



European Employment Observatory Review

The employment dimension of economy greening

2009



This publication is based on articles provided by the SYSDEM correspondents. National articles are the sole responsibility of the author(s).

European Commission

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European Employment Observatory Review
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European Commission

Directorate-General for Employment, Social Affairs and Equal Opportunities
Unit D.2

Manuscript completed in December 2009

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Luxembourg: Publications Office of the European Union, 2010

ISSN 1725-5376

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Printed in Spain

PRINTED ON ELEMENTAL CHLORINE-FREE BLEACHED PAPER (ECF)

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1. Introduction

Going green is currently seen not only as a necessary response to the changes in the climate around the world, but also as an avenue for stimulating the EU economic development in the near and longer-term future. The process of 'greening' the economy is expected to have a significant effect upon EU industries and labour markets.

Climate change itself, and policies to keep it within sustainable limits, are likely to trigger important changes in the way we produce and work. Some sectors or regions will suffer and jobs will be lost, while other activities will thrive and generate new employment. Managing this substantial structural change will require, amongst others, employment policies that facilitate the necessary adjustment in an efficient and sustainable way.

Green jobs are usually defined⁽¹⁾ as decent work created in economic sectors and activities, which reduces their environmental impact, ultimately leading to environmentally, economically and socially sustainable enterprises and economies. This includes jobs that help to reduce the consumption of energy and raw materials, decarbonise the economy, protect and restore ecosystems and biodiversity, and minimise the production of waste and pollution.

The definition for green jobs allows for different interpretation of environmental performance of economic activities over time and the size of the environmental footprint that can be considered sustainable. In addition, the quality of green jobs in terms of working conditions/standards also needs to be questioned. Examples of poor working conditions in the context of green jobs include electronics recycling without adequate occupational safety and low wages for solar panel installers.

The variation in environmental performance of green jobs and differences in understanding 'decent' productive working conditions make it difficult to define 'green' jobs. This variation in the boundary for defining green jobs creates 'shades of green' jobs, sensitive to the thresholds used for defining them. While the different shades of green jobs complicate the estimation, it does not have to be a major problem. The real significance of green jobs is not in the volume of direct green jobs that are being created, but in the way they transform the economy and the labour market. Thus, it is important to understand that the green transition provides opportunity not just for a small number of environment-related sectors but across the economy as a whole.

A growing literature suggests that a substantial number of green jobs already exist⁽²⁾. However, research on the implications of green jobs on the labour market, although limited, has been increasing over the last few years. The emerging picture points towards the fact that the EU will be confronted with the process of ongoing economic transformation, where some new jobs will be created, some existing jobs will become greener and some jobs will be lost. Economic modelling suggests that net employment impacts of the transition to a green economy are likely to be small at the level of the EU, but that there will be significant sectoral employment changes, with the potential for significant social impacts in some regions. It is expected that going green could cause unequal distributive effects, and will affect primarily the composition of employment (occupational and regional) and, to a lesser extent, the overall employment level within the EU.

The current evidence suggests that monitoring the labour market bottlenecks in different sectors (e.g. in terms of skills shortages) and occurring job losses (that would create potential risks in terms of long-term unemployment) will be crucial in order to develop adequate employment policy responses. This is well illustrated from the recent experience of implementing legislation on energy-efficient buildings in the EU. Knowledge gaps (mainly among building professionals, but also among other actors involved in the supply chain) are considered to be responsible for the slow progress in this area.

It is essential to be able to identify efficient measures that will encourage the development of the green economy, boost growth, gain productivity and stimulate innovation, while at the same time minimising the risk of structural unemployment or inactivity emerging as a consequence of the crisis and restructuring process. This will be an important move to set the foundations and direction for the post-2010 growth strategy for Europe.

In this context, the SYSDM experts provided an overview and their assessment of the national employment dimension of 'going green' in their respective countries.

⁽¹⁾ See UNEP, ILO, IOE and ITUC, *Green jobs: Towards decent work in a sustainable, low-carbon world*, 2008 (http://www.unep.org/labour_environment/PDFs/Greenjobs/UNEP-Green-Jobs-Report.pdf).

⁽²⁾ See, for example: Eurofound, *Greening the European economy: Responses and initiatives by Member States and social partners*, 2009 (<http://www.eurofound.europa.eu/eiro/studies/tn0908019s/index.htm>); GHK, *The impacts of climate change on European employment and skills in the short to medium-term*, 2009 (<http://ec.europa.eu/social/main.jsp?catId=88&langId=en&eventId=172&furtherEvents=yes>); European Commission, 'Climate change and labour market outcomes', Chapter 3 in the *Employment in Europe 2009* report, 2009 (<http://ec.europa.eu/social/main.jsp?catId=119&langId=en>); Fankhauser, S., Sehlleier, F. and Stern, N., 'Climate change, innovation and jobs', *Climate Policy*, Vol. 8, No. 4, London, 2008, pp. 421–429.

In addition to the skills implications of green transition, an understanding of the way green jobs affect labour markets needs to:

- put the creation of green jobs into perspective and consider the number of such jobs in the context of the overall job creation;
- recognise the forward linkages of greening economic activity;
- take into account the interactions of new job creation, substitution, destruction and transformation;
- consider the often large effects via indirect and induced employment; and
- look into the social implications of the transition; for example, the extent to which the change in employment between sectors leads to more decent jobs is unknown and this represents a risk to social cohesion and sustainable green transition.

This summary reviews the main findings of the national reports prepared by the SYSDem experts of the European Employment Observatory in 30 European countries in December 2009. The full national reports are available separately, on the EEO website (<http://www.eu-employment-observatory.net>).

The next section of the summary (Section 2) provides an overview of the assessments of the labour market effects of economy greening in Europe. However, as the available data on green jobs are rather limited, most reports paint only a scant picture of the employment effects.

Section 3 reviews the labour market policies that tackle the employment challenges and opportunities posed by economy greening. Here, a strong case is made for promoting policies in line with flexicurity principles that ease transitions so that workers can be encouraged to be receptive to experimental innovations, as they move towards less-polluting activities. In this context, the reports emphasise particularly the need to strengthen training and education schemes in order to avoid the emergence of skill gaps and shortages.

The last section (Section 4) provides some general conclusions arising from the national reports.

2. Labour market effects (effects of the greening of the economy on the labour market)

2.1. Introduction

The national reports show that the general public, social partners and national, regional and local authorities are aware of the main environmental challenges⁽³⁾ and opportunities⁽⁴⁾ that are faced by the European Union (EU), as well as the rest of the world. However, the recent economic crisis has diverted attention away from environmental issues and has, in some cases, reduced the sense of urgency surrounding the need to tackle environmental problems. This can be seen in countries such as Croatia, Lithuania, the Netherlands, Portugal, Slovenia, Spain and Turkey. Nevertheless, other countries have maintained a strong focus on the environment (e.g. Denmark, Germany, Luxembourg, Sweden and the UK).

In addition, there are significant differences across EU Member States in terms of the development of a green economy. Some countries are only just beginning to implement measures targeted at the greening of the economy (for example, Latvia, Slovakia and candidate country Turkey). Others have already made considerable progress (such as Denmark, Germany and Sweden). As a result, the effects of economy greening on the labour market are at different stages across different parts of Europe.

Overall, the national reports confirm that economic actors recognise that tackling environmental challenges will require large-scale structural changes in the way Europeans produce goods and services, as well as in the way in which we work. This is reported, for example, in Finland, France, Hungary, Lithuania, Poland, Romania, Slovakia and Slovenia.

The national reports have drawn attention to several studies and measures aimed at improving energy efficiency, increasing the use of renewable energy sources and promoting environment-related research and development (R & D). However, most of the initiatives have neglected the employment dimension and have instead primarily focused on cuts in greenhouse gas (GHG) emissions, or other environmental costs and benefits. Despite this, several of the national reports have suggested that, taken as a whole, the greening of the economy is likely to have more positive than negative effects on employment (e.g. Austria, Cyprus, France, Italy and Spain).

⁽³⁾ These include climate change, the erosion of biodiversity and the accumulation of waste and pollution.

⁽⁴⁾ These include the opportunities to develop new technologies and jobs, enhance energy security and improve public health.

2.2. Measurement of 'green jobs'

Almost all of the national reports have highlighted the difficulty countries face in trying to accurately measure the precise number of 'green jobs' in the labour market. The lack of available data on green jobs means that the employment dimension of economy greening is often poorly analysed and leads to difficulties in the creation of indicators to monitor developments in green employment.

The shortage of adequate data is in large part due to the fact that there is no one standard definition of 'green jobs' or 'green employment'. For example, in Austria the number of green jobs identified differs significantly depending on the definition and concept applied. Likewise, in France, although there are a number of statistics and assessments in place to define the importance and the evolution of the green sector in the national economy, they use different definitions, making them difficult to compare.

It is widely recognised in the national reports that 'green jobs' are a relative and dynamic concept; each new product or service will be more energy efficient than its predecessor (this is particularly evident in the automotive sector). This means that the line between 'green' and 'environmentally inefficient' jobs can become blurred in practice and can shift over time in line with progress in technology, work organisation, worker skills, and education and training. As a result, past levels of green efficiency may no longer be regarded as adequate in the light of modern developments.

As a result of the shortage of reliable data, a number of countries have called for greater research into the employment dimension of the green sector and the environment industry. These include Belgium, the Czech Republic, Finland, France, Germany, Hungary, Lithuania and Portugal.

Despite the lack of comprehensive and comparable data on the employment dimension of a green economy, several countries have noted that employment in 'green' sectors is gradually increasing. This can be seen in countries like Belgium, Denmark, France, Germany, Ireland and Sweden. For example, a 2009 report by the German Institute for Economic Research stated that in 2006 1.8 million people were working in environmental protection in the country, equivalent to 4.5 % of the labour force. This was an increase of 290 000 individuals compared to 2004, a rise of almost 20 % within two years.

2.3. Analytical tools to identify the employment dimension of economy greening

In some countries analytical economic tools⁽⁵⁾ are being used to identify the direction and intensity of the employment effects of green policies. This can be seen in countries such as Denmark, Finland and Italy. In Finland, the Government Institute for Economic Research (VATT) initiated a large-scale climate change research programme at the beginning of the 2000s. It used a general equilibrium model (Vattage) to estimate the macroeconomic and sectoral impacts of climate policy over the long run.

In Italy, in 2009 the Consiglio Nazionale dell'Economia e del Lavoro (National Council for the Economy and Labour — CNEL) carried out an analysis focused on the production of wind and photovoltaic energy based on production forecasts presented in an official position paper issued by the government in 2007. Employment and value-added estimates were achieved through the utilisation of input-output matrices.

Nevertheless, many countries recognise that assessment of the impact of policy measures promoting green jobs is a very complex exercise. The creation of new green jobs may replace existing (inefficient) jobs, contribute to the greening of existing jobs, eliminate existing (inefficient) jobs or create completely new jobs in other sectors of the economy as a result of knock-on effects such as price, wage and income effects. This concern has been highlighted in countries, such as Austria, the Czech Republic, France, Slovakia and the UK.

2.4. Disaggregated effects on social and territorial cohesion

In general, very little information was available on the potential effect of the greening of the economy on social and territorial cohesion. This is not a clear-cut debate; on the one hand, it could be argued that the creation of more green jobs will open up employment opportunities for those who were previously excluded from the labour market, acting as a 'platform' to integrate individuals on the 'fringes' of the labour market. On the other hand, there is a fear that the significant increase in new green jobs may exacerbate the gap between skilled and unskilled or low-skilled jobs.

⁽⁵⁾ These include tools such as macroeconometric models or input-output tables.

Overall, the national reports have highlighted that the transition towards a competitive eco-efficient economy is being driven by a number of key forces: the improvement of energy efficiency; the development of the use of renewable energy sources; the creation of conditions that encourage climate-related research and innovation; and efforts to modernise European infrastructure ⁽⁶⁾.

Although the evidence available is still too fragmented to be able to make any firm statements, most national reports recognise that adapting to and minimising the negative effects of the main environmental challenges will have a relatively small impact on the aggregate employment level in Member States. Such actions will, however, have an important effect on the composition of employment at the regional, sectoral and skills levels.

At regional level, the effects of the transition to a competitive eco-efficient economy on employment are likely to have a significant geographical dimension. In particular, employment in areas characterised by poor economic diversification (e.g. coastal regions heavily dependent on tourism and/or fisheries), those likely to be significantly affected by changes in climate (i.e. water shortages) and areas with a high concentration of traditional energy-intensive sectors will be severely hit during the transition process. This can be seen in countries such as Austria, Croatia, Finland, Greece, Hungary, Spain, Turkey and the UK. On the other hand, green jobs generated by activities designed to tackle environmental problems from the past could help to mitigate the adverse impact of the closures of industries such as metallurgy and mining on employment.

According to Austrian climate scenarios charting the period up to 2050, the number of summer days could increase by about 40 %, whereas the likelihood of snow in the Austrian ski areas will decrease. As a result of the changes predicted, it is vital that sustainable environment-friendly tourism concepts are developed. In Greece, Cyprus and Spain, climate change is expected to significantly affect the national tourism and agricultural sectors.

In addition, the sectoral composition of employment is also likely to be significantly affected as some existing jobs become obsolete. Others will need to be redefined and new jobs will need to be created. The economic sectors that are expected to undergo the most significant adjustments in employment, both in terms of level and composition, include agriculture and fisheries, (beach) tourism, infrastructure building, energy supply and construction. In some sectors — such as tourism, agriculture/fisheries and traditional energy supply — the long-term effects of climate change and climate policies may be highly

significant. This can be seen, for example, in the following country examples.

- In Croatia, the sectors most likely to be affected by climate changes have been identified as tourism, coastal resources (especially related to the sea-level rise), agriculture, fisheries and mariculture.
- In Estonia, around 1 000 jobs are predicted to disappear in the energy sector in the near future due to the sector's increasing energy efficiency. The biggest losses will be seen in oil shale energy; 200 jobs will be lost in line with normal outflow patterns (retirement, etc.) while a further 400 to 900 jobs will be lost by 2016 because of significant decreases in oil shale energy production.
- In Finland, national and EU energy and climate policies will have a significant impact on the forest industry cluster in Carelia and oil refining in Itä-Uusimaa.
- In Poland, one of the key sectors that will face major restructuring in relation to new energy sources is coal mining, especially hard coal, which is mainly located in the Upper Silesia region. Employment in the hard coal mining sector has progressively decreased; the number of employees fell from 119 300 in December 2006 to 116 046 in December 2008 and 115 688 in October 2009. It is estimated that between 2007 and 2015 around 64 900 people may leave employment in coal mines due to attrition.
- In Portugal, the economic activities that are most likely to be negatively affected are extractive and energy-intensive industries (e.g. refineries, thermoelectric plants and manufacturers of glass, steel, paper, cement, chemicals, rubber products and plastics). The size of the restructuring process will depend on the ability of energy-intensive industries to comply with environmental and energy regulations and remain competitive, and also on the instruments developed by the government to intervene in this process.

In some east European countries, such as Hungary, Latvia, Romania and Slovakia, the transition to a market economy during the 1990s led to large-scale job losses in sectors like heavy industry and mining and so changes in climate and energy policy are unlikely to impact as significantly on sectoral employment levels. Instead, green structural change — through lost and transformed jobs — is likely to affect the energy, transport and construction sectors, as well as parts of the manufacturing sector, if firms are unable to adapt to the new situation.

It should also be noted that new jobs in energy services and construction are expected to be created at the local level in response to new environmental demands — for example,

⁽⁶⁾ Other driving forces include: the efforts to capture and store CO₂ and other harmful emissions; the integration of the concept of environmental responsibility into business models; and the promotion of environment-friendly land use and agriculture.

with the development of new energy sources (solar, wind, biomass, etc.) and technology, or as existing building stock is refurbished to higher energy-efficient standards. This is illustrated in the following countries.

- In Austria, there is hope that, through the procurement and supply of biomass, new jobs could be created in the primary sector — especially in economically less developed rural areas.
- In Belgium, one of the areas currently offering the greatest potential for new economic and employment opportunities is the possible environmental upgrading of building stock. In Brussels, a generalised move towards eco-friendly construction techniques could result in the creation of as many as 3 500 jobs for construction workers and architects by 2012. In the same vein, it was hoped that the Flemish action plan 'REG Huishoudens' would enable the creation of 44 650 jobs by 2010, particularly in the areas of installation, production, marketing and distribution of goods and services linked to the reduction of household energy consumption.
- In Finland, structural changes in the forestry industry are opening up new opportunities for a wood-based energy economy, and other sectors such as construction have significant employment potential.
- In France, in the short term, jobs should be created in construction, transport, energy, waste treatment, water, agriculture, electrical engineering, refineries, tourism and the maritime industry. Over the medium term, the investments made available through the 'Grenelle de l'environnement' should lead to the development of new jobs in the fields of infrastructure, research and industry. However, it can be noted that sectors such as road transport, fossil energy or non-green construction should decline in the medium term. The jobs under threat are the non-green equivalent of the green jobs created (for instance, for the energy sector, jobs in fossil energies are likely to disappear, while jobs will be created in photovoltaic energies).
- In Germany 235 000 people are working in the renewable energy sector. Studies forecast the number of jobs to grow during this decade to 400 000 to 500 000 employees, and to 710 000 by 2030.
- In Ireland, a number of sectors have been identified as having high export and employment potential: renewable energy; the continued development of the electricity grid; efficient energy use and management (including eco-construction); waste management, recovery and recycling; and water and wastewater treatment.
- In Italy, a recent study based on scenario hypotheses and projections produced by the European Renewable Energy Council (EREC) and Greenpeace International estimates that the national employment impact in 2030 is about 74 000 jobs in the renewable electricity sector (against 39 500 in the baseline scenario) and 22 400 jobs in the energy efficiency sector (neither figure includes indirect job creation).
- Latvia has particular management competence in forestry and R & D competence in wood chemistry and various forms of bioenergy, such as biogas, bioethanol and biodiesel. Timber and timber products provide fuel for approximately one third of Latvia's annual energy production capacity. Further developments in these areas could potentially lead to the creation of new jobs.
- In Luxembourg, small-scale local and regional initiatives have contributed to job creation through their multiplier effects. Some local authorities (e.g. Beckerich) initiated measures to reduce carbon emissions by, for instance, setting up several photovoltaic solar cells and promoting local energy efficiency. In many cases, these measures required the recruitment of specialists while the development of projects also spilled over to local businesses.
- In Portugal, the sectors that will gain from the greening of the economy are mainly those related to renewable energies and eco-services.
- In Slovakia, a state-supported programme for thermal insulation of residential buildings was initiated by the government in 2009 within the national recovery package, aiming to increase energy efficiency in the housing sector and create and/or retain at least 8 000 jobs. There are also similar initiatives in the Czech Republic.
- In Spain, four sectors have been identified as vitally important areas not only for environmental reasons but also for social sustainability, as far as their employment dimension is concerned. These sectors are: eco-industries (water supply and treatment and waste management); renewable energies; sustainable construction; and sustainable transportation (trains, electric and hybrid cars). Indeed, Spain is the world's second-largest wind power producer (after Denmark), with a 10% share of its electricity in 2008 coming from wind energy. Moreover, the number of jobs in renewable energies is expected to increase significantly, especially in the biomass and biofuel sectors.
- In Sweden, in early 2009, a permanent tax reduction for repair, maintenance and improvement (the RMI tax deduction) for one-family houses and tenant owner housing was introduced in order to stimulate activity and sustain labour demand in the construction sector.
- In the UK, estimates have placed the number of new jobs that could potentially be created in the offshore wind

energy sector at between 23 000 and 70 000. However, given the relatively underdeveloped manufacturing capacity for the hardware needed for wind power, unless action is taken soon, many of these jobs could be created not in the UK but among overseas manufacturers.

With regard to the social effects of the greening of the economy, the transition to a competitive eco-efficient economy is likely to hit low-skilled workers harder than high-skilled workers. High-skilled workers will benefit as the transition to new greener activities will lead to the implementation of advanced technologies, whereas medium-skilled routine tasks and repetitive work may be replaced by automation and computerisation. This will leave a large number of medium- or low-skilled people out of work and with 'obsolete' skills.

On a more positive note, however, in the short term it may be possible to create new jobs for low-skilled workers, provided they receive adequate training and education. For example, in Belgium, the emergence of new sectors, such as the eco-friendly construction sector, has created new needs in the labour market, including some positions for low-skilled workers.

In Malta, a 2007 report by the Employment and Training Corporation (ETC) indicates that the green sector requires two types of workers at the extreme ends of the knowledge and skills spectrum: post-graduate degree holders such as scientists and environmental experts, and lowly qualified workers, with some basic training, to do manual work.

Finally, the national reports explored the extent to which the employment gains observed are permanent. For instance, employment gains linked to the current higher labour intensity of some of low-carbon technologies will probably not be sustained over the long term because differences in labour intensity are likely to diminish over time as technologies mature and become more competitive (Fankhauser et al, 2008). The permanence of employment gains is also likely to differ across different sectors and different regional areas. In Hungary, anecdotal evidence suggests that measures launched through the national climate change programme for 2009–10 (Nemzeti Éghajlatváltozási Programme — NÉP) addressing sustainable forest, waste and water management, are likely to have longer-term effects than other measures addressing other sectors.

2.5. Measures to stimulate the greening of the economy

A number of different measures to stimulate the greening of the economy have been launched across Europe. These include national programmes, government subsidies and grants for companies and households, and investment in research and development (R & D) activities.

National programmes that include measures and strategies to stimulate the greening of the economy have been introduced in several European countries.

- In France, the 'Grenelle de l'environnement' aims to take long-term decisions on environmental and sustainable development issues, in particular with regard to restoring biodiversity through the implementation of tools such as ecological regional schemes, as well as through the reduction of greenhouse gases and the improvement of energy efficiency.
- In Germany, research is supported by a number of different projects. EUR 500 million was invested in fostering application-oriented research in the field of mobility (e.g. hybrid motors). EUR 6.5 billion is being spent by the German recovery programme on research related to energy efficiency, mainly in schools and universities. The Federal Ministry of Education and Research (BMBF), together with an international cooperation with the BRIC countries (Brazil, Russia, India and China) and South Africa, promotes the DAAD (German Academic Exchange Service) project on studying and researching for the sustainability of biogenic resources and a value-added chain, which aims to foster education and research to create solutions and competences for a sustainable production of biogenetic resources. In another pilot project, the Federal Institute for Vocational Training (BiBB) develops new ways to combine vocational training with forestry. The focus is on promoting young scientists and engineers in the field of bionics. The federal government fosters research of lithium ion batteries for energy storage and research in bio energy in the German Centre for Biomass Research.
- In Luxembourg, the national action plan on eco-technologies was launched in January 2009 by the Minister for the Economy and Foreign Trade. As part of the plan a new 'EcoDev' cluster was established in February 2009 with the objective of creating a network of companies and research laboratories, providing information on national and European subsidies for ecological projects and initiating research projects.
- In Portugal, the national recovery programme (the main response from the government to the current economic downturn) foresees the promotion of renewable energy, energy efficiency and energy transport networks. This is to be achieved through various measures, including special aid for the installation of solar panels and microgeneration units; improved energy efficiency of public buildings; investment in intelligent energy networks; and anticipation of the investment in the energy transport infrastructure.
- In Slovenia, in May 2009 the Inter-service Group for Climate Change at the Ministry of the Environment and Spatial Planning appointed an expert group for policy

and legislation on climate change, with the aim of setting national climate change policy as a basis for drafting a law on climate change. It stressed the need to prepare a programme or strategy for mitigating and adapting to climate change in such a way as to overcome the attitude that climate change is exclusively an environmental problem. The group pointed out the value of synergy with economic development and social cohesion to improve economic competitiveness, job creation activities and more balanced regional development.

- In Spain, in November 2007 the national government launched a strategy on sustainable development, which integrated a threefold dimension (environmental, social and international sustainability) of the concept, as defined by the European Union. For 2010, a state fund for employment and local sustainability has already been approved, as a second phase of the local investment fund. One of its aims is to promote the greening of the economy by promoting projects related to energy and efficiency savings, sustainable local mobility and scientific and technological parks, as well as increasing employment demand.
- In Sweden, in March 2009 the government presented its energy and climate policy programme 'A cohesive climate and energy policy'. The main objectives of the programme are to further reduce greenhouse gas emissions, enhance energy efficiency and promote the development of the green sector and green technology.
- In the UK, the industrial strategy set out by the government has established two regions of England (South West and North East) as 'low-carbon economic areas' to speed up development in these areas by concentrating on their strengths. In Wales, the devolved administration has developed its own green jobs strategy that sets three main priorities: supporting businesses in adapting to a low-carbon economy; fostering innovation and technology; and investing in a more sustainable economy.

Some countries have introduced consumer grants and subsidies for companies in order to reorientate certain sectors towards the needs of the green economy; this is notably the case with the construction and energy sectors, as shown in the following examples.

- In Austria, a EUR 100 million package has been made available for the thermal upgrading of buildings of private households and companies.
- In Belgium, at federal level, grants, subsidies and tax breaks are available to encourage households to carry out certain types of environment-friendly expenditure (the replacement and maintenance of boilers, solar energy, insulation, double glazing, etc.). The interprofessional agreement (AIP) for 2009–10, moreover, allows companies

to supplement their workers' pay with 'eco cheques', redeemable against certain environmental goods and services. The value of these may be exempted from tax and national insurance contributions.

- In the Czech Republic, subsidies have been introduced for energy-saving measures. Subsidies are provided to individual households and apartment building owners to improve thermal isolation of the buildings and to introduce energy savings through various channels.
- In Germany, EUR 3 billion is being made available to private households for reconstruction and the improvement of energy efficiency between 2009 and 2011. This is also part of the German recovery programme. The tax deduction for craft services related to maintaining and modernising buildings was raised. A stimulus of EUR 300 million is used by the Reconstruction Loan Cooperation (KfW) to supply credits with low interest rates for investments in energy-efficient technologies.
- In the Netherlands, green production is subsidised as an alternative to polluting industries, especially in agriculture, energy-efficient housing and transport, production and use of green methods to produce energy (through wind and solar systems). Such a subsidy has employment effects, although it also increases public expenditure and taxes, thereby reducing economic activity.
- In Portugal, incentives to stimulate the greening of the economy include: the reduction of electricity tariffs for consumers with lower energy consumption and higher tariffs for the least efficient; incentives for the installation of solar panels for hot water; incentives for the renewal of electric household equipment; and credit for investments in energy efficiency. In addition, new regulations have been introduced on thermal characteristics, energy systems, and air-conditioning of buildings, as well as the introduction of a management system for intensive energy consumption.

A number of countries have increased investment in R & D activities to promote the transition to a green economy, which has had an impact on employment.

- In Luxembourg, investment in R&D is one of the fundamental priorities of the government and has the potential for both direct and indirect green job creation. The annual R & D budget has increased to over EUR 250 million; this amounts to 1% of GDP. Continuous efforts have been made to catalyse investments in carbon-friendly eco-technologies in order to promote activities in favour of sustainable development, diversify the economy and attract researchers (i.e. via a 2008 law on training and research). Investment in R&D has led to indirect and direct green job creation, primarily due to research needs.

- In Spain, companies can profit from some tax refunds and subsidies for their research and development activities.
- In Sweden, special efforts are being put into research in the automotive industry. Reduced fuel consumption and fewer emissions from both light and heavy vehicles are the priorities of the current government. Investment in knowledge improvement also covers information and communications technology (ICT), environmental technology, sustainable urban planning and strengthened support to new businesses in the field of environmental technology (incubators).
- In Turkey, in recent years the amount of grants available to university researchers to conduct research on the greening of the economy has risen and the funding seems to be steady. The State Planning Organisation and the Scientific and Technical Research Council of Turkey (Tubitak) fund relatively large-scale projects.
- The Spanish labour market has four characteristics that can affect the greening restructuring process: a high volatility of the employment rate; a high youth unemployment rate; a high temporary employment rate and segmentation of the labour market; and a significant predominance of the construction sector in the structure of employment. In relation to economy greening, rigidity, segmentation and mismatching may be the main obstacles of the Spanish labour market.

In addition, a number of national reports, such as those for Latvia and Slovakia, have drawn attention to financial restrictions in public budgets which limit the implementation of measures to support the greening of the economy. These in turn will impact on the development of an effective green economy with a matching labour market. In Latvia, the main barrier to implementing green stimulus programmes is not a shortage of green professionals, but restrictive access to financing. The 2008 law on the energy efficiency of buildings has inadvertently led to heavy bureaucracy and lengthy reimbursement procedures in programmes designed to provide partial reimbursement of building insulation and renovation costs for improving energy efficiency. This has meant that many projects require commercial bank financing, which is difficult to obtain in the current economic climate. Consequently, during 2009 the amount of state financing provided to energy efficiency improvement projects has been much lower than originally forecast.

Furthermore, several national reports have emphasised that some businesses are worried about the introduction of green measures that may prove expensive and could potentially reduce their national and international competitiveness. This has been reported in particular in the Czech Republic, the Netherlands, Portugal and Slovakia.

2.6. Structural challenges to economy greening

Several national reports have identified a number of labour market structural challenges, which will impact on the greening of European economies. Key challenges that have been reported include limited regional labour mobility (the Czech Republic, Hungary, Portugal and Spain); inflexible national labour markets (France and Portugal); the economic importance of certain energy-intensive sectors (Finland and Spain); and generally high levels of unemployment (Spain). Specific examples include the following.

- In the Czech Republic, low territorial mobility among the labour force may have repercussions for the labour market effects of a green restructuring.
- In France, labour market inflexibilities include difficulties for French society in accepting the closure of non-competitive sectors of activity (e.g. the textile industry) and the preference for the protection of jobs exposed to international competition.
- Greening policies introduced in Hungary will have to take into account and combat low levels of mobility among the population, in particular relating to low willingness to commute and migrate.
- In Portugal, several characteristics of the labour market generate concerns about an increase in structural unemployment. First, labour mobility is limited, which could lead to difficulties if new industries are in different locations to those where jobs are lost. Second, the labour market is not very flexible; research in 2001 found that flows of workers into and out of unemployment are three times lower in Portugal than in the USA.

2.7. Job quality

The national reports focus primarily on the quantitative effects of climate change and climate policies. However, it is important to note that qualitative labour market effects also have important impacts on employment and social cohesion.

A key issue highlighted by several national reports is the fact that a green job is not necessarily a high-quality job^(?) (for example, Austria and Slovakia). Indeed, in Austria, employees'

(?) The quality of a green job is determined by the same variables as the quality of any other job. The European Commission (2001) states that a safe and healthy working environment, together with a modern work organisation, is essential for quality in work and identifies several dimensions of quality in work: composition of jobs and their qualification requirements; profile of workers, their inclusion and access to the labour market, their skills and career development as well as their subjective job satisfaction; aims and operating practices of employers; working environment and health and safety at work in particular; gender equality and non-discrimination; and direction and priorities of employment and social policies. See also 'Measuring the quality of employment in the EU', Chapter 4 in the *Employment in Europe 2008* report, 2008.

representatives have expressed concerns about the quality of jobs. They argue that positive employment effects will only be achieved if social security minimum standards are guaranteed and atypical employment like temporary work is widely avoided.

In addition, extreme examples of low-quality 'green jobs' can be seen outside Europe, including, for instance, current practices in ship dismantling in south Asia and sugar cane and palm oil plantations for biofuels in Brazil, Colombia and Indonesia.

As yet, very little research is available across the EU Member States on the quality of green jobs⁽⁸⁾. Furthermore, existing research can present conflicting views of the situation. For example, in Austria two separate research studies outlined two different scenarios.

The importance of creating high-quality green jobs cannot be underestimated. Job quality can have significant impacts on staff turnover levels and employee well-being; for example, older workers may be encouraged to remain in employment post-retirement age, thereby raising the currently low participation rate of older workers in employment in Europe.

2.8. Skill shortages

A mismatch between the skills required by companies and those available on the labour market could lead to short-term unemployment in several countries and negatively affect their transition into fully functioning green economies. This is particularly evident in sectors such as construction (e.g. Belgium and Turkey), energy production and technology (e.g. Estonia, Poland and Portugal) and engineering (e.g. Germany, Ireland, Portugal and Turkey), waste management (e.g. Lithuania), as well as an overall shortage of highly skilled and experienced green professionals (e.g. the Czech Republic, France, Ireland, Italy, Portugal, Turkey and the UK). Specific examples are as follows.

- In France, it has been recognised that a distinction must be drawn between the need for new professional skills for activities affected by environmental dynamics (such as technological developments in waste and wind energy) and the skills needed for jobs that have changed completely. Some functions (like quality control, maintenance and specific expertise) will be more complex and will be marked by the need for upgraded skills, which requires the implementation of high-level training. It should be noted that there is a real risk of skill shortages in the future.

- In Germany, recruitment in the environmental technology sector has to compete with the automobile sector, which is the largest employer of engineers. The fact that companies in the environmental technology sector currently have low sales levels often makes them less attractive for potential engineers in terms of working conditions and career prospects; in other words, smaller companies have difficulties in competing with large, often multinational, companies.

- In Lithuania, the national sustainable development strategy states that local authorities lack skilled employees and funds for more efficient planning of waste management, ensuring maintenance and control of municipal waste-handling systems.

- A study by the Portuguese Ministry of Labour (MTSS) on 'Green jobs in Portugal: the renewable energy sector' included a survey of firms in the environmental sector in order to identify shortages of green professionals. It concluded that labour demand was higher than the supply of graduates in fields related to energy and engineering (e.g. mechanical engineers, electronics engineers and information engineers).

- In the UK, in terms of employment, the greening of the economy is viewed as a challenge for the future that requires considerable adjustment in the current provision of skills, if the country is to make the most of the benefits created by the move towards a low-carbon economy. A report from the Department for Environment, Food and Rural Affairs (Defra 2009) examined the available evidence on what it calls 'low-carbon and resource-efficient economy skills' (LCREE). It found there was a latent demand for skills to the extent that signals from employers on what will be needed in the future are either non-existent or confusing. As a result, the supply side (including learners and the providers of education and training) was unable to adequately respond — with the likely outcome being a growing skills shortage.

Several national reports have highlighted that while national skill forecasting measures do exist, they do not yet include information on green jobs and so cannot provide information on potential mismatches between the demands of the labour market and the supply of certain skills. This has been noted in Italy, Latvia, Lithuania, Luxembourg, Malta, Portugal, Slovakia and Turkey.

It should be noted, however, that in some countries previous ongoing investment in the green sector has ensured that relatively little upskilling will be required to prepare the labour force for green employment opportunities. This is the case in Denmark, in particular.

⁽⁸⁾ For instance, Steiniger et al. (2007) argue that many of the newly created jobs in the context of climate transport policies will be of average quality.

3. Labour market policies

3.1. Introduction

The reports state that in most Member States there is an acknowledgement of the necessity for an integrated policy approach to manage the opportunities and challenges posed by the environmental changes. However, to date labour market policies that take into account the greening of the economy are only in the initial stages of development and implementation (e.g. the strategy of low-carbon regional economic areas in the UK). Separate instruments that make a positive contribution to sustained greener growth do exist, but in general there are no integrated and coordinated sets of labour market policies that would support going green.

Moreover, in some Member States the fight against environmental degradation is not a priority, as providing basic services such as education, healthcare, pensions and municipal services is considered to be a higher priority, especially given the current economic downturn.

Most reports mention that public authorities recognise that in view of the expected strong shifts in employment composition, employment policies should in particular focus on easing transitions in the labour market, strengthening skills anticipation and human capital formation, and improving information sharing.

The flexicurity approach, with its emphasis on implementing secure transitions between jobs, through modern labour laws, active labour market policies, lifelong learning and modern social security arrangements, is considered to be a useful platform, especially if it supports and focuses policy efforts on the low-skilled workers and energy-intensive industries.

However, active labour market policies only occasionally take the greening of the economy into account and not necessarily through a strategic orientation and approach. There are many examples of subsidies to green job creation in specific sectors, greening R & D investment, measures to support geographical and sectoral mobility and programmes to support renewable energy. However, they rarely constitute a coherent and strategic employment policy response to the greening of the economy.

A number of reports referred to the effects of using public works as a labour market policy instrument with a significant impact on the protection of the environment. Such public works provide an employment opportunity for unemployed people and help to carry out socially useful services, including those relevant to environmental protection (for example, in Bulgaria, Lithuania, Slovakia and Slovenia). It is also noteworthy that the scope of public works has been extended in the context of the current economic crisis.

3.2. Skills anticipation and formation

The reports emphasise strongly that workers need to acquire new skills in order to ease the transition to a competitive, greener economy. Nevertheless, although it is expected that the employment effects of adaptation to climate change are going to take time to realise, the development of the institutional framework to forecast and develop new skills is still in its initial phase in many Member States.

In relation to the forecasting of future skills and occupational demands arising from the greening of the economy, the reports highlight that such 'green' forecasting is part of the general skills anticipation system. The general system has several shortcomings which also affect the availability of data on skills and occupational profiles in the green economy. In some countries (e.g. Austria and Malta), the system is characterised by the existence of different single instruments and an absence of a coherent and integrated approach, which leads to a lack of concrete and, in terms of policy implementation, transferable results. In some countries (e.g. the Czech Republic, Estonia and Romania) such instruments are still in the early stage of development and implementation. Furthermore, in many countries the existing forecasting methodology relies on historical data and projections — analytical methods which cannot cope with the sudden emergence of new needs.

For these reasons, in most Member States there is no green dimension in the forecasting of skills needs. However, in countries where the forecasting system is well developed (e.g. Sweden) it is generally considered that these forecasting instruments could easily be adapted to take into account the transformation implied by the development of the green economy. The further development of the pan-European exercise led by the European Centre for the Development of Vocational Training (Cedefop) on the forecasting of skills demand and supply for all EU Member States (plus Norway and Switzerland) also needs to be considered in this context⁽⁹⁾.

Despite all of this, it is clear that there are some initiatives in the area of green skills forecasting, as highlighted in the reports. In Poland, occupational standards have been developed to include green jobs, in order to facilitate the measurement of green employment. A new classification of occupations has been proposed, prepared in line with the International Standard of Classification of Occupations ISCO-88, to include new occupations (non-existent in a previous version of the classification) that relate to economy greening.

⁽⁹⁾ For more details, see: <http://www.cedefop.europa.eu/EN/publications/5069.aspx>

Other countries, such as France, Spain and Sweden, have implemented forecasting measures.

- In September 2009, the French state secretary in charge of green technologies launched a plan for the development of green growth in sectors and territories. One of the four key priorities outlined targeted the identification of jobs affected by the greening of the economy (new skills, new jobs, jobs in transformation, jobs threatened), with the aim of establishing a national forecasting observatory.
- In Spain, the Public Employment Service, through its National Observatory of Occupations, is carrying out a survey among companies to study training needs and future employment demand in the coming years in the renewable energy sector.
- In Sweden, a new online forecast system (with a time horizon of 10 years) gives valuable information to job seekers regarding the actual and expected demand in more than 150 occupations in the various Swedish regions, some of which are related to the green economy (Yrkeskompassen).

The greening of the economy has highlighted the need for further education and training in order for people to take full advantage of emerging sectors and new technologies. Moreover, even when available, training courses do not necessarily provide the right training and can be inaccessible for financial reasons. For example, in Belgium, a considerable number of training courses have now been developed, especially in the area of solar energy, land reclamation and air conditioning. However, they have suffered from a lack of public awareness and public interest to date. Moreover, the courses do not always cover emerging training needs and can be expensive, if not subsidised.

The need for targeted education and training has been raised in many national reports, including the following.

- In Croatia, there is recognition of the need for better links between the education system, the economy and employers. Currently not enough attention is given to the estimation of the future trends and needs of the labour force. This causes problems in providing education and skills programmes required for the skills and occupations needed by the labour market.
- In France, according to research by the AFPA (National Association for Adults' Vocational Training), of the 180 000 people trained each year, 40 000 are undertaking training in the field of green jobs (either to facilitate a change in career or to adapt skills). It should be noted that there is a real awareness of the need to adapt the vocational training system to the needs of the greening of the economy.

- In Ireland, a 2008 report on 'Environmental goods and services sector on the island of Ireland' recommends the incorporation of environmental considerations into continuing professional development programmes, which would enhance awareness of the importance of sustainable development, as well as boosting the stock of appropriate skills.
- In Malta, there is recognition that in order to fill the low-skilled jobs in the green industry, short job-oriented courses are needed, to be provided by training and education institutions in collaboration with employers in the green industry.
- In Portugal, at the national level, jobs requiring less than basic education predominate, followed by those requiring higher education. Research has shown that the average qualification level in the green sector is above the national average, which has led to an increasing demand for more skilled workers. Moreover, the study by the Ministry of Labour on green jobs indicated that only 9% of employees in the firms surveyed had specific education or training in renewable energies. This increases the burden on firms for on-the-job training.
- In Italy, in December 2009, the Ministry of the Environment, together with the University of Tuscia, established a master's degree course on green jobs. It has the objective of providing specialised training in the fields of the green economy to civil servants, professionals, business representatives and graduates in order to combine economic growth, environmental protection and the efficient use of natural resources.
- In the UK, there is a strong commitment to the development of future skills and training. Environmental matters have already been introduced to the school curriculum, which should help raise awareness of employment opportunities for school leavers, and the Welsh Assembly government is working with the Sector Skills Councils in identifying the skills needed in the future for the promotion of more energy-efficient businesses and homes, and manufacturing and supply sectors — all with a focus on those areas with high unemployment.

In general, the reports highlight a number of important government initiatives to support skills formation and development in the process of economy greening, including:

- organisation of qualification and vocational training measures in green jobs in, for example, Austria, France, Germany, Greece, Ireland, Italy, Spain, and the UK;
- various forms of financial support to training in green jobs (e.g. subsidy to the creation of apprenticeship places in the energy and environmental technology sector in Austria;

in the Walloon region in Belgium, training vouchers for training in energy saving for SMEs — the eco-climate cheque scheme);

- development of a new classification of occupations (in Poland and Portugal) which shows new occupations and vocational education profiles that relate to economy greening.

The reports also recognise that although funding for skills formation and development may be available, obstacles limiting green skill formation may arise from the structural characteristics of the national labour markets, such as market segmentation or the lack of occupational and geographical mobility. Furthermore, the training system needs to be adjusted to the needs of a green economy. The choice of vocational training courses needs to be well-informed; the training provided should be integrated and include technical competences and soft skills. An example of the development of the training system in response to the greening of the economy can be found in Germany, where the promotion of green jobs has been concentrated on initial and continuing vocational training. Programmes for skilled workers in environmental protection have been initiated in response to demand and dual vocational training and university studies have been adapted in order to meet the requirements. In addition to new types of training, many existing training courses are becoming greener due to the integration of environmental protection aspects. Continuous vocational training related to environmental protection is particularly important.

3.3. Promoting partnership and information sharing

Most reports recognise that there is a need for effective social dialogue in order to help shape both the understanding of the problem and the necessary policy responses, and to identify possible joint actions. Several countries have insufficient coordination and cooperation between stakeholders at the various levels (e.g. Croatia, Estonia and Greece). One of the consequences of such lack of coordination is the existence of different sectoral approaches to environmental protection and the lack of integration between environmental and employment policies. (This is further discussed in Section 4.)

Several new initiatives in this context have been reported to promote partnership working and information sharing.

- In France, some 'green jobs' officials have been nominated in each office of the Pôle emploi (public employment service) to gather information on jobs and job offers, as well as to develop specific programmes to support the jobs identified.

- In Germany, a pilot project which focuses on continuing vocational training was initiated by the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety in cooperation with the German Federation of Trade Unions. It aims at teaching employees a higher awareness of resource efficiency in the operational and production processes. The concept established during the study is expected to be suitable for application in other areas.

- In Italy, the role of the green economy as an important stimulus for economic development and employment creation is widely recognised by the trade unions.

- In 2009, the major social partners represented on the Malta Council for Economic and Social Development (MCESD), Malta's highest organisation for tripartite dialogue, urged the government to exploit the opportunities available for the development of environmental industries and the creation of green jobs through supportive policies.

- In the Netherlands, in February 2009, three Dutch trade union federations published an investment plan to boost both employment and sustainability. With regard to economy greening, they proposed a number of relevant measures and drew attention to the need for labour market measures, schooling and subsidies for R & D in the context of economy greening. Importantly, the plan contains both greening and labour market measures.

- In Slovenia, the social partners have become more active in demanding more concrete measures in one comprehensive strategy and producing the synergies between economy and environmental goals.

- In Norway, the social partners have published a joint statement emphasising the long-standing tradition of social dialogue, underlining the importance of cooperation in the area of climate change.

Social partners have also been active in a number of countries raising awareness of the need to adapt to a green economy and promoting dialogue at national and regional levels. For example, in Denmark a joint report from the United Federation of Danish Workers (Fagligt Fælles Forbund, 3F) and the Ecological Council presented detailed assessments of the direct and indirect employment effects of its 22 proposals for investments that amounted to a total of DKK 27.8 billion per year (EUR 3.7 billion). In Spain, major trade unions CCOO and UGT (Confederación Sindical de Comisiones Obreras and Union General de Trabajadores) support the 'Just transition' campaign, which is an international labour response to environmental problems, and considers environmental issues in the national level social dialogue. Similarly, employers' associations have also committed themselves on environmental and social issues, as they are also represented in the State Council on Corporate Social Responsibility.

3.4. Work organisation

The reports make some references to the fact that workplace organisation can affect the environment. Workplaces consume energy, use resources and generate waste, transport and travel, and are thus one of the most obvious places where environmental issues need to be addressed. However, in general there is very little research undertaken in the Member States on this dimension of economy greening, and this area certainly needs to be explored in future research.

3.5. Policy instruments used (tax reforms, social funds)

Policy instruments to improve energy efficiency in a cost-effective way include environmental tax reform, promotion of environmental technologies and R & D, introduction and monitoring of minimum energy-efficiency standards (eco-design), labelling of products and services (eco-labelling), better targeted state aid and construction of green infrastructures.

Some reports indicate that an increase in indirect taxes on fossil fuel carriers, coupled with the use of the tax revenues to fund reductions in direct taxes on labour, may reduce the emission of GHGs and stimulate labour demand (i.e. the so-called 'double dividend'). Nevertheless, little information with respect to the distribution of the dividend between the different types of workers is reported.

There are varied reports from countries where eco-friendly taxes have been introduced. Some countries (e.g. the Czech Republic, Ireland, Hungary, Malta and Slovakia) have recently introduced such taxation (or the first steps towards it), and hence it is either too early to identify the employment effects, or such effects have been obscured by the current global economic downturn.

In other countries (e.g. Denmark, Germany, Sweden and Norway) such taxes have been in place for some time. Information on employment effects is varied. In Denmark, the structure of employment and qualifications has already adapted to this taxation regime. In Sweden, no formal evaluation to measure the impact of the green tax on employment has been conducted. However, based on the empirical evidence from studies aimed at evaluating the employment effect of a reduction in payroll tax, there are strong reasons to believe that the employment effects of the Swedish green tax reform have been limited.

Future research needs to take into account the need to coordinate these tax reforms at a European level to avoid tax competition and consider the impact on the internal market.

Another significant area of government intervention with substantial employment effects is state aid for eco-efficient building renovation. Such developments are reported in a number of Member States (for example, in Belgium, the Czech Republic, Estonia, Greece, Romania and Slovenia). They take the form of financial incentives, grants, subsidies to employers undertaking the renovation, and support to training in such work. Job gains from energy-efficiency actions in the residential sector could be substantial in the coming years. It is estimated that many households already invest in renovation works to reduce the energy consumption of their homes, and this trend is forecast to strengthen in the near future.

Finally, greening public procurement procedures has been reported as an area where employment effects are anticipated. Such green public procurement procedures (in the sense of requiring bidding companies to certify their compliance with the requirements of an environmental management system) have been reported in, for example, Bulgaria, Latvia and Slovenia.

3.6. The role of the European Social Fund (ESF)

The reports emphasise that current EU funding, including the Structural Funds and particularly the European Social Fund, can play an important role in supporting investments directed at raising human capital and available skills. However, as a general rule, operational programmes in the area of employment do not explicitly respond to the issues of greening the economy. Nevertheless, relevant activities financed under the ESF are reflected in the national reports.

- The ESF finances training and promotion of employment in the field of green jobs in Austria, Luxembourg, Italy and Portugal.
- It supports projects to extend the knowledge base and information campaigns in Belgium, Estonia and Portugal.
- It provides technical, administrative and financial support to encourage initiatives from companies providing green employment in Belgium, Portugal and Sweden.
- It supports the development of skills forecasting tools and instruments in Romania and Slovakia.

One of the recommendations arising from the reports is the need to determine whether sustainability and environmental protection issues should be included as part of the monitoring of ESF expenditure.

3.7. The effects of the global economic crisis

Some reports identify the main barrier to implementing green stimulus programmes as restrictive access to financing, which is exacerbated by the current economic downturn. Nevertheless, there seems to be a consensus that although the current global economic crisis may be slowing the speed at which the rate of environmental reform is implemented, it does not change the significance of this long-term challenge, certainly not if one takes into consideration that tackling these environmental problems provides significant opportunities to develop new technologies, create new jobs, enhance energy security, increase international competitiveness and improve public health.

The implications of the global economic crisis for the public policy response have been varied. Some countries have been able to adapt significant fiscal stimulus programmes, where green investments have been explicitly singled out, thus supporting the greening of the economy (e.g. in Germany, where the stimulus packages on green investments amounted to around 13 % of the total EUR 100 billion allocated; green investments in Poland's stability and development plan; green recovery measures in Norway).

In other countries, the current economic crisis led governments to moderate the pace of restructuring, responding to the needs of the greening of the economy, supporting the existing economic structures instead (e.g. Cyprus, Hungary and Spain).

Finally, some countries have experienced such negative impacts of the economic crisis that a response to the long-term climate change agenda has not been a priority (e.g. Greece and Latvia).

4. Conclusions

The transition to a competitive eco-efficient economy is expected to have an important impact on economic activity and, more specifically, on the level and composition of employment in Europe.

As these environmental changes and green policies will affect the level and structure of employment, employment policies will have to find adequate responses to manage these changes. The reports indicate that most countries still lack a strategic direction and an operational set of instruments to fulfil this task. This leads to several conclusions and policy-relevant recommendations.

4.1. Linking and improving the coordination between environmental protection and employment policies

Climate change challenges are increasingly attracting the attention of decision-makers, social partners and wider society. However, the employment dimension to the greening of the economy is not widely acknowledged or discussed. Environmental policy is an important part of a growth and employment strategy and influences all activities of production and consumption. Thus, environmental policy has to be treated as a cross-cutting issue and not a distinct policy. Part of the problem is the lack of cooperation and institutional separation between authorities responsible for environmental and labour market policy issues. In this respect, coordination with the non-governmental sector could also be improved.

Such improved coordination would require a strategic commitment to link employment and environmental protection policies and, thus, lead to the 'greening' of active labour market policies. Such strategic commitment could find an expression in the national strategy for green employment, developed with the participation of key stakeholders, based on the commonly agreed definition of green employment, comprehensive labour market statistics and a set of development priorities appropriate to the national contexts. The strategy could also reflect the most appropriate use of existing resources, including the use of the European Social Fund.

4.2. Improving the knowledge base

Identifying green employment and quantifying the employment effects of the greening of the economy is currently a methodological and statistical challenge in most Member States. The green economy is a broad concept and it is necessary to define and focus on the parameters of the jobs to be developed. The employment and labour market consequences of the economy greening policy and the ongoing restructuring process related to the development of green technology have, to date, not given rise to empirical studies. It is therefore extremely difficult to assess the labour market consequences of the green measures and the transitions toward a more environment-friendly economic growth. Further research needs to be undertaken on the influence of specific climate change adaptation measures on employment.

There is above all a need for a comprehensive overview of the net effect of the greening of the economy and, while this is a complex task, its importance in planning for the future labour market cannot be underestimated. However, a key problem is that the precise nature and scale of these changes are still unclear (the so-called 'latent demand' problem), to the extent that it is not yet possible to identify future needs sufficiently for

the supply side to respond. Some of the problems are caused by an overreliance on the views of employers to determine future needs — even more difficult in the emerging sectors covered by the low-carbon economy.

It is clear, therefore, that in order to support the development of labour market policies that promote the creation of more and better jobs for all in a competitive, eco-efficient economy, further research should be aimed at strengthening the EU capacity for assessing the employment effects of a transition to a sustainable economy⁽¹⁰⁾.

4.3. Improving skills development

In the medium and long term, it is necessary to facilitate the greening of the economy by anticipating jobs and skills so as to avoid either shortages or the need for a large-scale restructuring. In addition, training should now be provided for employees active in sectors facing large-scale transformation.

The training systems need to be improved. Curricula at all levels should be reformulated to bring them into closer correspondence with economic needs, particularly regarding knowledge and skills linked with environment protection and energy efficiency.

Even in the countries (e.g. Germany) where the training systems are more developed in this regard, policy has to focus on increasing the availability of skilled workers in order to ensure the growth of the environmental sector.

The skills development process in response to the greening of the economy should be based on the development of a comprehensive skill identification and forecasting system which also reflects the changes arising from the growth of green jobs.

4.4. Considering the flexicurity framework for adaptation of ALMPs

The flexicurity framework provides an adequate conceptual means for labour market policies to respond to the greening of the economy. Indeed, several types of measure could be encouraged, including:

- supporting transitions and mobility between jobs, activity sectors and geographical areas, with the active involvement of social partners;
- incorporation of green components into the specific ALMP schemes (e.g. green job training, preferential support for the creation of jobs in green sectors, shifting support to public transportation);
- minimising the social and economic effects of green restructuring processes, by a mix of policies (e.g. improved impact assessment, support to pilot projects, adjusted social and education policies); and
- addressing existing rigidities, segmentation and mismatching of skills demand and supply already existing in the labour markets.

Finally, the context of the current economic downturn invariably poses challenges to policymakers in responding adequately to the long-term challenges linked with adaptation to climate change. However, it can also be argued that the current economic crisis should be used to open up new possibilities for green jobs and innovative and sustainable businesses.

⁽¹⁰⁾ Such research initiatives are listed in the annex to this summary.

Annex: Available and forthcoming analyses commissioned by the European Commission

1. Available analyses

Cedefop (2009), 'Green economy', *Skillsnet Sector Flash*, June 2009 ([http://www.cedefop.europa.eu/etv/Upload/Projects_Networks/Skillsnet/Flashes/SkillsnetSF_GreenEco\(HR\).pdf](http://www.cedefop.europa.eu/etv/Upload/Projects_Networks/Skillsnet/Flashes/SkillsnetSF_GreenEco(HR).pdf))

Ecorys (2008), *Environment and labour force skills*, a study by Ecorys for the Environment DG (http://ec.europa.eu/environment/enveco/industry_employment/pdf/labor_force.pdf)

Directorate-General for Employment, Social Affairs and Equal Opportunities, *Future skills needs: sector-based studies*, whereby climate change is identified as one of the main drivers of change (<http://ec.europa.eu/social/main.jsp?catId=784&langId=en>)

Directorate-General for Employment, Social Affairs and Equal Opportunities, 'Climate change and labour market outcomes', *Employment in Europe 2009* (<http://ec.europa.eu/social/main.jsp?catId=119&langId=en>)

Eurofound (2009), *Greening the European economy: Responses and initiatives by Member States and social partners* (<http://www.eurofound.europa.eu/eiro/studies/tn0908019s/index.htm>)

European Commission (2001), 'Employment and social policies: a framework for investing in quality', Communication from the Commission to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions, COM(2001) 0313 final (<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52001DC0313:EN:NOT>)

GHK (2009a), *The impacts of climate change on European employment and skills in the short to medium-term: company case studies – Final report (Volume 1)* (<http://ec.europa.eu/social/main.jsp?catId=88&langId=en&eventsId=172&furtherEvents=yes>)

GHK (2009b), *The impacts of climate change on European employment and skills in the short to medium-term: a review of the literature – Final report (Volume 2)* (<http://ec.europa.eu/social/main.jsp?catId=88&langId=en&eventsId=172&furtherEvents=yes>)

Szovics, P., M. Tessaring, C. Walmsley and J. McGrath (2008), *Identification of future skill needs for the green economy*, Conclusions from the workshop on Future skill needs for the green economy, October 2008 (<http://www.cedefop.europa.eu/EN/articles/14669.aspx>)

2. Forthcoming analyses

MODELS — Model Development for the Evaluation of Lisbon Strategies (<http://www.ecmodels.eu/>)

Improvement of existing large-scale economic models, among other, to enhance modelling of labour markets and human capital and integration of energy and environment systems (GEM-E3, WorldScan, MIRAGE: general equilibrium models and NEMESIS: macro-econometric)

Cedefop/ILO, *Skills for green jobs* (<http://www.cedefop.europa.eu/working/procurement.asp?idnews=4424>)

The objective of the study is to identify strategic skill development responses in six EU Member States — Denmark, Estonia, France, Germany, Spain and the UK — against the backdrop of environmental degradation, climate change and the global call for greener economies. The ILO will provide for analysis of countries outside the EU. The outcome of the study should address the contribution of stakeholders to skills upgrading through effective education and training systems designed to achieve sustainable growth and development.

The call for proposals aims to:

- (i) provide the evidence concerning the scale and nature of implications and future labour market requirements of the green economy, and to promote debate about the results and methods used;
- (ii) identify the innovative employment policy solutions targeted at greening of labour markets and exchange good practices; and
- (iii) raise the awareness among stakeholders (labour market institutions, social partners, workers) about short-term employment challenges of green recovery programmes and about employment implications of a move towards a green economy as such.

European Commission

**European Employment Observatory Review –
The employment dimension of economy greening 2009**

Luxembourg: Publications Office of the European Union

2010 — 20 pp. — 21 × 29.7 cm

ISSN 1725-5376

The concept of 'going green' is spreading in the EU and is having a significant impact on the economy. This greening of the economy is expected to have widespread effects on EU industries and the labour market. This European Employment Observatory Review looks at the influence of the greening of the economy on European employment. The report analyses both the risks and benefits of the green economy and identifies measures that can be taken to limit such risks.

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Publications Office

ISBN 978-92-79-14867-5



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