



### WORKSHOP ON GREEN SKILLS

The workshop 'Future skill needs for the green economy' was held at Cedefop in Thessaloniki, Greece, on 6 and 7 October 2008. Its objectives were to identify and increase knowledge of the implications of climate change for education and training professionals and associate professionals involved in tackling climate change. Tackling climate change by reducing greenhouse gas emissions and increasing energy efficiency, a key issue for policy-makers, means creating green technologies. This will not only lead to changing existing job profiles, but also to creating new, green jobs and occupations which require new skills.

The workshop focused on: trends and mechanisms for restructuring the green economy; the new occupations and skills required; the necessary policies for creating these occupations; and developing education and training systems to support continuously changing requirements in accordance with new occupational standards.

### THE NEED FOR A GREEN ECONOMY...

Scientists agree that greenhouse gas emissions and exhaustion of fossil fuels and other natural resources are a danger to

future development. New policies to address climate change are necessary. These policies should lead to a sustainable development strategy that preserves both environmental quality and the social conditions for prosperity. Energy policies should reduce greenhouse gas emissions and at the same time achieve greater energy security by developing renewable energy technologies.

### ... WITH GREEN JOBS

Cedefop's workshop concluded that measures to green the economy are already affecting the job market. New jobs are being created by restructuring key economic sectors such as energy, construction, transport, agriculture and energy-intensive industries. These, defined as green jobs specifically, but not exclusively, include jobs that help to protect ecosystems and biodiversity, reduce energy, materials and water consumption through high efficiency

strategies, decarbonise the economy and minimise or altogether avoid generation of all forms of waste and pollution.

### EMPLOYMENT TRENDS IN THE GREEN ECONOMY

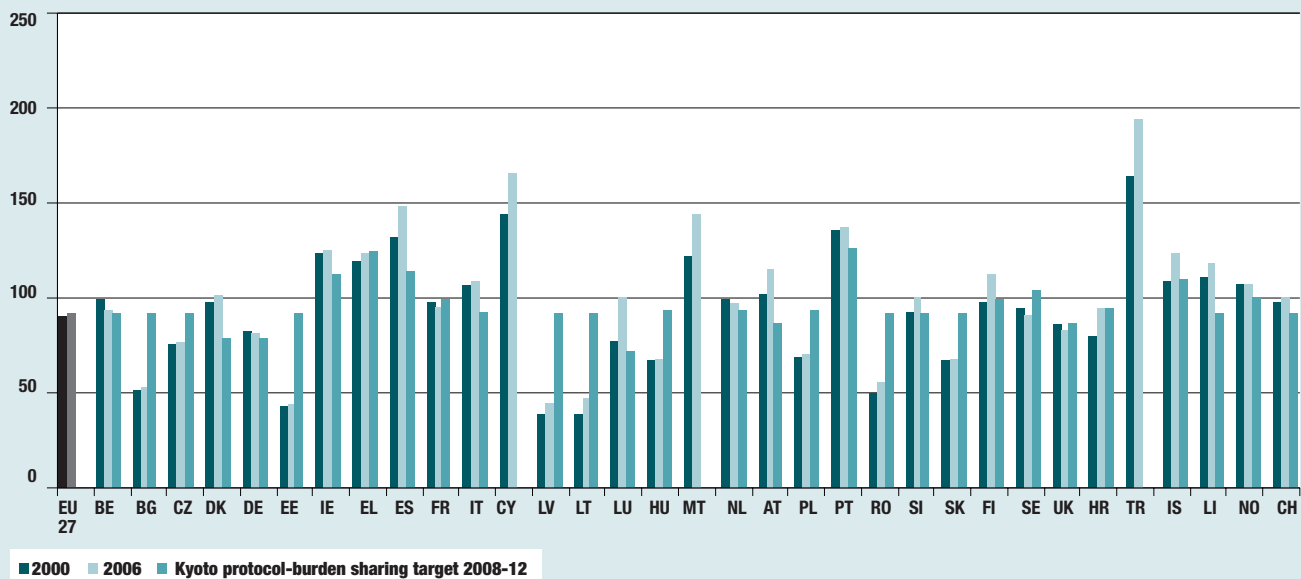
In economic restructuring towards sustainability, some sectors, such as coalmining and other heavy industries, will decline causing some sections of society to experience losses, but no sector will disappear. Large-scale redistribution of jobs will probably occur within sectors, considering lower retraining costs and shorter search periods for the new workforce. For example, the automotive industry is likely to manufacture hybrid, low-emission vehicles instead of inefficient cars, and is likely to retrain its employees in accordance with new necessities.

New and transformed jobs will be created in companies able to adapt to new requirements.

'Stabilizing CO<sub>2</sub> concentrations at around 445 to 535 ppm, limiting the long-term temperature rise to about 3.6 to 5.4°F (2 to 3°C), is estimated to reduce the cumulative growth in global GDP by 3% by 2030. This is equivalent to only a 0.12% reduction in the annual growth rate of GDP.'

Source: Gordon et al., 2007.

Figure 1. Greenhouse gas emissions (1000 tonnes CO<sub>2</sub>-equivalents)



Source: Eurostat, 2008.

Some green jobs will focus on delivering green goods and services and might entail totally new qualifications due to the introduction of new technologies. Others will require skill adjustment to improve energy and resource efficiency. In the construction sector, for example, jobs will be created for producing additional insulation fitters, and new jobs will also emerge for retrofitting homes: electricians, carpenters, roofers, insulation workers, construction managers and building inspectors will all require new skills.

A decline in manual, low skills employment in different industries (mining, packaging products) is expected but new jobs will emerge in waste management and biofuel production.

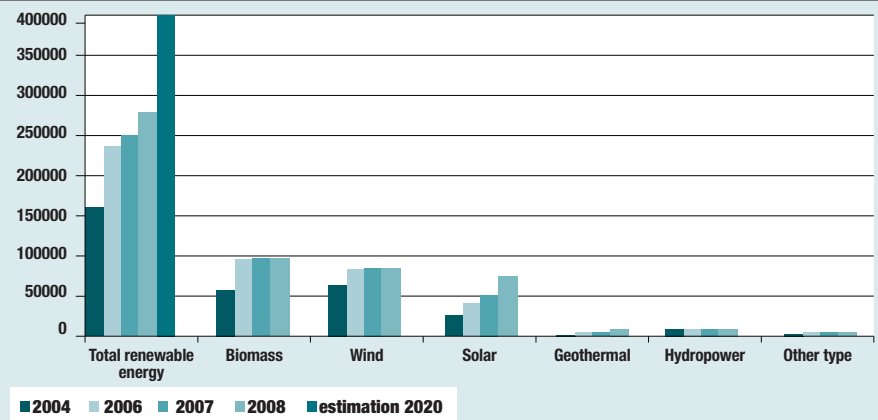
Green vocational employment will increase to develop new low carbon technologies. Innovation, research and development are expected to attract investment and will experience growth, subsequently requiring a qualified workforce.

Further, indirect jobs from supplier industries are likely to experience growth, as even new industries such as solar and wind power generation use the same supply chains as traditional industries.

There are four main employment trends: new jobs mainly in manufacturing pollution-control devices; some jobs will be substituted such as in shifting from fossil fuels to renewable sources, waste incineration to recycling, etc.; some jobs may be eliminated without replacement; some jobs (such as plumbers, electricians, construction workers) will evolve as the sectors go green.

Source: UNEP et al., 2008, p. 43.

Figure 2. Jobs in the renewable energy sector in Germany



Source: O' Sullivan, 2009, p. 9 and 11.

**THE MOST AFFECTED SECTORS: BETWEEN JOB CREATION AND JOB REDUCTION**

The following four key sectors which are the greatest contributors to greenhouse gas emissions, are supposed to experience major changes: electricity, transport, construction and energy-intensive industries.

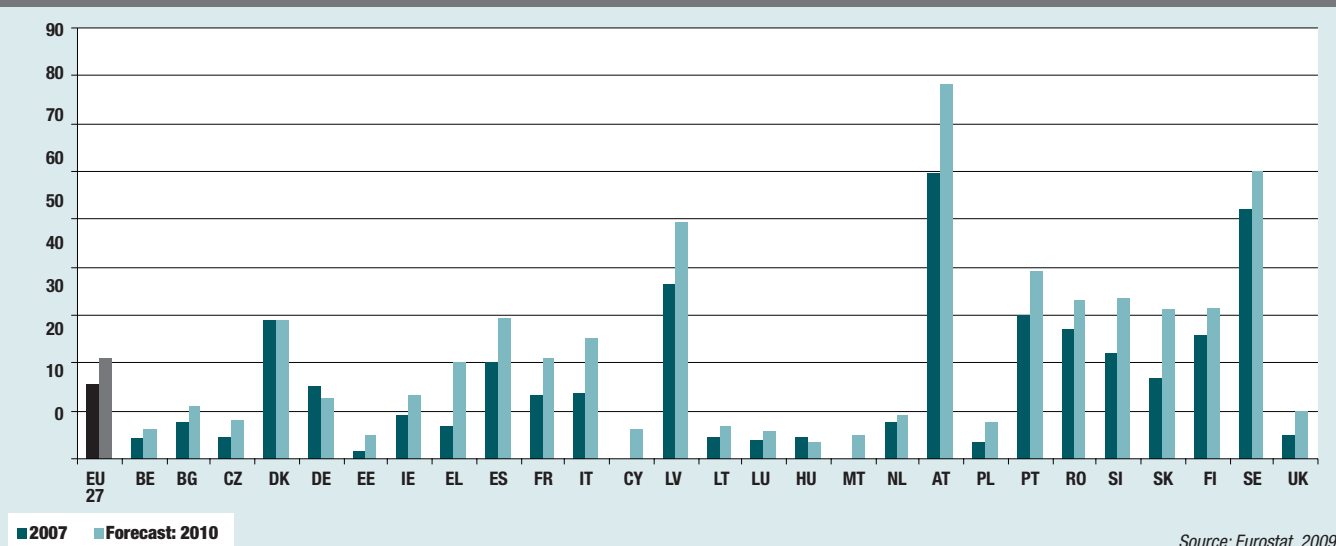
**ELECTRICITY PRODUCTION AND SUPPLY**

Employment in the electricity generation sector will be influenced by two main factors: the EU's climate policy priority to reduce energy consumption and the process of shifting to renewable energy generation. According to the ETUC et al. (2008) report on climate change, the first is likely to cause a loss of around 20% of direct jobs in the sector, while the latter is expected to generate 50% growth in jobs directly related to renewable energy. Manufacturing new equipment, construction and installation of new power plants is going to generate, at least in the short term considering the long useful life of such equipment,

significant indirect employment growth. The combined effect of these two developments is expected to be positive and will compensate job losses in the coal sector.

The share of electricity generated from renewable sources in gross electricity consumption was around 15% in the EU in 2007. The highest percentage was achieved in Austria (59.8%), followed by Sweden (52.1%) and Latvia (36.4%). The 2010 forecast shows that Austria is expected to remain on top with 78.1%. However, all EU countries are expected to experience growth (Figure 3). According to Ernst and Young (2008), Germany and the US are top of the list of the most attractive destination for investment in renewable energy. New jobs are estimated to almost double compared to 2007 (Figure 2). Investment in green energy production infrastructure is rising not only in Germany but also in other European countries as all of them need to accomplish their renewable energy targets (Figure 4).

Figure 3. Electricity generated from renewable sources (% of gross electricity consumption)



Source: Eurostat, 2009.

**TRANSPORT**

This sector has considerable weight in the European economy and employment (estimated at more than 7% of total employment in 2005) but it is also characterised by strong increases in its CO<sub>2</sub> emissions and final energy demand. The ETUC et al. study (2008) points out that by reducing the volume of traffic by around 10%, creating more balance through greater use of rail and public transport, and developing intermodal transport combining road with sea, rail or river, transport is one of the solutions considered by the European Commission (2001) to reduce resource consumption and emissions. Further, the study shows that it is possible to stabilise transport emissions by 2030, compared to 1990, while creating 20% more jobs overall compared to the reference scenario, even without additional climate change policies.

'EU-27 road freight transport grew by 4% in 2007 compared to 2006. Growth slowed during the year from 6% in the first quarter to 1% in the fourth. The five major economies, Germany, Spain, France, Italy and the United Kingdom dominated total and national transport.'

Source: Pasi, 2009, p. 1.

'In 2007, EU-27 road freight transport, measured in tonne-kilometres (tkm), was 27% higher than in 2000. The modal share of road freight transport in inland total freight transport (road, rail and inland waterways) has slowly increased over the years and is now 76%. In 2006, passenger cars accounted for 83% of the inland total passenger transport (passenger cars, buses and coaches, and trains), measured in passenger-kilometres (pkm).'

Source: Noreland, 2009, p. 1.

**CONSTRUCTION**

The sector is mainly influenced by Directive 2002/91/EC on the European energy performance of buildings and Directive 2006/32/EC on energy end-use efficiency and energy services. The former identifies energy efficiency in the building sector as a top priority, with a key role in realising the savings potential in the building sector, estimated at 28%, which in turn can reduce the total EU final energy use by around 11%. The latter requires Member States to save at least an additional 9% over the next nine years starting from 2008.

The jobs directly created from thermal renovation of buildings are expected to be of relatively low qualification level; however, workers already in the sector should receive training in sustainable building.

**ENERGY INTENSIVE INDUSTRIES**

The EU's climate policy is likely to have a significant effect on the iron and steel industry, which could experience job losses of 50 000 of a total of 350 000 for EU-25 as a whole, due to relocating production outside the EU and lack of new investment in Europe. Investment in research and development for reduction of emissions by these industries should act as an alternative to pay for CO<sub>2</sub> emission quotas which determine the above-mentioned trends.

**THE GREENING PROCESS: DRIVERS OF CHANGE**

The main four factors which emphasise the need for a sustainable green growth policy are: natural resource scarcity determined by rapidly growing demand resulting in rising costs; the need for energy security which requires a shift towards renewable energy sources; climate change making a low carbon economy an imperative; and intergenerational justice demanded by an ageing population. In the Lisbon strategy tackling climate change is a high priority and requires an appropriate mix of forward-thinking policies and strategies, with several components. One component is promotion of energy efficiency and low-carbon technologies. This is accompanied by economic instruments such as environmental taxes, the emission trading scheme and various incentives and subsidies.

The biggest source of environmental tax revenue comes from petrol and diesel (energy charges). Tax revenues from pollution and resources – such as environmental charges from water use or landfills – generally contribute a very small share of tax revenue. The EU greenhouse gas emission trading system (based on Directive 2003/87/EC) was introduced to help Member States comply

with their commitments under the Kyoto Protocol (European Commission, 2007). The scheme covers over 11 500 energy-intensive installations – representing nearly half the EU's emissions of carbon dioxide (CO<sub>2</sub>).

The EU cohesion policy's objective to deliver sustainable growth, jobs and competitiveness, is sustained by EUR 105 billion dedicated to green projects and jobs. This funding represents more than 30% of the regional policy budget for 2007-13 and is almost three times greater than the sum allocated in the 2000-06 budgetary period. The EU regional policy Commissioner Danuta Hübner emphasised the plan's importance in boosting employment in the green economy.

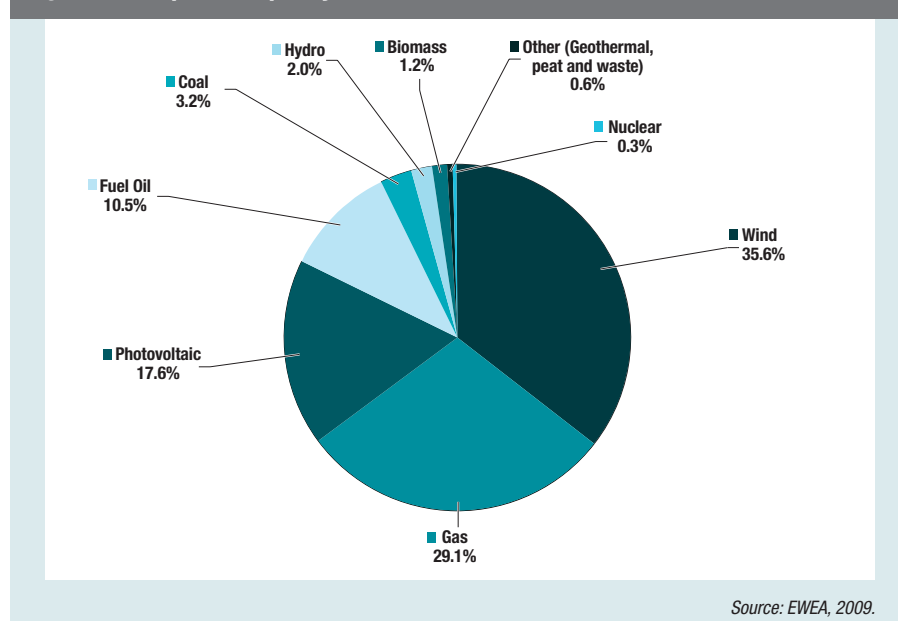
Source: European Commission, 2009.

**GREEN OCCUPATIONS**

Whether we speak of jobs and occupations focusing totally on delivery of green goods or those affected at a lower scale by the new requirements of energy and resource efficiency, all occupations and skills will need to be adapted to new demands. Each related technology will require a mixture of skills, sometimes consisting of high technological expertise accompanied by good communication skills for counselling business and consumers, as well as the skill to manage and lead multidisciplinary teams.

Consultancy on carbon auditing and low carbon technologies will probably increase, carbon auditors becoming an important occupation, and the ability to measure the carbon footprint will be a key competence.

Figure 4. New power capacity installed in the EU in 2008



Source: EWEA, 2009.

However, given the relatively small percentage of carbon auditors in green jobs, their skill needs may be ignored. Increased awareness of energy efficiency and environmental issues, rising energy costs as well as legislation in this domain (Directive 2002/91/EC) will create strong demand for energy assessors. Environmental impact assessment skills (flora, fauna) will also be highly prized in this context of sustainable development.

#### THE NEW SKILLS PARADIGM

The green economy creates a new skills paradigm categorising related skills into 'generic' and 'specific' skills. This is a more holistic approach than the traditional paradigm, emphasising aspects such as working in multidisciplinary teams as professionals from different backgrounds work together in green projects.

The main generic skills required will be strategic planning and leadership, adaptability/transferability, systems analysis, risk analysis, coordination and entrepreneurship. These specific skills will be important although they are not entirely new skills, but rather add-on or an appropriate mixture of existing skills.

#### NEXT STEPS: IMPLICATIONS FOR EDUCATION AND TRAINING POLICIES

The need to develop a skill base for each mitigation technology is obvious, both for technological expertise and soft skills. Students can benefit from a revised curriculum providing the necessary knowledge while professionals and blue collar workers need to be offered lifelong learning programmes. In both cases a multidisciplinary approach should be adopted. Encouraging the education system to take a broader view

of how competences and qualifications are acquired is an important step. Involving the EU in promoting green awareness in education and increasing general public awareness of the green economy is equally important. The European Commission new skills for new jobs initiative promotes early identification of skills and labour market needs and also develops the green economy.

Cedefop in cooperation with ILO will continue to examine skill needs for greener economies with respect to new and changing occupational profiles, greening existing occupations, and identifying skills and occupations that become obsolete. The research is based on several country studies with primary focus on good practice examples of how national policies for greening economies are complemented by identification of skill needs and efficient skills response strategies.

#### REFERENCES:

- Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the energy performance of buildings. *Official Journal of the European Union*, 4.1.2003, L 001, p. 65-71.
- Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC. *Official Journal of the European Union*, 25.10.2003, L 275, p. 32-46.
- Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC. *Official Journal of the European Union*, 27.4.2006, L 114, p. 64-85.
- Ernst & Young (2008). *Renewable energy country attractiveness indices*. London: EYGM Limited (Quarter 1-2, 2008).
- ETUC et al. (2008). Directorate General for Environment. *Climate change and employment: impact on employment of climate change and CO<sub>2</sub> emission reduction measures in the EU-25 to 2030: synthesis*. Brussels: ETUC.
- European Commission (2001). *White paper: European transport policy for 2010: time to decide*. Luxembourg: Publications Office.
- European Commission (2007). DG Environment. Impact of the European carbon emission trade directive on industry. *Science for Environment Policy, DG Environment News Alert Service*, Issue 85, 8 November 2007.
- European Commission (2009). Cohesion policy backs 'green economy' for growth and long-term jobs in Europe. *Press releases RAPID*, IP/09/369, 9.3.2009.
- Eurostat (2008). *Greenhouse gas emissions: index base year = 100*. Last update 9.12.2008. Available from Internet: <http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=tsdcc100> [cited: 27.5.2009].
- Eurostat (2009). *Electricity generated from renewable sources: % of gross energy consumption*. Last update 28.4.2009. Available from Internet: [http://epp.eurostat.ec.europa.eu/portal/page/portal/product\\_details/dataset?p\\_product\\_code=TSDCC330](http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/dataset?p_product_code=TSDCC330) [cited: 27.5.2009].
- EWEA (2009). *Wind energy statistics*. Brussels: EWEA – European Wind Energy Association (Wind Energy Factsheets).
- Gordon, D. et al. (2007). *Climate change mitigation: findings of the IPCC fourth assessment report*. Cambridge, MA: Union of Concerned Scientists (IPCC Highlights series).
- Noreland, J. (2009). *Inland freight and passenger transport in the EU-27 up to 2007*. Luxembourg: Publications Office (Eurostat Statistics in Focus, 11/2009, Transport).
- O'Sullivan, M. et al. (2009). *Bruttobeschäftigung durch erneuerbare Energien in Deutschland im Jahr 2008, eine erste Abschätzung: Stand 06. März 2009*. Berlin: German Federal Environment Ministry.
- Pasi, S. (2009). *Trends in road freight transport 1999-2007 – freight grew by 4% in 2007*. Luxembourg: Publications Office (Eurostat Statistics in focus, 8/2009, Transport).
- UNEP et al. (2008). *Green jobs: towards decent work in a sustainable, low-carbon world*. Nairobi: UNEP – United Nations Environment Programme, 2008.

#### HOW TO BECOME A MEMBER OF CEDEFOP'S SKILL NEEDS NETWORK?

Cedefop's skill needs network welcomes all those active in research or policy on early identification of skill needs. The network has 300 registered members from all over the world. If you are an experienced researcher in skill needs analysis and forecasting, or are actively engaged in the transfer of research results on future skill requirements into policy and practice, you are welcome to submit the online application form on Cedefop's skill needs website.

(<http://www.cedefop.europa.eu/skillsnet>)



## CEDEFOP

European Centre for the Development of Vocational Training

Europe 123, 570 01 Thessaloniki (Pylea), GREECE  
 PO Box 22427, 551 02 Thessaloniki, GREECE  
 Tel. +30 2310490111  
 Fax +30 2310490020  
 E-mail: [skillsnet-team@cedefop.europa.eu](mailto:skillsnet-team@cedefop.europa.eu)  
[www.trainingvillage.gr/skillnet](http://www.trainingvillage.gr/skillnet)