through which it seeks to minimize the negative impact on the environment. The Environmental Program includes the following actions: Operation of a liquid waste treatment station, Recycling of cooling water, Recycling of metal, glass and paper waste, Monitoring of fuel, electric energy and water consumption to minimize waste, Reduction of material waste, energy and resources usage.

The company is also a member of the Organic Products Cluster of Greece, which participates as an industry stakeholder and partner in the GREEN-AgriChains FP7 REGPOT Project (“Innovation Capacity Building by Strengthening Expertise and Research in the Design, Planning and Operations of Green Agrifood Supply Chains”).

Recycling & Waste

Recycling and Waste management is a challenging issue from an environmental, political, legal and social point of view. Growth of large urban areas, tourist flow, rise of living standards and change of consuming patterns, have led to an increase of the produced volumes of municipal waste with a simultaneous change of its composition.

To a large extent, Greece has incorporated European Legislation to National Law and the legislative framework in recycling and waste management can be considered sufficient and well elaborated.

Good practice examples in this sector are the following:

KAFKAS S.A. (http://www.kafkas.gr/) is a leader in the trading of electrological products. The company, which declares its respect and responsibility towards the environment, contributes systematically to the protection of the environment by applying, since 2008, in all of its branches, a program of lamp recycling in cooperation with companies Fotokiklosi SA and Appliances Recycling SA, aimed at saving energy and reducing the volume of waste, thus helping to create better living conditions for every citizen. Moreover, in all company stores, special battery collection bins can be found placed in collaboration with AFIS SA.

Recently, a new recycling system for electric devices has been integrated in some parts of the company's network in cooperation with RECYCLING S.A., which aims to recycle each widget, such as mobile phones, small appliances, computers etc., contributing to the reduction of the volume of litter and the risk of pollution from harmful substances, while simultaneously achieves savings of non-renewable natural resources.

KAFKAS has received various awards and distinctions over the years, reflecting the company's sustained efforts to achieve business excellence. The company's most significant distinctions are:

- 2012 – "EFQM Levels of Excellence" certification
- 2012 – "AEN ARISTEVEIN" certification
- 2011, 2012, 2013 – TRUE LEADER award from the ICAP Group
- 2010 – Strongest Companies in Greece
- 2007-2012 – Business Leaders in Greece
- 2005-2013–STATBANK commerce and industry study

BIORECYCLING LTD (http://biorecycling.gr/) was established in 2008, providing services in the area of hazardous and non-hazardous solid waste, covering a wide range of waste codes as they are mentioned in national Ministerial Decisions (KYA) 1909/B/2003 and 13588/725/2006, always according to the procedures of European Legislation. The company offers management solutions for animal by-products, plant by-products, hazardous and non-hazardous waste management and photovoltaic panel recycling.

The company is cooperating with VEOLIA, one of the biggest waste management companies globally, for the hazardous waste management. BIORECYCLING is also a member of the European Organization PV CYCLE, a pan-European Producer scheme, offering dedicated compliance and waste management services for solar energy system products falling under WEEE and Battery Producer Responsibility legislation. The organization has national representations in a series of European countries, managing waste treatment and compliance solutions. In this context, the company is the first in Greece to collect and recycle photovoltaic panels.

The company has received Praise in the Greek Environmental Awards 2014 for its innovative services.

Transportation & Logistics

The transport system of people and goods is a major source of air pollution and greenhouse gas emissions. An enterprise has to evaluate all available options for reducing its transportation footprint by developing a transportation management plan that will comprise a characterization of its fleet in terms of number of vehicles and fuel use (transportation audit) and the deployment

of a strategy for transportation efficiency. A green transportation strategy should implement some important steps: increasing the performance of vehicles (maintaining their peak performance, reducing loads, improving aerodynamics, best practices for fuel saving while driving), reducing the quantity of miles vehicles traveled (planning trips), shifting to more benign vehicles (new technologies are enhancing the fuel economy of vehicles), shifting to more benign fuels, promoting eco-friendly organizational choices (encouraging efficient worker travel and enabling employees to work from home, using teleconference systems, reducing the need for personal trips).

Good practice examples in this sector are the following:

MED FRIGO S.A. (http://www.medfrigo.gr/) ranks among the largest Greek companies in integrated 3PL services and International Transportation designed for the controlled temperature products (-25° C to +25°C). The company was established in 1991 in the city of Patras and consists of 3 divisions; Med Frigo, Cargo Med and Med Win, all offering innovative services and customized solutions adjusted to the needs of the customers. The logistics and international transportation from Greece to EU are the specialty of Med Frigo, one of the 10 largest European companies skilled in handling and distributing seafood products. The collection and international transportation from EU to Greece is the specialty of Cargo Med. Med Win collects, handles and distributes in a daily basis in the regions of Attica & Southwest Greece. Annually, more than 6,500 refrigerated trucks go all over Europe, delivering to more than 400 points in 15 European countries every week.

The company is certified with ISO 39001, ISO 9001 and HACCP for food safety standards.

The company operates with respect for the environment in terms of sustainable development. It constantly invests in upgrading the equipment of the facilities, thus preventing the environmental impact and improving the working environment.

In this respect, it has implemented the following environmental friendly actions:

- Establishment of a recycling program for paper and packaging materials.
- Support of environmental organizations, thus promoting their work
- Use of light pipes in the premises, thus bringing natural light indoors
- Modernization of the corporate fleet of trucks in order to reduce environmental pollutants
- Increased staff awareness so that they are sensitized and actively participate with small everyday actions to environment protection and resource saving.

Vehicle Manufacturing

TROPICAL S.A. (http://old.tropical.gr/) was founded in 1991 and is a Greek fast-growing industrial company which manufactures over 100 products (with the cooperation of Greek and International Universities) that are being sold to Greece and abroad. Since 2002 it has been certified according to ISO 9001:2000 from TUV in Germany (Certification No 04 100 20021692-E9). TROPICAL has been certified since 2002 according to ISO 9001:2008 from RINA Organization (Cert. No IT-81077). It has to be underlined also that it is the only company in Europe certified under EN ISO 9001:2008 for the **production of Fuel Cell Systems** as well as the **assembly of electric and hybrid vehicles**.

TROPICAL among others, constructs special vehicles and chassis on demand, it develops products of hydrogen technology and RES, and it has also a special Department for the development of industrial prototypes and other innovative products. TROPICAL invests every

year in R&D and cooperates with Universities, Research Institutes, Technological Foundations and Schools.

TROPICAL's products can be briefly described as follows:

- Bus construction of all types (touristic, urban, intercity, school, worker transport)
- Mobile post vans and bank vans
- Special Fire trucks for the Greek Refineries of Aspropyrgos
- Special Police trucks (traffic investigation, suspicious person monitoring, special forces, prisoner transfer)
- Ambulances
- Mobile offices, exhibitions, libraries, markets
- Bullet proof vehicles
- Mobile dentist units, hospitals, blood units, radiological units
- Money transfer vehicles
- TV broadcast vehicles
- Horse transfer vehicles
- Vehicles for the disabled
- Mobile service units, toilettes, restaurants, catering
- Solar vehicles
- Electrical vehicles and motorcycles
- Hydrogen vehicles

In the hydrogen technology sector, TROPICAL is the only company in Greece that has been engaged in the production of Hydrogen Fuel Cell Systems, Hydrogen Electrolysers and Hydrogen Metal Hydride Tanks.

One of the most important moments in the company's history was the award given by Bill Gates himself, on January 28, 2008, during Gates' visit for the inauguration of Microsoft Innovation Centre in Athens. TROPICAL, together with some other companies, received an award for its innovative products such as the **4-seat hydrogen city car**.

Greek newspaper "Kathimerini", in its special "Eco" Guide in June 2011, has an extensive report for the innovative **electric bicycle** of TROPICAL. It operates with lithium polymer battery (doubling the life span) and there is also a speed controller which "reads" the street through a sensor and adjusts the speed accordingly.

5.4. PORTUGAL

Once a year, and complying with the national Environment Basic Laws, the Portuguese Environment Agency (APA) produces a report evaluating and disseminating the environmental performance of the country. The State of the Environment Report 2014 comprises recommendations for seven major areas:

- **Environment and economy** – including internal consumption of materials, taxes with environmental relevance, instruments for environmental management, and "green" patents;
- **Energy and transports** – including energy production and consumption, energetic and carbonic intensity of the economy, renewable energies, and transports;
- **Air and climate** – including greenhouse gas emissions, ozone precursor substances' emissions, acidifying and eutrophying substances emissions, precipitation and temperature,

Air Quality Index, tropospheric ozone pollution episodes, pollution by inhalable particles, and pollution by nitrogen dioxide;

- **Water** – including water for human consumption quality, bathing water quality, hydric efficiency, and status of the body of water;
- **Land and biodiversity** – including National Classified Areas System, production capacity of aquaculture, area of biological agriculture, sales of plant protection products, and nitrogen and phosphorus balances;
- **Waste** – including production of urban waste, management of urban waste, packages waste management, and trans-boundary movement of wastes;
- **Environmental Risks** – including forest fires, genetically modified organisms, and chemical products.

Regarding specifically the "Environment and economy" the key messages (main goals and objectives) summarised in the report were the following:

- To obtain an economic growth less intense in natural resources consumption.
- To ensure that resources consumption is lower than the capacity of regeneration of the environment.
- To promote a better eco-efficiency in the use of resources.
- To enhance the rational use of natural resources and the internalisation of the environmental externalities.
- To promote re eco-efficiency of the organisations.
- To motivate the adoption of more sustainable production and consumption patterns.
- To encourage the supply and demand of products, activities and services with a reduced environmental impact.
- To enhance the environmental performance of the economic activities.
- To promote R&D of green technologies

The main data sets analysed on the above-mentioned report is also considered in the report "Environment Statistics", published by the National Institute of Statistics. Some of the major findings detailed in the report of 2014 (having as reference period 2013) are listed below:

Energy

- In 2013, the primary energy consumption in Portugal was 1.0% more than in 2012.
- The primary energy consumption by source reveals that, despite the downward trend, oil dependence remains very high (natural gas is the second most consumed energy source in 2013, followed by coal).
- Portugal is rich in some resources (water, wind, sun, biomass) and has no reserves of fossil fuels, which justifies the investment in renewable energy and energy efficiency.
- Between 2009 and 2013 the contribution of renewable sources was 22.4% and 48.8% of the total primary energy consumption and total electricity production.
- In 2012 (the last year for which there is available data for the EU-28), Portugal had the seventh largest share of renewable energy in the EU-28. In 2012 the renewable energy represented 14.1% of gross final energy consumption in the EU-28 and 24.6% in Portugal.

Waste

- When comparing among the EU28, Portugal is placed on the third position starting with the

countries having the lowest ratio of waste by GDP. Such position and condition is determined by the fact that Portugal is the ninth country in the less waste production list of countries and sorts out in the middle (fifteenth) of the EU 28 countries rank regarding GDP value.

- In 2013 Portugal generated 4.6 million tons of municipal waste, an amount 3.5% lower than the 2012 quantity.
- Despite the significant reduction and the gradual downward trend of the quantities of waste disposed of in landfills in the period 2009-2013, in 2013 nearly 50% of the municipal waste managed was sent out to landfill. This past year, the amounts of municipal waste submitted to organic recovery and recyclables recovery, amounted to a total of 1.2 million tons, approximately 26% of total waste.
- In the period 2009-2013, the economic activities in Portugal, generates about 57 million tons of waste. In 2013, the estimation points to a value of production of 11.2 million tons, an increase of 18.5% comparing with 2012, reversing the downward trend that was estimated for the biennium 2011 -2012.

Air

- In 2012 (the latest year with available information on emissions) there was no decarbonisation of the economy. The air quality index reflects the air quality in Portugal, considering pollutants such as nitrogen dioxide (NO2), ozone (O3) and fine particles with less than 10 micrometers in diameter (PM10).
- In 2013, 77.4% of the days showed “good” air quality and 15.3% “medium” quality. These two quality grades were also dominant in the remaining years. 2013 had the lowest proportion of days with “very good” air quality of the time period.

Water:

- According to the latest data on the monitoring of drinking water quality, it is possible to provide for the first time in 2013 the all territory indicator of Safe Water for Portugal estimated at 98.2%.
- In 2014 Portugal had the highest number of blue flags ever. The 298 beaches classified this summer with the Blue Flag Award correspond to 53.5% of the total existing bathing areas (beaches) in the country, highest proportion in the last twelve years period.

6. FRAMEWORK OF GREEN JOBS AND TRAINING

6. FRAMEWORK OF GREEN JOBS AND TRAINING

6.1. GERMANY

The main causes of the wide spread integration of environmental know-how are: Energy from fossil fuels is becoming more and more expensive. CO2 emissions are gradually priced and thus contribute to rising energy prices. The use of energy efficiency at all working stages support cost saving and competitiveness. Moreover, the use of renewable energy is partly subsidized. It secures a partial independence from price fluctuations of fossil fuels. The population's awareness has changed and the greening of products and businesses has become a matter of public concern. Companies are reacting to these changes on consumer markets in order to avoid damaging their image and competitive disadvantages. Legislative measures and constraints regarding environmental standards are affecting product development, production, investments and consumption behaviour.

The retraining within economic sectors in the course of green restructuring mainly orientates on the education and training system. Companies' initiatives are marginal compared to the well structured and organised training system. The skills response in terms of promoting education and training is visible. Promotion programmes have been established, technical qualification trainings are offered and new study courses and further training with environmentally relevant subjects have been developed. Beyond new types of training, many existing training courses are becoming greener due to the integration of environmental protection aspects. Especially the offer of continuing vocational training related to environmental protection is substantial. Moreover, there is the possibility to participate in education-integrated studies. Companies offer an initial vocational training and at the same time the apprentices participate in a university course. In the course of the establishment of the environmental technology sector and its continuous growth, specialists have been increasingly required. German universities established new study courses with focus on environmental technologies. The number of students has been growing in recent years. All in all around 7,000 students were studying engineering with a focus on environmental techniques (inclusive recycling) in 2009. Another contribution for educating professionals is from research institutes. The number of research projects has risen in the last few years and thus, specialised knowledge has accumulated. The educated scientists who work at the institutes often change in the industrial sector to a future date.

On the level of dual apprenticeship training, environmental protection has been integrated in all initial vocational training regulations and therefore a greening of the whole dual vocational training can be observed. The chemical industry in particular played a leading role in the integration of environmental aspects in their sector and apprenticeship training. The first revision of training regulations within the chemical industry with environmental protection was in 1987 and was updated in 2002 and 2009. Moreover, four environmental technicians were established as a dual apprenticeship in 2002. These are able to work in the waste management, sewage and recycling area and have adapted skills to operate the facilities in this area. All together around 2,500 apprentices were employed in these trades in 2008. The extent of integration regarding company training strongly depends on the company offering the apprenticeship as only a minimum requirement is determined by the regulation.

Greening revision of existing initial training regulations (examples):

1) **Environmental Technicians** (revision: 2002). The environmental technicians emerged as four training programmes from the "Provider and Disposer" (Ver- und Entsorger) training.

They present a modernised apprenticeship with greening character. These apprentices still hold technical qualifications as standard qualification and have additionally integrated wide knowledge regarding environmental protection. The environmental technicians mainly work in waste and sewage disposal and recycling.

2) **Plant Mechanic for Sanitary, Heating and Air Conditioning** (revision: 2003). For this trade especially the increased use of sustainable energy input was part of the revision. The apprentices adapt knowledge to use regenerative energy and to conserve energy by efficient energy use. They will intensively install solar facilities, heat pumps and wood pellets for heating. Moreover, they will acquire knowledge for control systems and building system automations which take the weather forecast into account and thus help to increase the energy conservation.
3) **Electronic Technician for Energy and Building Services Engineering** (revision: 2003). For this trade the same extended work tasks apply as for the Plant Mechanic for Sanitary, Heating and Air Conditioning
4) **Builder of Stoves and Air Heating Systems** (revision: 2006). For the Builder of Stoves and Air Heating Systems also the integration of an increased use of sustainable energy dominate the greening part of the training revision.

In terms of greening, four new dual apprenticeship trainings were established from the existing provider and disposer training in 2002 (examples), namely:(a) recycling and waste management technician, (b) water supply engineering technician, (c) sewage engineering technician, (d) pipe, sewer and industrial service technician.

Continuing vocational training:

Greening an existing occupation within continued training comprises additional skills which can be adapted by the training. These include basic trainings which impart environmental protection aspects such as waste and recycling, energy conversation or environmental legislation as well as specialised training for further work as an environmental specialist, energy consultant or environmental engineer. The need for further training is mostly affected by either new legislation or new technologies and the corresponding need for skills adaptation. To illustrate skills adaptation as a consequence of new legislation the energy consultant was included in the case studies. According to legislation landlords and other people who sell buildings and dwellings require an energy pass which defines the energy need of the building. Only a designated group of occupations may opt out these energy passes. A special group is craftsmen who have completed a continuing training to become an energy consultant. A greening of an existing occupation in the course of technological change is for example the already mentioned Solar Technicians. Due to the establishment of solar plants, skills to install these plants especially in private are needed. The target group is craftsmen, Plant Mechanics for Sanitary, Heating and Air Conditioning and Electronics, who adapt the required competences with help of continued training.

6.2. SPAIN

Policy context

Key challenges and priorities for a green economy

The challenge of adapting to climate change in Spain is three-fold: the next decades will see intensifying increases in temperature, decreases in precipitation and sea level rise. Global warming will have serious effects on biodiversity, affecting agriculture and livestock industries. Decreases in precipitation will diminish water resources, with implications for agricultural

production, forest density, soil erosion and fertility, as well as potentially negative consequences for water supply in many cities.

Economic development and population growth also affect efforts to mitigate climate change. Water problems are enhanced by the current trend of urban growth and periodic droughts. Priorities in Spain are therefore focused on energy security and solving the problem of water scarcity. To this end, renewable energy production and desalination technologies have been developed extensively over the last decade. Energy and water strategies form the core of Spain's transition to a greener economy.

Spain also has to make considerable advancements in relation to its Kyoto Protocol commitments, as GHG emissions are currently far from targets, reaching 420 Mt of equivalent CO2 in 2008, 52 per cent higher than in 1990. Efforts to reduce GHG emissions are embedded in various environmental strategies cutting across all sectors in the economy.

The environmental response strategy and the role of skills development

General environmental strategy

The strategy for dealing with the above challenges prioritizes four areas: energy, water, pollution and transport. First, the energy strategy is based on reducing the energy/production ratio and increasing renewable energy production. Second, the water strategy is based on increasing efficiency of water consumption and increasing water resources. Third, reducing pollution and protecting natural resources is a green priority in itself. Fourth, the transport strategy consists of the development of electric cars and promoting sustainable transport, including the shift from road to railway transport. Agriculture and fisheries are targeted in several of these priority areas.

The Spanish policy response to the challenge of climate change is fostered at different administrative levels of the state: central government, autonomous communities and local councils.

Key environmental strategies at the national level are the 2006 Spanish Climate Change and Clean Energy Strategy, the 2007 Spanish National Climate Change Adaptation Plan and the 2007 Spanish Sustainable Development Strategy. Sectorial plans have also been implemented at a national level for transport, pollution, water and energy. Several initiatives from the autonomous communities complement the Government strategies, together with Agenda 21 at the local council level.

Green response to the current economic crisis

In December 2008, the Spanish Government launched an 11 billion economic stimulus package, equivalent to approximately 1 per cent of GDP. The package included 600 million in environmental projects and 500 million in research and development, together with funding for infrastructure projects and investment in the ailing automotive sector, signalling the importance placed by the Government on the "green economy" and its role in promoting growth and development.

In response to the economic crisis, the Government launched the Spanish Economy and Employment Stimulation Plan (Plan E) in early 2009 and consulted on a Law of Sustainable Economy later that year.

The Spanish Economy and Employment Stimulation Plan (Plan E) is a comprehensive and extensive strategy containing short-term packages oriented towards introducing long-term reforms in the economy to move towards sustainability. Plan E includes an important and comprehensive skills development strategy, from primary education to R&D projects in universities and research centres, which to some degree addresses the skills needs brought about by environmental policies.

The strategy is supported by a raft of measures to enhance environmental sustainability, including funding for sustainable transport (Plan VIVE) and R&D in low-carbon vehicles (MOVELE project), as well as additional support for the Energy Efficiency and Saving Plan 2008–11, the Renewable Energy Plan 2011–20, the Law of Renewable Energy and Energy Efficiency, and the Railway Freight Transport Promoting Plan.

The skills development strategy in response to greening

Despite the inclusion of several skills training responses in environmental policies, and the progressive development of diverse environment-related programmes in the higher education system, there is no explicit national strategy targeting skills needs for greening the economy. Many public strategy documents identify the need for more skills training but there is no overarching, comprehensive skills training strategy identifying the skills needs for the occupations involved, and a recent Symposium of Environmental Training within the Spanish Public Administrations found that there h s been a lack of strategic coordination of skills responses for “greening the economy” at different administrative levels. However, there are many interesting initiatives from public bodies that contribute to skills training. Public bodies also participate in skills training programmes designed by private sector academies or associations, funding these programmes directly or through managing EU funding.

In Spain, the regions are responsible for managing active labour market policies, which include employment creation and occupational training for the unemployed. They also manage education policies including formal vocational training and tertiary studies. Though harmonized and coordinated at the state level, they adapt employment and education strategies to their needs and strategic priorities. Regional approaches to the “green jobs” agenda and associated skills re- Skills for Green requirements vary greatly but there are several existing environmental education plans by the Spanish autonomous communities.

Many agents in the private sector or civil society are complementing the skills training offer for the greening of the economy. In the last decade, “green sectors”, especially the renewable energy sector, have grown rapidly, increasing the demand for professionals and leading to the development of skills responses by universities, certain public bodies and the private sector.

Skills in transition to a greener economy

Green restructuring and its impact on the labour market

Green restructuring in Spain is mainly policy driven. Greening of the economy started about ten years ago with reform in energy policy, and has recently been reinforced by policies designed to deal with the economic crisis. The greening strategy focuses on renewable energy but includes promotion of waste treatment and green management in public and private bodies. Due to the impact of the economic crisis on the construction sector, a concerted effort to aid employees to diversify into renewables has been launched. The automotive industry has also recently been

targeted as a greening sector, in an effort to aid the ailing industry and make advances in meeting climate change policy targets.

Green structural change involves several retraining needs across these sectors. For many occupations in the building industry, the skills gap for renewable energy is small, particularly for electricians, plumbers or installers training to install solar energy panels on buildings. Certain technical skills are needed for construction-related occupations to adapt to the particular technical specifications for installing photovoltaic and thermal solar panels, but these skills are not too different and can be acquired in a relatively short time span. Energy policy has also led to the creation of several “new” green occupations, namely technical staff in the areas of building and installation and in operation and maintenance. Furthermore, although the electric car strategy is only in its initial phase, it is also likely to require some kind of skills response, for example for building power supply access points, which will involve construction-related occupations such as electricians and building workers.

Skills response

The skills training response needed for green structural change is carried out by several agents from public, private and mixed bodies. Two quite different approaches are taken in the public and private sectors:

- **Public sector responses:** skills responses led by the public sector have been observed in regional government strategies for the renewable energy sector. Many local and regional governments are organizing such skills training in the context of active labour market policies, for example the programmes undertaken in the Basque Country, Navarre and Extremadura. Here, regional governments attempt to anticipate the need for green skills through initiatives to provide a skills training response for the green structural change.
- **Responses from the private sector and social partners:** skills responses coming from private sector and social partners flow directly from demand from workers and SMEs and they either undertake skills training themselves or entrust the skills response to a training centre.

There is often coordination between public and non-public skills responses, for example in initiatives created by a private agent (an academy or association) and funded by a public body offering subsidies to agents developing green skills training projects (such as the city council, regional government, or EU funding).

Changing and emerging occupations and related skill needs

New and emerging occupations

New or emerging green-collar occupations are found across several sectors involving quite different occupations, education levels and skills. They are not entirely “new” in that they have emerged from established occupations, but the skill sets required to perform the work are distinctively different. New or emerging green occupations can be classified in the following four broad groups: Renewable Energy, Waste Treatment, Green Management, and Awareness.

Many companies from the engineering, electricity or installation sectors have diversified their core activities to the renewable energy sector. Only half of the renewable energy companies are specialized in renewable energy, while the other half perform additional activities. This means that new skills required are relatively easily acquired through retraining in skills related to

renewables such as knowledge of technology systems, installation procedures, regulation, maintenance and management.

Waste management in Spain includes activities across urban waste management, dangerous waste management and recycling. New recycling and waste management approaches have been developed in response to increased urbanization, population growth and development of the tourism industry, while technological innovations involving mechanization of tasks have changed the skills set for the sector. Greener waste management, which includes selective waste collection or recycling techniques, is expected to grow in the coming years, requiring additional jobs and skills training responses.

Green management organizes and controls the shift in production to a more environmentally sustainable productive structure or manages goods with a high natural value. Examples of occupations in this sector are protected natural reserves management, forest area management, corporate environment protection activities and public body technicians and inspectors (located in local councils).

Workers in environmental education and the environmental information sector have a key role in influencing the behaviour of consumers. Occupations related to environmental education and awareness have experienced a considerable growth and diversification in the last few years, with more people acquiring skills for environmental training and awareness.

Greening established occupations

Greening of existing occupations is part of the overall green structural change and is therefore related to those fields targeted in environmental strategies such as occupations within construction, water, transport, agriculture and fisheries. Greening processes within one sector often affect more than one occupation. Sometimes this is because the same factor drives the greening process across the whole sector. Two main drivers of the greening process have been observed: environmental concerns/policy and economic drivers. The first is based on regulations reflecting environmental priorities and the second is based on economic savings obtained by the “greening process” (usually related to energy efficiency).

In shifting to more environmentally responsible production methods, two different skills gaps have been identified in this study. First, there is a “capital greening gap”, which could be narrowed by increasing energy efficiency through capital substitution (generally involving technological change). Second, there is a “non-capital greening gap”, which could be addressed by increasing energy efficiency through organizational changes or improving attitudes of workers.

As an example, a capital greening gap could be the change in agriculture from old harvesters to newer, less polluting ones.

By contrast, an example of a non-capital greening gap could be switching off the lights in office buildings when they are not in use. Closing this non-capital greening gap involves training in conceptual skills, such as environmental awareness. A non-capital greening gap could be found in almost every occupation, from farmers to highly qualified white-collar workers, and this is one of the key challenges of greening the economy. Thus, conceptual skills training responses, such as awareness campaigns, should continue and perhaps incorporate new training methods.

The study has observed that greening occupations tend to be blue-collar rather than white-collar workers. Blue-collar activities tend to be more energy intensive than white-collar activities;

hence the potential greening gap would appear to be wider for blue-collar workers than for white-collar workers.

Skills response

Three types of skills responses have been identified for changing and emerging occupations: Long programmes within the education system, courses for specific occupations, and skills responses in corporations.

- The first kind of skills response, **long programmes within the education system**, is providing a growing range of courses related to new green-collar occupations. These courses are either set within the vocational training system for technical occupations or within managerial postgraduate programmes in universities. University training tends to be directly focused on new green-collar jobs, whereas the vocational training system usually provides wider technical skills training programmes. Courses for green occupations have experienced considerable growth in the latest years.
- The second type of skills response, **courses for specific occupations**, has been fostered and financed both by public and private bodies, including regional and local governments, employment services, associations, foundations and trade unions. Private training centres have played an important role in this kind of skills response. This kind of skills response is effective in delivering greening of existing occupations, as skills gaps are typically small and the training period is short – professionals, both employed and unemployed, do not tend to take long and comprehensive courses in order to green their skills but prefer shorter and focused courses for learning the skills required to perform a new green-collar occupation.
- The third kind of skills training, **skills responses in corporations**, is also focused on specific skills needed for the new green-collar occupation. Corporations identify the skills needed for their activities within their departments and the skills training response are internally organized. Here, the corporation identifies the skills gaps through reports from the different production departments, while the skills training is provided either by experienced staff within the training department, or by external trainers.

Anticipation and monitoring of skill needs

There is no single entity entrusted with anticipating and monitoring green employment in Spain. Instead, identification of skill needs for the greening economy is undertaken through several initiatives in public, private and mixed bodies, involving different methods. This study found five main methods of identification that apply across restructuring cases, new green jobs and greening of existing jobs:

- **Worker demand:** this has played a key role in the identification of skills needs in the solar energy sector, motivating the organization of several courses.
- **Company demand:** is clearly differentiated depending on company size. Large companies tend to identify needs in their own departments and provide the skills training needed internally. By contrast, SMEs usually communicate skills gaps to regional bodies, training centres or corporate associations.
- **Private academy marketing studies:** this approach is entirely market driven and is for example used by the Institute for International Research training centre in its skills response for desalination plant maintenance and operation managers (see case study).
- **Public initiatives:** consists of several initiatives from public bodies identifying skills gaps for the greening economy. Some are integrated within a certain skills development response, while others consist of studies on skills needs.
- **Comprehensive and organized studies at national or regional level:** skills studies at regional and national level complement the above skills identification procedures. One example is the comprehensive study undertaken by the Public Employment Service in order to identify the occupations and skills needs in the renewable energy sector.

An important recent regional initiative that was created specifically for anticipating and monitoring green employment is ECOEMPLEO, the Valencia Observatory for Environmental

Employment and Training.183 This body is committed to the study and analysis of employment trends and skills needs in the environmental sector. The observatory originated from the study "Present situation and trends of environmental employment in Valencia Autonomous Community", and is supported by several public and private bodies in the Valencia region. ECOEMPLEO has carried out a study entitled "Present situation and trends of environmental employment in Spain", detailing a collection of new green-collar occupation profiles.

Skills studies and policy require better integration: the identification of skills needs could be better forecasted, with a positive effect on the timing of skills provision. A comprehensive study of skills needs at the national level is currently being undertaken by the National Employment Service. It would have been positive if such a study was linked with the design of the main green strategies (many of them conceived around a decade ago).

Stronger public–private cooperation is highly recommended for anticipating future skills needs in order to avoid possible skills bottlenecks.

6.3. GREECE

Occupation trends

The transition to green economy dictates many changes in all aspects of the economic sector. Consequently, employment is also affected to a significant extent as traditional jobs might be replaced or upgraded, while new jobs will be created in order to answer to the demands of the market. This will change the identity of some existing jobs while also generate higher employment rates for the countries. More specifically, green jobs are developed at the same pace as green economy and are shaped by the analogous green skills. These skills are not necessarily new skills that must be developed but they could be already existing skills that can now be applied in the framework of green economy and the protection of the environment. In Greece, VET centers and providers are working towards this harmonisation and continuous learning for both employed and unemployed personnel, in order to meet the new-shaped needs of the market and the economy.

Green jobs and green business are expected to blossom in Greece. There is already evidence that some occupations, especially in the energy efficiency sector, such as energy auditors, are in great demand due to the development of alternative energy sources in the country. However, the economic crisis has negatively affected the employment trends as the country ranks 1st among the other European countries in unemployment, especially for the young people. Nevertheless, despite the difficulty of the situation, the Greek government has promoted various training programmes that assist both job seekers and unqualified personnel in order to find jobs in numerous sectors. For example, in the construction sector, there are many programmes that create jobs in public construction projects.

Even though in Greece, there is limited skill need planning and lack of available data on the employment levels and trends for green occupations, since 2010, the Greek National Accreditation & Certification System has certified 202 occupational profiles, 24 of whom are linked to agriculture and the green economy. According to CEDEFOP, in Greece, because of major efforts to develop training that is linked to the development of a green and energy-efficient economy, recruitment tends to be closely connected to specific learning and training providers.

Training requirements

The EU-LFS provides data on occupations based on the ISCO codes set by the International Labour Organization. However, in Greece, data concerning employment rates for various occupations is not available which confuses the picture of the training requirements needed for various occupations in the country.

In addition, VET centers and learning providers face difficulties in meeting the needs of employers with diverse occupational profiles and understanding the skill needs of organisations. Important role in this situation is given to the geographic disparity of employers and the number of learners who require training in all parts of the country. Nevertheless, despite this difficulty, the National Organisation for the Certification of Qualifications & Vocational Guidance offers valuable information on occupational profiles that fully include job functions, required knowledge and skills and competencies in order to exercise each profession.

Below, there are some indicative examples on green jobs and the skill training that is required in Greece, according to CEDEFOP and the National Organisation for the Certification of Qualifications & Vocational Guidance:

- **Transport vehicle emissions inspector**: Initial qualification in car mechanics is needed which is usually acquired from technical or vocational colleges. Additionally, vehicle testing is also required which is usually standardized at national level. The skill demands of the job that should be addressed are regulatory awareness, risk management, inspection and monitoring, communicating and documenting, analysis and decision-making.
- **Refusal collector**: No minimum qualifications are required for this occupation. The training is provided on-the-job by each employer. Training for refuse collectors is generally not formally regulated and is mostly provided on-the-job by employers. It is typically of short duration, varying between a few hours and a few days, and may be supplemented by informal mentoring or supervision by more experienced staff.
- **Vehicle mechanic/technician**: Vehicle mechanics/technicians require basic and specific knowledge on cars' technology. Qualification can be provided by technical or vocational colleges. Some of the skills required for this occupation are car maintenance and diagnostics and control and enforcement of safety regulations.
- **Viniculture/vinification technician:** This occupation requires knowledge on viticulture and tree planting. It can be acquired by technical or vocational colleges. Good organization skills as well as good sense of space are also important. Additionally, chemistry and agriculture are also an internal part of this occupation.

6.4. PORTUGAL

The European Qualifications Framework is a common reference framework which assists in relating the various national qualifications systems to a single reference framework, acting as a translation and comparison device of the qualification levels in different countries. In the Portuguese case, the referencing process showed that there is a clear and direct relationship between the levels and descriptors of the National Qualifications Framework and the European Qualifications.

The National Agency for Qualification and Vocational Education and Training, I.P. (ANQEP), is the National Coordination Point for the implementation of the European Qualifications Framework, in conjunction with the Directorate General of Higher Education with respect to levels 5 to 8 of the National Qualifications Framework structure.

The ANQEP is responsible for developing and updating the National Catalogue of Qualifications (CNQ), an instrument for the strategic management of lower level qualifications, covering at this stage 262 vocational qualifications from 39 educational and training areas.

Within the CNQ several green-oriented qualifications can be found, including from ISCED level 2 (lower secondary educational), ISCED level 4 (Post-secondary non-tertiary education) and ISCED level 5 (Short-cycle tertiary education).

A non-exclusive list of these green-oriented qualifications:

ISCED II

- Solid waste management systems operator
- Water treatment systems operator
- Electrician (electric installations)
- Electrician (networks)
- Electromechanic (electric appliances)
- Electromechanic (refrigeration and air conditioning)
- Fireman

ISCED IV

- Quality technician
- Gas technician
- Electric installations technician
- Electric networks technician
- Refrigeration and air conditioning technician
- Bioenergy systems installer technician
- Eolic systems installer technician
- Photovoltaic solar systems installer technician
- Thermic solar systems installer technician
- Water treatment systems technician
- Industrial chemistry technician
- Water treatment systems technician
- Metallic treatment technician
- Civil protection technician

ISCED V

- Energy management and control specialist technician
- Safety, environmental and quality Management specialist technician

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