



Towards a greener labour market - The employment dimension of tackling environmental challenges

Final report endorsed by EMCO on 10 November 2010

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LIST OF ABBREVIATIONS

AGE	Applied General Equilibrium
ANS	Adjusted Net Savings
CEDEFOP	European Centre for the Development of Vocational Training
CSR	Corporate Social Responsibility
CO ₂	Carbon Dioxide
CVTS	Continuing Vocational Training Survey
DG REGIO	Directorate General for Regional Policy
EC	European Commission
EU	European Union
EMCO	Employment Committee
EMCO IG	Employment Committee Indicators Group
EMAS	Eco-Management and Audit Scheme
EGSS	Environmental Goods and Services Sector
EGAF	European Global Adjustment Fund
EES	European Employment Strategy
EEA	European Environment Agency
ESAW	European Statistics on Accidents at Work
EWCS	European Working Conditions Observatory
EPL Indicator	Employment Protection Legislation Indicator
EODS	European Occupational Diseases Statistics
EUROFOUND	European Foundation for the Improvement of Living and Working Conditions
ESF	European Social Fund
FAO	Food & Agriculture Organisation
FTE	Full Time Equivalent
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GL	Guidelines
EGL	Employment Guidelines
ICT	Information and Communication Technologies
ILO	International Labour Organization
ISO	International Organization for Standardization
ISO 14001	Requirements for an environmental management system

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ISO 26000	An International Standard providing guidelines for social responsibility
JAF	Joint Assessment Framework
LAF	Lisbon Assessment Framework
LFS	Labour Force Survey
LIME	Lisbon Methodology
LMP	Labour Market Policy
LLL	Life Long Learning
MS	Member States
NACE	Classification of Economic Activities within the European Communities
OECD	Organization for Economic Cooperation and Development
PIAAC	Programme for the International Assessment for Adult Competencies
PES	Public Employment Services
R&D	Research and Development
RES	Renewable Energy Sources
SEEA	System of Integrated Environmental and Economic Accounts
SBS	Structural Business Statistics
SES	Structure of earnings survey
SILC	Statistics on Income and Living Conditions
STEM	Science, Technology, Engineering and Mathematics
TOE	Ton of oil equivalent

SUMMARY RECOMMENDATIONS

1. Climate change itself and policies to mitigate its impact will have a substantial impact on the level, distribution and quality of jobs. But the issue goes beyond the climate change challenge and involves the broader issue of environmental sustainability. A too narrow definition of the “green economy” or “green jobs” risks missing out on the wider economic and labour market effects of the environmental challenge that is, in many ways, comparable to the challenges of globalisation, technological change or ageing. For employment policy purposes, we therefore recommend to not confine ourselves by a strict definition of the term “green”. We rather believe it is more useful to **take a broad policy-based approach that acknowledges the complex inter-linkages between climate change and environmental sustainability on the one hand and labour markets on the other hand**. In other words, the main focus should be on appropriate employment policy strategies to cope with environmental change and policies to mitigate it.
2. However, for analysing labour markets and monitoring policies, a narrower focus and a number of definitions will often be necessary for measuring the effects in specific green activities and for using **statistical indicators that need to be based on clear definitions and classifications**.
3. Europe should **seize the employment opportunities of greening the economy**. The EU and its Member States should be proactive in mitigating climate change and achieving environmental sustainability, and thus it is necessary to set clear and stable rules and policies. Environmental policies should also be assessed against their employment impact: preference should be given to instruments that are efficient in reaching environmental goals and, at the same time, employment-friendly. Policies should be about providing opportunities for enterprises, without picking “winners”.
4. The environmental challenge underlines the **need to further improve the reactivity of labour markets**. The green transition is not dissimilar from the other fundamental changes our labour markets have undergone (such as the ICT revolution or the development of the service sector) or are facing today (such as globalisation). Labour market policies developed to meet these challenges will therefore also be very relevant for tackling the environmental challenge. Flexicurity type policies that encourage mobility, provide effective active labour market measure and help to secure transitions, will be the key to facilitate the shift towards a greener economy.
5. Greening the economy will prompt another episode of large scale technological change. A key role in mastering this knowledge intensive change falls to **equipping workers with the right skills and allow enterprises to find employees with the skills they need**. Although relevant, the issue is less about genuinely new green skills and more about improving existing skills that can be applied in green activities. Particular attention should be paid to providing access to affordable and profitable training opportunities to complement their existing skills. More young people, especially young women, need to be attracted to study STEM subjects (science, technology, engineering and mathematics) which provide the basis for high-level low-carbon skills while stereotypes affecting these professions have to be addressed. Generic skills need to be improved across the entire workforce. Trainers and teachers should also be made aware of environmental issues and be trained to teach new skills. Moreover, there is a need to reinforce capacities to forecast skill needs and analyse labour markets and skills trends at national and European level.
6. **Employment policies** not only have a role to play in coping with the changes imposed on labour markets by environmental change and policies. They can also actively contribute to mitigate environmental change by encouraging greener production methods, greener work practices,

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greener transport and commuting. Public administration and public enterprises can lead by example in this respect, also by raising public awareness about environmental issues in general and green employment in particular.

7. In order to be successful in reaching for both environmental sustainability and good labour market outcomes, **all relevant institutions at the international, national, regional and local level have to be involved and take on their responsibility**. Moreover, as the challenge cuts across several domains, there is a need for cooperation between employment authorities and their counterparts in the environmental, energy, transport, economic and other fields. The social partners should be involved at all levels. International cooperation has to be reinforced in order to coordinate policies and to share knowledge.
8. The analysis and assessment of the labour market impacts of greening the economy requires **quality indicators**. The Working Group proposes a concrete indicators framework that takes stock of existing indicators and identifies areas for further development. A particular challenge in this field is a substantial lack of high quality indicators. Efforts such as Eurostat's new data collection on the Environmental Goods and Services Sector are essential and should receive continued support from Member States and the EU. However, EMCO, together with the Commission and in cooperation with other international institutions, should intensify its work to improve the availability of comparable high quality data in the area.
9. In addition, and given the complexity of the inter-linkages between labour markets, the environment, and environmental policies, there is a need to further explore **quantitative modelling tools** that allow for a better analysis of the labour market impacts at the level of the European Union and Member States.

1 INTRODUCTION AND POLICY BACKGROUND

The fight against climate change and other environmental challenges has become a major concern worldwide, including in the EU and its Member States. It is a driving force behind the European Union's new Europe 2020 strategy for jobs and smart, sustainable and inclusive growth, adopted by the European Council in June 2010¹.

The strategy mentions climate change and pressure on resources as major, long-term challenges, along with globalisation and ageing. The Europe 2020 broad guidelines for economic policies call upon Member States and the Union to aim at sustainable growth *"... decoupling economic growth from the use of resources, building an energy and resource-efficient, sustainable and competitive economy, a fair distribution of the cost and benefits and exploiting Europe's leadership in the race to develop new processes and technologies, including green technologies. Member States and the Union should implement the necessary reforms to reduce greenhouse gases emissions and use resources efficiently, which will also assist in preventing environmental degradation and biodiversity loss. They should also improve the business environment, stimulate creation of green jobs and help enterprises modernising their industrial base."*²

Broad economic guideline 5³ is specifically dedicated to improving resource efficiency and reducing greenhouse gases. This includes an EU headline target to reduce, by 2020, greenhouse gas emissions by 20 % compared to 1990 levels; to increase the share of renewable energy sources in our final energy consumption to 20 %; and moving towards a 20 % increase in energy efficiency. Member States are asked to use this headline target as a basis to set their national targets.

While primarily aimed at reducing greenhouse gas emissions and reducing environmental impact, environmental policies in Member States, the European Union, and other countries around the world will also lead to substantial structural economic change, with important repercussions on labour markets and consequences for the quantity, distribution and quality of jobs. In addition, environmental change itself will also impact on labour markets.

This labour market side of environmental challenges is also reflected in the new guidelines for employment policies of the Member States, which are an integral part of the new Europe 2020 Strategy. For example, Employment Guideline 7 on increasing labour market participation calls on Member States to promote *"...job creation in all areas including green employment..."*. Guideline 8 on developing a skilled workforce refers to the need to regularly monitor *"...the performance of up-skilling and anticipation policies which should help identify areas for improvement and increase the responsiveness of education and training systems to current and emerging labour market needs, such as the low carbon and resource efficient economy."*

Yet, while the basic challenges have been identified and recognized, there is a need to further analyze the labour market outcomes of environmental policies and to discuss adequate labour market policies to deal with the impacts. There is a range of questions that require further insights, in particular in view of defining and clarifying the concepts and issues at stake, developing adequate indicators and analytical frameworks, understanding labour market impacts, and designing sound policies to tackle these impacts.

For these reasons, and with the aim to improve the evaluation and monitoring of the labour market impact of climate policies, the Employment Committee established a working group to pursue further work on policy and measurement issues concerning the employment dimension of tackling climate change (see mandate in **Annex 2**).

¹ EUCO 13/10

² Council Recommendation on broad guidelines for the economic policies of the Member States and of the Union, Recital 9, 11646/10

³ Council Recommendation on broad guidelines for the economic policies of the Member States and of the Union, 11646/10

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The Working Group consisted of experts from Member States (Annex 4) and took up its work in February 2010. Other institutions such as the ILO, the OECD, CEDEFOP and the Commission, are also developing strategies that endeavour to produce answers to the economic and labour market challenges of climate change and other environmental change. This work has benefited strongly from their ongoing activities.

The present final report was endorsed by the Employment Committee on 10 November 2010.

The report is structured as follows: following the introduction in Chapter 1, Chapter 2 addresses the labour market impact of green policies;. Chapter 3 looks at the implications for policy formulation, and chapter 4 deals with appropriate indicators to analyze labour market impacts. The report formulates a set of recommendations on these areas.

2 GREEN POLICIES AND THEIR LABOUR MARKET IMPACT

2.1 Defining the scope of the issue: climate change or wider environmental concerns?

EMCO's main policy framework over the next decade is the Europe 2020 strategy. While climate change is clearly a main topic, the sustainable growth objective of Europe 2020 goes beyond the climate change issue and covers a wider range of issues such as improving energy efficiency, developing renewable energy sources (RES), capturing and storing carbon dioxide (CO₂) and other harmful emissions, modernising European infrastructure, integrating environmental responsibility in business models, promoting environmental friendly land use and agriculture, and creating conditions conducive to environment-related research and innovation.

The Working Group therefore recommends to take a broader approach and to look not only at the employment impact of climate change and policies to mitigate climate change, but to also consider the impact of wider environmental sustainability issues. In other words, the aim is to look at the impact of green policies in a broader sense.

The question raised here is whether and how "green", "green economy" and "green jobs" should be defined in this context. Several international institutions, such as Eurostat, UNEP and ILO, define the "green economy" and "green jobs" along the lines of specific activities and sectors which are active in the green economy through the way they contribute to improving the environment (see Box 1). The advantage of such activity-based concepts is that they provide a concrete definition of the green economy and thus allow for its quantitative measurement.

Box 1: Defining Green Jobs

UNEP

The United Nations Environmental Programme (UNEP) defines green jobs "... as work in agricultural, manufacturing, research and development (R&D), administrative, and service activities that contribute substantially to preserving or restoring environmental quality. Specifically, but not exclusively, this includes jobs that help to protect ecosystems and biodiversity; reduce energy, materials, and water consumption through high-efficiency strategies; de-carbonize the economy; and minimize or altogether avoid generation of all forms of waste and pollution."⁴

ILO

"'Green jobs' does not lend itself to a tight definition but certainly includes the direct employment which reduces environmental impact ultimately to levels that are sustainable. This includes jobs that help to reduce the consumption of energy and raw materials, decarbonizes the economy, protect and restore ecosystems and biodiversity and minimize the production of waste and pollution. [...] A somewhat wider concept of "green jobs" might embrace any new job in a sector which has a lower than average environmental footprint, contributes to improving overall performance, albeit perhaps only marginally."⁵

Eurostat: Environmental goods and services sector (EGSS)

The Eurostat methodology for the "Environmental Goods and Services Sector" (EGSS) does not define 'green jobs', but measures employment in the EGSS. The EGSS is a heterogeneous set of producers of

⁴ UNEP (2008)

⁵ ILO (2008)

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technologies, goods and services that prevent or minimise pollution and minimise the use of natural resources. Thus, environmental activities are divided into two broad segments: environmental protection and resource management. Only those technologies, goods and services are considered that have an environmental protection or resources management purpose as their prime production objective (i.e. 'environmental purpose'), hence excluding goods and services that are not provided mainly for environmental purposes.

However, the employment impact of greening the economy goes beyond genuinely green activities. Next to direct employment effects in green industries, greening the economy can have indirect effects in other areas, such as substituting environmentally inefficient jobs (e.g. reduced employment in fossil fuel based industries), contributing to the greening of existing jobs, and eliminate existing jobs as well as establishing new jobs. In addition, indirect knock-on effects may ripple through the economy and affect other parts of the labour market via price, wage and income effects.⁶

Employment policies will have to address these much broader impacts of greening the economy and take into account the interdependence between the economic, ecological, and even social dimension of the issue. Therefore, this Working Group believes that, for policy purposes, it is useful to avoid activity-based definitions of green jobs which would run the risk of focusing on a too narrow area of the economy. Instead, it proposes to take a broad policy-based approach that acknowledges the complex inter-linkages between climate change and environmental sustainability on the one hand, and labour markets on the other hand.

Consequently, this report uses the term "green" in a rather generic sense that does not follow one very specific definition.

2.2 Which are the green policies affecting labour markets?

There are two broad groups of policy instruments for addressing the environmental challenges: pricing and non-pricing instruments.⁷ Both can have a significant effect on employment. In addition, the regional and sectoral distribution of labour will also be affected directly by climate and environmental changes (see Box 2).

Economic or market-based instruments (including pricing instruments) essentially aim at imposing a price on environmentally harmful aspects of production and consumption, thus providing incentives to producers for internalising the external costs of environmentally harmful behaviour.

Economic instruments include:

- Taxing environmentally harmful activities or production factors;
- Charges and tradable permits (e.g. emissions trading schemes);
- Subsidies promoting environmentally friendly production (while phasing out subsidies for environmentally harmful inputs and products).

Non-pricing instruments try to influence the behaviour of economic consumers, companies and individuals by other means than price signals.

⁶ See e.g. European Commission (2009)

⁷ European Commission 2010.

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They include:

- regulatory measures (e.g. technical standards on car emissions, industrial pollution, product ingredients etc; eco-design i.e. introduction and monitoring of minimum energy-efficiency standards: eco-labelling, i.e. labelling of products and services);
- awareness raising and promoting the consumption of green products;
- research and technology development for more environmental use of resources;
- stimulation of transfer of knowledge and information;
- fostering voluntary environmental agreements between industries;
- completion of the internal market in the EU;
- green public procurement.

The broad economic policy guidelines of the Europe 2020 strategy explicitly favour the “...extensive use of market-based instruments...” and the phasing out of environmentally harmful subsidies as the way to greening the economy that is most compatible with supporting growth and employment.

2.3 Expected labour market impacts

Environmental change itself and policy efforts aimed at more sustainable growth will have important feedbacks on the labour markets: they will affect how and what will be produced and how work is going to be organised. The dynamics of labour market outcomes are complex and at this stage, with the transition to a greener economy involving changes in technology and work organisation which are very difficult to predict, we are still some way off from a complete understanding of its precise mechanics.

Nevertheless, the available research provides for a useful starting point to give a qualitative assessment of some basic trends and indicates how policy makers may have to respond to the challenges created by this transition.

2.3.1 Level and distribution of overall and sector specific employment

Policies aimed at greening the economy imply a substantial degree of labour reallocation. In turn, this will require appropriate labour market policies that address mismatches between the demand and supply of employment and skills, facilitate transitions, and foster the direct and indirect creation of jobs. Positive employment effects can be expected in the form of **direct and indirect job creation in specific sectors and areas**, i.e. clean energy, environmental resource management, energy and material efficiency, environmental services, cleaner production and diversification.

However, there will also be a substantial **redistribution and reallocation of jobs between sectors as well as within sectors**. In fact, OECD evidence suggests that job flows between firms in the same industry are an order of magnitude larger than sectoral reallocation. Furthermore, as new technologies often diffuse via the displacement of existing firms by innovative start-ups, the acceleration of eco-innovation and the diffusion of green production technologies will further intensify these within-industry flows.

OECD work also shows that the employment impact of green growth will be **uneven across geographical areas**. Although localities that have specialised in what will eventually become declining sectors (e.g. fossil fuel production) will face the challenge of developing new specialisations, green growth will also provide new opportunities for local economic development initiative. Many workers in declining regions and sectors may however require public assistance to relocate or acquire new skills.

Box 2: The labour market impact of adapting to environmental change⁸

Employment levels and structures will not only be affected by policies aiming at environmental sustainability, but also by the need to adapt to climate and other environmental changes that are already happening now. These may become worse in the future, depending on the degree and success of mitigation strategies. On the one hand, climate and other environmental change destroy certain production factors (e.g. farm lands, touristic resorts, and fish stocks) and disrupt production processes (e.g. through hurricanes and flooding) which leads to the reallocation of labour and capital across and within sectors and regions. On the other hand, climate change can create new job opportunities as new markets emerge in specific sectors or regions and investments are made to cope with the changing environment. It should be borne in mind though that the capacity for effective adaptation is limited and is likely to entail, from a certain point onwards, very high social, environmental and economic costs.

So far, there is only a limited number of studies about the quantitative impacts on output and employment of adaptation to climate change, but the scale of labour market adaptation should not be underestimated. The areas that are expected to undergo the most significant adjustments in employment, both in terms of level and composition, include agriculture and fisheries, beach and skiing tourism, infrastructure building, energy supply, construction and finance and insurance. The regions most likely to be affected are thought to include Southern Europe, the Mediterranean Basin, mountainous areas, coastal zones, densely populated floodplains and the Arctic region.

Studying gross and net employment impacts

Studying the complex set of direct and indirect effects of job creation and destruction requires the use of economic models in which scenarios of none environmental policy intervention are compared to those which do involve environmental policies.

In principle, the more direct effects of climate policies could be monitored in a rather straightforward way through statistical indicators on employment in specific green activities. In practice however, there are severe limitations in the availability of comparable and good quality data even for specific green sectors.

These data could include, for example:

- employment in energy intensive production sectors and energy production based on fossil fuels (negative direct effect)
- employment in renewable energy sectors (positive direct effect)
- employment in manufacturing of clean technology components (positive direct effect)

In addition to instances of direct job creation or destruction, there are indirect employment effects that need to be taken into account. They are however much more difficult to estimate and depend on the type of green policies and instruments applied, and on the ability of labour markets and their institutions to cope with and facilitate structural change.

⁸ See European Commission (2009).

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Figure 1 tries to illustrate different possible scenarios of various climate policies and some mechanisms behind these outcomes:

- Scenario A describes “net loss of jobs” outcome with a high loss of jobs in “dirty” industries which is not matched by the creation of new jobs in green activities.
- Scenario B “green jobs but lower productivity”: implies moderate carbon leakage but higher energy price and lower real income, probably lower productivity - depends on whether positive effects dominate negative indirect effects or not
- Scenario C implies “loss of dirty jobs” compensated by higher productivity (in green or other sectors as well)
- Scenario D would be the “green growth” scenario.

Figure 1: Direct and indirect employment effects of climate policies - different scenarios

Various outcomes of climate policies	Mainly negative direct effects	Mainly positive direct effects
Mainly negative indirect effects	<p>A. “Loss of jobs”</p> <ul style="list-style-type: none"> - green energy with higher energy cost - higher price on carbon (fossil fuels) - carbon leakage - strong decline of traditional “dirty” production - not enough new low carbon or green activities - lower GDP and real income; negative feedback effects 	<p>B. “Green jobs but lower productivity”</p> <ul style="list-style-type: none"> - no significant carbon leakage - direct job losses moderate - increase of renewable energy - increase of low carbon jobs - lower real income and negative indirect effects - lower productivity -> the overall effect on employment is sum of mainly positive direct effects and negative indirect effects
Mainly positive indirect effects	<p>C. “Loss of dirty jobs”</p> <ul style="list-style-type: none"> - direct job losses (‘dirty’ production) - carbon leakage - some but not high enough increase of renewable energy and low carbon jobs - positive indirect effects through higher productivity which compensates the negative real income effect of higher energy costs 	<p>D. “Green growth”</p> <ul style="list-style-type: none"> - new efficient green or low emission energy production - no significant carbon leakage - new productive activities in industry sector (energy efficient technology; greener production in traditional sectors), fully compensating the loss of jobs in “dirty” production - increased or not at least decreased productivity - no negative effect on GDP, real income and long-run employment (compared to business as usual case)

The overall “net” employment effect is the sum of direct and indirect effects. The problem is that the indirect employment effects cannot be measured and monitored through descriptive indicators, but require the use of economic models.

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Nonetheless, difficulty in measurement does not mean that the indirect effect, and therefore the net employment impacts, can be ignored. They could have a very significant role under scenarios A and B. On the other hand, concerning scenarios C and D it could be argued that (negative) indirect effects are not significant and could be ignored. However, especially in the short run and assuming significant emission reduction targets, energy prices are likely to increase significantly, with a likely substantial negative indirect impact on the level of employment.

In general, findings from studies on the net employment impact of climate-change-related policy measures suggest that the resulting structural changes will have, at least in the long run, no or only a slight positive impact on the overall employment level. However, one can expect significantly different effects across economic sectors, skill types and regions.⁹

Box 3: How to quantify green jobs? In Germany the amount of people working in the environmental sector was estimated with input-output-model, using environmental expenditures. This approach counts the number of jobs financed by environmental expenditures, rather than the amount of jobs with green activities. The number of people was estimated at around 1.8 million, i.e. 4.5 % of the German labour force.

The main result of the studies show that there are much more 'greening' jobs which include some environmentally oriented activities, compared to the 'green' jobs which are specialized on environmental issues.

Skills for Green Jobs, Cedefop, Country report - Germany, GHK, February 2010

The international dimension: carbon leakage and competitiveness

The level and structure of employment can also be affected by changes in the international competitiveness of Member States, depending on the level of EU vis-à-vis non-EU environmental policies and standards. A frequently voiced concern is the potential loss of jobs in the EU due to carbon leakage, i.e. the relocation of jobs to non-EU countries with relatively lower environmental standards (e.g. in energy intensive-sectors such as steel, cement or paper production).

The European Commission has estimated the sectors facing the risk of carbon leakage and the magnitude of carbon leakage¹⁰. Carbon leakage can be a challenge, especially for the energy intensive export industry. However, even in these sectors carbon leakage is also determined by a number of other conditions. One potential candidate to monitor carbon leakage could be the changes in production and employment in energy intensive sectors - except that these could be caused by other reasons as well:

- for the energy intensive production sectors more important determinants could be closeness to markets, skills, price of labour, price of resources
- the possibilities to increase consumer prices because of higher energy cost are detrimental, determined by global competition vs. imperfect competition.

2.3.2 Impact on productivity and real income

Looking beyond the employment effects of greening the economy, it is also necessary to take into account the consequences for productivity and income. "Green growth" can only be achieved if productivity was not reduced (compared to business as usual case, i.e. no climate policy case). Moreover, productivity losses would result in lower real income and probably on lower employment as well.

⁹ For an overview see European Commission (2009).

¹⁰ Directive 2003/87/EC Impact assessment: Commission Decision determining a list of sectors and subsectors which are deemed to be exposed to a significant risk of carbon leakage pursuant to Article 10a(13) of directive 2003/87/EC

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In the context of analysing and understanding the effects of climate policy, these somewhat broader economic issues also call for modelling approaches instead of indicators. The main messages from applied general equilibrium models (AGE), which are typically used to undertake this type of analysis, are as follows:

- results differ in the short and long term: while in the short term they could be negative, they could be less negative or even positive in the longer term
- the role of labour market adjustment is crucial for employment effects as well as for broader economic effects (GDP etc.)
- even if the effects on employment were neutral or positive (in the longer term), the effects on real income could be negative (“green jobs” - but not necessarily “green growth”?)
- significant emission reduction targets are likely to result (at least in the short term?) on higher energy prices, increasing production costs and resulting negative indirect effects
- the parallel between the green challenge and the ICT revolution is that both have a far reaching impact, although the effects on productivity could be even opposite, at least in short term

Taking into consideration the above-mentioned elements, it could be suggested that labour market adjustment mechanisms and changes in productivity and real income are important - while at the same time bearing in mind that those are not only affected by environmental policies.

2.3.3 Short-term and long term effects

The time interval also plays a role: broadly speaking, negative side effects of climate policy are more likely to materialize in the short term, while positive impacts are rather to be expected in the medium and long terms. Keeping in mind that what is in economic terms “long term” is quite “short term” for the world climate, it should be noted that, in particular the risks of not reducing greenhouse gas emissions are likely to manifest themselves in the very long term. The costs of emission reductions on the other hand, will have to be borne in the short or medium term.

The same might be true for the economic costs and benefits of climate policy. The economic cost of climate policy tends to be more negative in the short run than in the long run. This is especially the case when assuming that adjustment on the structural change, caused by climate policy, takes time. On the other hand, poor adjustment and/or inefficient climate policy (not being a cost-efficient policy) could result, also in the long term, in negative economic effects.

Figure 2: Short- and long-term labour market impacts of climate change policies

Potential negative effects	Potential positive effects
Higher energy costs (=> lower production and GDP; lower real income) - negative effects more likely in the short run; possible also in the long run, but moderate	Lower dependence on import energy Lower energy consumption Less local environmental problems
Loss of competitiveness (especially in the short run?)	(- negative effects the lower the more countries committed)
Lower employment (negative especially in the short run)	New jobs (more likely in the long run)
Risks of new technologies	New innovations (more likely in the long run)

The fact that the economic and employment effects could differ in the short and long term proves also relevant in view of indicators. As an example, indicators related to short-run labour market adjustment mechanisms and matching are more relevant in short to medium term, while indicators related to productivity of new green jobs are more relevant in the medium to long term.

2.3.4 Changing demand for skills

Changes in the demand for skills and occupations are widely thought to be part of the main consequences of greening the economy. The following broad impacts can be identified¹¹:

- **Some skills will become obsolete** due to structural changes in the labour market and employment shifts, both within and across sectors, due to demands for a greener economy (e.g. as utility meter reading services are rendered obsolete by introduction of 'smart' household meters that automatically relay data to utility companies)
- Demands for **some new skills** will be created as new 'green-collar' occupations emerge to support adaptation to and mitigation of climate change (e.g. support and servicing of solar, wind and other renewable energy technologies)
- The **skills required for existing jobs will have a stronger green element** as existing occupational profiles change (e.g. bottle manufacturers learning new technical skills to reduce carbon emissions from production).

Recent work by Cedefop¹² suggests that the boundaries between low-carbon and not-low-carbon work are becoming increasingly blurred and that making the distinction between green jobs and skills and others is not necessarily helpful. Cedefop's study also argues that many of the skills needed for low-carbon jobs can be found in existing occupations. A balance of generic skills (e.g. autonomy and communication), generic green skills (such as reducing waste and improving energy and resource efficiency) and 'topping up' existing job related skills, is found to be much more important to developing a low-carbon economy than more specialised, green skills.

¹¹ GHK (2009)

¹² Cedefop (2010)

Yet, although up-skilling appears more effective than developing new green skills, some sectors will require significant investment in skills, less though in terms of new skills required but rather because of the scale of up-skilling required (e.g. as a consequence of national legislation for energy efficient housing and a resulting high demand for construction workers skilled in applying the techniques need in low-carbon homes).

The Cedefop report also identifies systemic weaknesses in the EU's skills base which, according to the findings, limit productivity and competitiveness and reduce the EU's capacity to exploit the opportunities offered by green growth. Deficits in management skills and technical, job-specific skills, (many of which are related to STEM/science, technology, engineering and mathematics), are of greater concern than shortages of 'new' green skills.

2.3.5 Impact on quality in work

The skill issue mentioned above is a key aspect of job quality, in particular when it comes to access to training and life-long learning opportunities. There are however additional issues related to job quality that will be affected positively or negatively by environmental change and/or policies aimed at greening the economy:

- **Health and safety at work:** On the one hand, measures aimed at environmentally friendly workplaces can help to improve working environments. For example, natural ventilation can both reduce energy consumption and at the same time improve air quality at the workplace. On the other hand, more extreme climate change can lead to more difficult work conditions in certain occupations, e.g. outdoor workers in construction or agriculture.
- **Gender equality:** Structural change resulting from greening the economy can affect the gender balance of employment. For instance, several strongly male dominated sectors such as fossil-based energy production and extraction of oil and gas, are likely to suffer most from job losses. At the same time potential positive employment effects may arise in other, also typically male dominated areas, such as infrastructure investments in green energies and resource efficiency.
- **Sustainability of job creation:** Not all employment gains in green sectors will be permanent. While some green technologies may initially have a higher than average labour intensity, differences in labour intensity are likely to diminish over time once initial investments have been made, and new green technologies mature and become more productive.

3 IMPLICATIONS FOR POLICY FORMULATION

The global economic crisis began with the acute fall on the world's financial markets in the second half of 2008 and then spread into the real economy to become one of the most serious economic and social crises since the Second World War. The unexpected depth of the crisis required prompt action from governments, which have broadly succeeded in limiting its labour market impact, although unemployment rates have soared to long-term heights.

The crisis has reaffirmed the importance of the long term challenges that our employment policies are facing: demographic change, technological evolution, globalisation and, last but not least, the need to tackle climate change and develop a resource-efficient, greener and more competitive economy.

This report focuses on the environmental challenge. It looks at the way environmental policies and employment policies mutually influence each other, and how this relation can be described, analyzed and monitored. To define its scope, we have opted for a policy-based approach, focusing on the interlinkages between employment policies on the one hand, and environmental sustainability, climate change and green growth on the other hand. By doing so, we have tried to avoid separating out a part of the economy and defining it as "the green economy", in contrast to everything else that then becomes "non-green" or "brown". We have made this choice in the conviction that by 2020 all jobs in the European Union will inevitably become "greener" than they are today. Therefore, a "pigeonhole" approach, only looking at a limited number of industries and reducing the overall challenge to their job creation potential, should be avoided.

Nevertheless, in line with the work carried out by the European Commission, CEDEFOP, the ILO and the OECD, and where appropriate, the report pays special attention to the "green sector" activities that are most closely involved in the reduction of environmental risk, minimizing pollution, and resource use. On the one hand, as has been explained above, this focus is justified for analytical reasons.. On the other hand, it also has a policy relevance, stemming from the belief that the development of this sector is of strategic importance for the European economy, that the green activities can and should act as forerunners for a broader greening of the labour market, causing spillovers throughout the economy, and that the size and characteristics of the green sector are in itself indicative for expected broader labour market changes and the policy choices to be made.

3.1 Europe should seize the green job opportunities

Although surrounded by some uncertainties, it has become an established fact that the world climate is changing under the influence of human activity. This will have an undeniable impact on our societies and on our labour markets, regardless of the policy path that will be chosen. Even if Europe would not take any action to mitigate climate change and merely adapt to its consequences, employment policies would still need to deal with the ensuing structural changes. This means that most of the policy conclusions described here will still be relevant, notwithstanding the overall direction of environmental policies taken in the EU.

However, in line with the Europe 2020 strategy, the EU should not hesitate to play a proactive role in climate mitigation, and use its strong starting position and large potential in environmental products, services and low-carbon technologies as a springboard. The necessity to make the EU economy more sustainable should not be seen as a mere cost, but as an opportunity to strengthen the competitiveness of Europe. Despite some possible short-run costs (e.g. through carbon leakage), Europe's economies are likely to emerge stronger in the long-run. Nevertheless, keeping the cost low and maximising the benefits of a proactive mitigation strategy requires an integrated policy approach encompassing all relevant policy domains, in particular environmental, labour market, social, economic and education policies. The new Europe 2020 strategy provides the EU with an excellent platform for such a comprehensive approach, and its possibilities to develop these synergies should be fully exploited. Therefore, the different EU Council formations and their respective committees should work together more closely.

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Ambitious environmental policies, embedded in a coherent and coordinated legal framework, are consistent with a positive business environment if enterprises can count on clear rules and policy continuity. This requires a further coordination of relevant European legislation, as well as a closer international cooperation, to avoid downward competition on the basis of environmental legislation. Environmental policies should undergo a thorough assessment, not only in view of their environmental, but also their labour market impact. In cases where different policy instruments can reach the same environmental goals, preference should be given to the most cost-effective employment and productivity enhancing policy alternative. When tackling the problem of existing environmentally harmful subsidies, those that have the most negative impact on employment should go first.

Learning from the sobering lessons of industrial policy, Governments should refrain from trying to select the best technology for reaching the environmental goals and avoid picking would-be "winners" of greening the economy. The right balance needs to be struck between, on the one hand, governments setting the framework conditions for greening the economy and, on the other hand, letting markets determine the most efficient products, technologies and investments within that framework. Governments should therefore mainly aim at promoting basic research and development, innovation and competitiveness. They should foster business opportunities by limiting administrative burden and reducing start-up regulation. Special funding systems could help enterprises in their adaptation of greener technologies and jobs. Particular attention in this context should be given to SMEs, in line with the "Think Small First" principle, through support services such as advice, consultancy and tutoring.

Governments should ensure that, all else equal, the most environmental-friendly enterprises are also the economically most competitive ones. Tax policies can play an important role in this respect, by providing the right incentives and internalising environmental costs. Revenues from taxing greenhouse gases and other environmentally harmful activities should be used, at least partially, to lower the tax burden on labour, in particular in countries where this burden is very high. If this is handled efficiently, it can yield a "double dividend" benefiting both the environment and employment.

3.2 A reactive labour market for a smoother greening

Greening the European economy will lead to the creation of new businesses and the demise of others. Most enterprises will continue to exist, but will have to adapt more or less strongly. Ensuring that greening the economy is compatible with the European Employment Strategy's aim of "more and better jobs" depends very much on how the corresponding structural change of labour markets is handled. The green transition is not dissimilar from the other fundamental changes our labour markets have undergone (such as the ICT revolution or the development of the service sector) or are facing today (such as globalisation). However, greening the economy may be different from other challenges in the sense that it is more strongly policy-driven, with governments setting the main rules of the process. This should be taken as an opportunity since, in principle, it allows for a better preparation and management of the necessary adaptation and restructuring.

Flexicurity policies can be key instruments in this respect. Conceived as an employment policy framework to respond to the challenges of globalisation, ageing societies and technological change, flexicurity policies, under each of its four components - flexible and reliable contractual arrangements, comprehensive life-long learning strategies, effective active labour market policies, modern social security systems - become also very relevant in the context of environmental change, which, after all, can be seen as a form of technological change. These policies should be put in place to make sure that phasing out environmentally harmful activities is not only a step forward for the environment, but provides people with new perspectives for their professional careers. The necessity to green the economy underlines even further the need for speeding up structural reforms through flexicurity type approaches. Flexicurity can underpin support for change that has become inevitable; it can increase awareness and mutually reinforce necessary reforms from both the environmental and employment side. At the same time, greening the economy should also be used as an opportunity to increase the labour market participation of women and to improve gender equality.

Labour markets that are more mobile in general terms are also more likely to allow for a more dynamic and quicker transition towards greener employment. Therefore, policies that encourage professional and geographical mobility should be reinforced, and access barriers to the labour market should be further

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reduced. This calls, on the one hand, for adequate tax/benefit systems and make-work-pay policies, and, on the other hand, for policies that encourage language learning, the coordination of social security rights and better cross-border recognition of professional experience. More broadly, it calls for a reassessment of an increasingly outdated and environmentally unsustainable industrial labour market model under which a "good" job was supposed to be for the entire working life, and a reorientation towards a new balance between flexibility and security.

Effective and efficient active labour market policies are an essential part of this package. Public employment services have a key role to play in this respect by further developing their role as transition agents. They should provide information, guidance, matching and training for new opportunities in a greening labour market for the unemployed, the inactive, as well as for workers looking for another job.

Given the likely dimensions of labour reallocation due to greening the economy, the associated distributional effects also need to be taken into account. Adequate security must be provided to those in transition between jobs or those becoming unemployed, with a special focus on the most vulnerable workers. At the same time, opportunities should be created for people on the margin of the labour market and labour market segmentation needs to be reduced. In doing so, the greening of the economy and the labour market should go hand in hand with stronger social cohesion.

Box 4: Low growth?

According to some scholars, the sustainability of the planet is incompatible with continuous economic growth (see e.g. Jackson, 2009 "Prosperity without growth", Schaffer and Stahmer, 2006, "Die Halbtagsgesellschaft"), as available natural resources dwindle and population growth decreases in parts of the world (as is already the case in the EU). In their view, under such conditions, full employment can only be achieved if productivity growth is reduced or working time is shared differently from today.

Such an approach, which is clearly not the one taken by Europe 2020, would require altogether different labour market policies. It would call for a reduction in standard working hours, coupled with more flexibility for employees to choose their working time, and equal protection for all workers independently for the amount of hours worked.

If Europe wants to increase its competitiveness by tapping into the opportunities of a greening economy, it must take into account the necessity to sustain productivity growth during the transition. However, it also needs to recognize that productivity should be measured on the basis of a broader concept than GDP, taking into account sustainability concerns, in line with the report from the Stiglitz-Sen-Fitoussi Commission and the Commission Communication on "GDP and beyond: Measuring progress in a changing world" (European Commission, COM 2009/433-final).

Unless a "low growth" path would be chosen (see box 4), Europe's economy in 2020 should on average be greener *and* more productive than today. Since quality in work and productivity go hand in hand, this also means that green jobs should mostly be better jobs, at least respecting the ILO's decent work standards.

3.3 Skills are the key to green employment

A key part of the flexicurity agenda concerns lifelong learning. As has been underlined within the context of the "New Skills for New Jobs" agenda, if tomorrow's jobs are different from today's, different skills will be required from the workers. One aspect in which they will be different is related to the evolution towards a more environmental-friendly economy, and therefore these skills will have to be greener.

Developing a low-carbon, resource-efficient and competitive economy will firstly require a general up-skilling of the (potential) workforce. This will require substantial investment in efficient education and training. Once again, the green challenge offers an excellent opportunity to implement a policy that is indispensable by all means: a good basic education provides the best foundation for developing one's skills throughout life.

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In addition to these general skills, specific skills will be necessary. The development of the green sector makes it indispensable for Europe to match other parts of the world in science, technology, engineering and mathematics (STEM) skills, as has been underlined, amongst others, by Cedefop. Technical studies, from secondary education up to post-graduate level, including the associated career possibilities, need to be made more attractive to young people, in particular young women, e.g. through apprenticeships, internships and school-work experiences in green activities.

In many cases, topping-up available skills with some specific, green-oriented skills will be sufficient to allow for the transition to a greener job. Apart from the necessary adaptation of training courses in the context of active labour market policies, this calls for adequate life-long learning and on-the-job training systems. This type of learning is the responsibility of workers, employers and authorities alike, and calls for systems allowing for tripartite financing of training, possibly using some kind of career training accounts. They should guarantee that the necessary up-skilling remains affordable and practicable. In addition, more emphasis is needed on training the trainers and enabling trainers and teachers to teach relevant new “green” techniques.

In this context, special attention should be paid to the low-skilled. They are likely to be among the ones most affected by the expected structural change. Adequate ways must be developed to make sure that they can fully benefit from the up-skilling exercise.

Furthermore, the transferability of “green skills”, and more generally of all skills, should be assured, meaning that the recognition of formally and informally acquired skills must be stepped up. In this respect, it should also be recognized that many of the skills that have been acquired in less green activities, such as traditional industrial occupations, will still be very relevant for more environmental-friendly jobs.

Skills forecasting is crucial in this respect. Current initiatives to analyse labour market and skills trends are useful and should be reinforced, in particular within the “new skills for jobs” initiative.

This type of forecasting can also be the basis for a well-designed immigration policy. Although it is by no means an alternative for a well-designed up-skilling approach, Europe should become more attractive for high-skilled talent from other parts of the world, in particular those with high-level green skills. Mutually beneficial arrangements should be established, avoiding harmful brain drain in countries of origin, and creating a climate in which the EU is an integral and central part of the worldwide research community.

Finally, a mainstreaming of green skills is called for. Attention for the sustainable use of energy, raw materials, space and new technologies should become a vital part of all education and training curricula, already starting in early childhood education. Teaching staff should be adequately prepared for this task.

3.4 Everyone should contribute to greener workplaces and greener commuting

Not all sectors will be equally affected by efforts to green the economy. However, all enterprises can contribute to Europe’s environmental objectives, and - to this end - policies, including employment policies, should provide them with the adequate incentives.

An obvious contributor to greenhouse gas emissions is commuting to and from work, and work-related transport. Enterprises and authorities should therefore encourage alternative modes of transport, (e.g. cycling, public transport, and carpooling), through for example tax laws and the provision of adequate infrastructure. Moreover, communication technologies such as telework and the use of videoconferences, should be used to limit transportation needs; where necessary, legislation should be adapted to facilitate and encourage such practices. In this respect, the interlinkage with the need to develop family-friendly arrangements should be fully exploited.

Furthermore, enterprises should be encouraged to change production methods and work practices towards more sustainability. Small steps, such as limiting paper use, power saving practices and waste recycling can help to reduce cost and increase productivity, while at the same time sensitize workers and management to greener modes of production. Labels such as EMAS can play an important role in this respect, and their use should be further encouraged.

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Attention should also be paid to occupational health and safety, in particular in occupations that will be affected by adverse changes in climate or by the introduction of new technologies. Green jobs should be safe jobs, and greener workplaces should be safe workplaces.

Governments should, besides providing an adequate framework for workplace greening, also fully recognize that public administration can lead by example. Public services and state-owned enterprises should serve as model in environmentally-friendly working methods. Public procurements can also play an important role, by imposing strong ecological conditions on possible contractors.

3.5 A joint responsibility for greener labour markets

The EU will not reach its goal of a more sustainable economy, coupled with a substantial increase in employment, if not all actors take their responsibility in greening the economy.

Public institutions across policy areas and different levels must be involved. Employment authorities should cooperate with their counterparts in the environmental, energy, economics, transport, and education fields. Regional authorities are often best placed to guide the conversion from declining industries to greener activities, and to deal with the necessary change in regional and professional identity which is often linked to traditional and long established industries (e.g. in "coal" or "steel" regions). In a spirit of European solidarity, those regions most affected by climate change must be adequately helped to rebuild their economies based on diversified and competitive activities. Local governments are often responsible for key activities such as waste management, public procurement, water resources and public transportation, and therefore must be a partner in any "green employment" strategy.

Cooperation by the social partners at all levels is essential:

- at a central level, where they share responsibilities with the authorities in accordance with national practices;
- at an industry level, where they can have a key role in forecasting skills needs and designing adequate training initiatives;
- at an enterprise level, where they can contribute to greening workplaces and facilitate the acceptance for green policies.

Individual companies, regardless of their size, can make a difference, too. According to a 2008 special Eurobarometer on "Europeans' attitudes towards climate change", around three-quarters of respondents believe that corporations and industry are not doing enough to fight climate change. One way for companies to contribute to greening the economy is to adopt and implement corporate social responsibility practices (see box 5). The full potential of Corporate Social Responsibility should be exploited internally and externally, based on the principle "people-planet-profit": Internally, through awareness-raising, promotion of responsible practices and greening workplaces; externally, by including green considerations in business relations with other companies. In consequence, it would be greening the entire supply chain, by raising the awareness of customers and by sustaining green community initiatives. In this respect, the exchange of best practices between companies at national and EU level should be encouraged. Moreover, the potential of the social economy and of socially innovative practices should be fully exploited. SMEs in particular should be encouraged and assisted in adopting CSR practices.

Box 5: The role of corporate social responsibility

Corporate social responsibility (CSR) is defined as "a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis." (European Commission, 2006). It has become an increasingly important concept, both globally and within the EU, as reflected by the growing numbers of company sustainability/environmental performance reports. Transparency and disclosure of CSR related performance information have become particularly important in the context of the latest economic and financial crisis. CSR is part of the Europe 2020 strategy for smart, sustainable and inclusive growth. These CSR programmes, as a response to climate change, can contribute to job creation.

CSR is the behaviour of businesses that goes beyond legislative requirements and contractual obligations. CSR practices are not a substitute for public policy. They can however contribute to a number of public policy objectives, such as a more rational use of natural resources and reduced levels of pollution. This is possible thanks to investments in eco-innovation and to the voluntary adoption of environmental management systems and labelling, as well as to a greater respect for environmental protection.

CSR can play a twofold role:

1) *Within the company (internal dimension of CSR)*: Socially responsible practices at company level relate to issues such as information sharing and raising awareness on environmental issues, acquisition of new skills (green skills), upgrading of skills, lifelong learning, facilitating the transition to a low carbon economy and managing the change.

Other characteristic CSR practices involve green buildings, recycling, use of hybrid cars and less energy to commute (e.g. incentives for public transportation, carpooling, biking, telecommuting/teleworking).

They also relate to the application of new, environmental-friendly technologies and systems for the production of environmental-friendly products (e.g. reduction of packing, etc). In addition, responsible practices relate to the rational management of natural resources used, among others, in the production and energy conservation efforts. Responsible enterprises can make a significant contribution to the shift towards a low carbon economy by setting quantitative emission reduction targets, and then taking decisions in order to reach the targets as well as implementing impact assessment practices. Through public disclosure (e.g. of greenhouse gas emission information), enterprises allow consumers, investors and other stakeholders to assess the companies' environmental performance as well as risks.

2) *Outside the company (external dimension of CSR)*: There is a plethora of CSR initiatives going beyond legislation that can contribute to the environmental protection and the fight against climate change. Companies can spread their message across their supply chain and align their customers and suppliers to common values and procedures, as well as applying an "ecological assessment" on suppliers concerning their environmental standards. Information campaigns and counselling on environmental issues for the suppliers, business partners, customers or the society, as well as recycling programs adopted at the local community level, are some examples of CSR initiatives that go beyond the company.

CSR Europe¹³ has built a unique database of company best practices on CSR, which includes solutions for reducing the environmental impact of products. Moreover, the European Commission has announced backing for the launch of a European Alliance on CSR (a business-led initiative to promote CSR), aiming to make Europe a pole of excellence on CSR.

¹³ See <http://www.csreurope.org/>

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The added value of the European Union in this context is crystal-clear. Environmental concerns don't stop at Member States' borders, and Europe can only be the most competitive forerunner for the environment if it acts in a coherent way. Within the employment field, the full potential of the instruments of the European Employment Strategy should be used to make sure that green employment will be more than a slogan in 2020. The Mutual Learning Programme provides the adequate forum for a thorough policy exchange. The monitoring and assessment framework that will be developed on the basis of the existing indicators will allow for a well-designed follow-up, and the Country-Specific Recommendations should be fully used to encourage Member States to tackle the green challenge adequately.

European funds can contribute to such a policy approach. In particular the European Regional Development Fund (ERDF) supports programmes addressing regional development, **economic change**, enhanced competitiveness and territorial co-operation throughout the EU. Funding priorities include modernising economic structures, creating sustainable jobs and economic growth, **research and innovation**, **environmental protection** and risk prevention. The European Social Fund (ESF) also focuses on **increasing the adaptability of workers** and enterprises. These funds can help to deliver the Europe 2020 objectives, in particular the transition towards a low-carbon economy. The role of the European Investment Bank (EIB) in investments in low-carbon technologies, and in processes as part of its wider remit of financing activities related to climate change mitigation and adaptation, should also be noted.

Finally, the Union should continue its cooperation with other international bodies in this field, in particular with the ILO and the OECD which have done ground breaking work on the analysis of the greening labour market and on the development of adequate policy strategies. Similarly, effective dialogue with third countries that are well advanced, such as the United States, Canada and South Korea, should be reinforced.

4 ANALYSIS AND ASSESSMENT OF LABOUR MARKET IMPACTS

The interlinkages between the labour market and environmental policies are complex. As the mandate for the working group had called for, and in line with previous work within the Employment Committee, this report looks first and foremost at appropriate indicators on employment and environment. These indicators can be used within the Europe 2020 Joint Assessment Framework that is currently under development, in particular within the policy area "exploiting new job creation possibilities". In addition, the framework can be used on a stand-alone basis; it could serve as an empirical basis for thematic reviews in this area, and for further analysis of the relationship between employment and the environment. Furthermore, the indicators can be used as a source for inspiration by others working on the same topic, within and outside of the EU institutions.

Nonetheless, indicators can never fully grasp the complexity of this issue. Economic models should allow for a more integrated analysis. Over recent years, mostly under the impulse of the European Commission, different models have been constructed that allow for an analysis of the economic impact of energy policy or energy price changes (PRIMES, GAINS, GENESIS...). Since climate change will have a significant impact on energy, they can contribute to an analysis of the labour market impact. However, these models do not use the estimation of labour market impacts as their main goals, and therefore only provide rough estimates. Moreover, they do not allow estimating interactions between labour market policies and environmental policies. A first step would be to link them with presently existing labour market models, such as the one that is currently being developed for DG Employment. Nevertheless, given the need to detail both the environmental and employment aspects (investment in skills, effects on different groups, effects of active labour market policies and labour legislation...), the task will not be easy.

4.1 Indicators on employment and environment

In order to identify appropriate indicators, this report starts from existing structures and processes. The Employment Committee, and in particular its Indicators Group, have developed a comprehensive set of indicators for the monitoring and evaluation of the European Employment Strategy (EES) since its very creation. Moreover, within this framework, specific indicator (sub)sets were developed for the follow-up of thematic policy areas within the Strategy, such as quality in work and flexicurity. That work provides an important inspiration for this report.

Yet, also other indicator frameworks have been developed to assist us in our task. Over the past years, the LIME-group of the Economic Policy Committee has carried out impressive work to develop assessment frameworks, based on indicators, to monitor progress with structural reforms in the European Union. It recently started working on the integration of environmental aspects in its growth accounting system ("iGrowGreen"). Thanks to the cooperation of the Employment Committee with the LIME-group, we could benefit from this work, in particular from the note "An indicator-based assessment framework to identify country-specific challenges towards greener growth"¹⁴.

From a broader perspective, the work of the "Commission on the Measurement of Economic Performance and Social Progress", set up by the president of the French republic and headed by Joseph Stiglitz, Amartya Sen and Jean-Paul Fitoussi, should also be cited.

What to measure?

As described in chapter 2, climate policy is a crucial element of the Europe 2020 strategy and of the employment guidelines. Although monitoring the employment effects of climate policy is necessary, the issue goes beyond the mere impact of climate policies and also touches upon environmental sustainability and green growth.

¹⁴ ECFIN/B4 - ARES(2009) 350075 from 18 December 2009 and the revised version of this note from 17 March 2010

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- The main focus is on labour market issues, i.e. core issues such as labour market adjustments, transitions, and productivity.
- The employment impact of greening the economy will be framed in broader terms, including climate change and other environmental concerns.
- Relevant interlinkages/synergies with other areas will also be considered (e.g. social inclusion, quality of work)

It is essentially a policy-based approach, focusing on the interlinkages between environmental sustainability, climate policy and green growth. This broad focus is very appropriate for formulating policy recommendations, but for monitoring and analysis it will often have to be narrowed: indicators will be used for monitoring, whereas the analysis should also be based on economic models.

Although this leads to a broad indicator framework, it needs to be specific when looking at the sector of activities specifically related to the subject of our work, the so-called "green sector". Hence, the framework "supersedes" in a certain way the choice between a strictly policy oriented approach towards indicators, and a strictly descriptive approach of the green sector.

When we need to define a "green sector", on the basis of both theoretical considerations and pragmatic reasons of data availability, we decided to use the definition that Eurostat put forward for the "environmental goods and services sector" (EGSS), i.e. the sector whose activities are *"to measure, prevent, limit, minimize or correct environmental damage to water, air and soil, as well as problems related to waste, noise and eco-systems. This includes cleaner technologies, goods and services that reduce environmental risk and minimize pollution and resource use."* When data on the basis of this definition are not (yet) available, an appropriate proxy will be used, obviously trying to stay as close as possible to the EGSS definition.

In some way, if we look at the existing framework of the EES indicators, this work stands out since it does not only look at the labour market in general, but also at that specific sector. This choice is based on a triple justification:

- the development of this sector is of strategic importance for the European economy.
- this sector can and should act as a fore-runner for a broader greening of the labour market, causing spill-overs throughout the economy.
- the size and characteristics of the green sector are in itself indicative of the labour market in development and of the policy choices that have been made.

The parallel is often made between the development of this sector and the earlier ICT sector. Indeed, if the ICT sector would have been at the same stage of development as the green sector is now at the start of the EES, it would probably have received the same kind of specific attention. It is no coincidence that the spread of ICT skills continues to be seen as indicative for the development of "new skills" (EES indicator 24.A2).

The evolution towards a low carbon economy and a greener labour market will have a significant impact and could be of an unseen magnitude. However, this does not mean that our experience with earlier labour market evolutions ceases to be relevant. On the contrary, many of the lessons learned remain pertinent, and therefore a well-chosen selection of the current EES indicators should be taken on board of this framework. In other words, this proposal also contains a number of indicators which are rather generic and not directly related to labour markets in the context of greening the economy. Indicators such as the share of people taking part in lifelong learning, or the number of tertiary graduates in science and technology, can be relevant in this context as they can provide indications for the general ability of a labour market to cope with structural change.

The focus of the exercise should remain on the labour market and hence remain within EMCO's remit. However, the link between employment on the one hand and climate change / the environment on the other hand cannot be distinguished from the broader economic context, i.e. the necessity to shape a "green growth" strategy.

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4.2 The indicators framework

It is clear that the relationship between employment on the one hand, and climate change or environmental policies in a broader sense on the other hand, has different aspects. In the indicators framework, they are structured into six pillars:

- **Green jobs:** how important is the part of the labour market that is most directly linked to climate change / the environment developing?
- **Green skills:** what skills will be needed to develop the green jobs and to green the overall labour market and are they available?
- **Green workplaces:** what happens with workplaces with respect to the necessity to tackle climate change / environmental concerns?
- **Green transitions:** what changes do people go through in relation with the changing of the labour market caused by climate change / environmental policies?
- **Green labour markets:** what does climate change / environmental concern means for the overall functioning of the labour market?
- **Green growth:** how are employment, economic development and climate change / environmental concerns interlinked?

Given the important role of climate change policies within the overall environmental challenges, and in addition to this distinction, key indicators in this field have been identified.

The framework identifies three types of indicators:

- Input indicators reflect the needs and the potential, the policies put in place and their cost (without any judgment on efficiency).
- Process indicators reflect how people and policies interact, and how policies are implemented. They reflect how the gap is bridged between the inputs and the outputs.
- Output indicators describe the result of the policies and link employment and climate change. They can be the basis for setting targets.

It is useful to repeat the usual quality criteria that have been put forward by EMCO for its indicators. They should:

- reflect the policy area closely
- be clear and unambiguous
- be estimated with harmonised EU sources (if possible)
- be appropriate to identify the problems related to targets or benchmarks
- be in conjunction with structural indicators
- be of good quality.

Having these criteria in mind, the indicators in this note are divided into three categories:

- A. Indicators/proxies for which data are available
- B. Indicators for which data are likely to be available shortly (i.e. within two or three years at most)
- C. Indicators for which a data source has to be developed

The detailed list of proposed indicators is presented in the ANNEX. It was discussed and agreed by the EMCO Indicators Group at its meeting on 21/22 September 2010.

BIBLIOGRAPHY

- CEDEFOP (2010) - *Skills for green jobs. European synthesis report*. Available at:
http://www.cedefop.europa.eu/EN/Files/3057_en.pdf
- CEDEFOP (2009) - “*Future skill needs for the green economy*”, Research paper, Luxembourg
- CEDEFOP (2010) - “*Vers des emplois à plus forte intensité en connaissances et de compétences en Europe*” (note d'information), Luxembourg
- CEDEFOP (2010) - “*Skills supply and demand in Europe: Medium-term forecast up to 2020*”, Luxembourg
- DG Transport and Energy (2009) - “*The impact of renewable energy policy on economic growth and employment in the European Union*”
- Ecologic Institute, Berlin (2009) - “*Final report: design of guidelines for the elaboration of Regional Climate Change Adaptations Strategies*”
- Ecorys (2008) - DG Environment report “*Environment and labour force skills*”
- Employment Committee (2009) - “*The Employment Dimension of Tackling Climate Change. Overview of the state-of-play in Member States.*” Report endorsed by EMCO on 9 October 2009. Available at:
<http://ec.europa.eu/social/keyDocuments.jsp?type=0&policyArea=81&subCategory=115&country=0&year=0&advSearchKey=emcoreport&mode=advancedSubmit&langId=en>
- European Commission (2010) - “*Towards sustainable growth and full employment: the employment dimension of greening the EU economy*”, forthcoming.
- European Commission (2010) - “*Europe 2020: A European strategy for smart, sustainable and inclusive growth*”, Luxembourg (COM (2010) 2020 final)
- European Commission (2009): *Climate change and labour market outcomes*. Employment in Europe report, chapter 3. Available at:
<http://ec.europa.eu/social/main.jsp?langId=en&catId=113&newsId=642&furtherNews=yes>
- European Commission (2009) - “*Climate change and labour market outcomes*”, in *Employment in Europe 2009*, Luxembourg
- European Commission (2009) - “*White Paper on Adapting to Climate Change*”, Luxembourg (COM (2009) 147 final)
- European Commission (2009) - “*An indicator-based assessment framework to identify country-specific challenges towards greener growth*”

Towards a greener labour market

European Commission (2009) - Communication “*GDP and beyond: Measuring progress in a changing world*”, (COM (2009) 433 final)

European Parliament (2010) - *Report on developing the job potential of a new sustainable economy (2010/2010(INI))*, Committee on Employment and Social Affairs. Available at:

<http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+REPORT+A7-2010-0234+0+DOC+PDF+V0//EN>

European Employment Observatory (2009) - “*The Employment Dimension of Economy Greening*” in EEO Review: Autumn 2009

European Union (2009) - “*Sustainable development in the European Union, 2009 monitoring report of the EU sustainable development strategy*”, Luxembourg

European Union (2010) - “*Broad Economic Policy Guidelines*” [Note from the Council (Ecofin) to the European Council, Brussels, 9 June 2010, 10876/10]

European Union (2010) - “*Employment Policy Guidelines*” [Report from Council (EPSCO) to the European Council, Brussels 9 June 2010, 10907/10]

European Union (2006) - *Sustainable Development Strategy*

Eurostat (2009) - “*The environmental goods and services sector*”. Eurostat methodologies and working papers, Luxembourg. Available at:

http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/publication?p_product_code=KS-RA-09-012

ETUC (2007) - “*Climate change and employment impact on employment in the European Union-25 of climate change and CO2 emission reduction measures by 2030*”

GHK (2009) - “*The Impacts of Climate Change on European Employment and Skills in the Short to Medium-Term: Company Case Studies*”, Final Report (Volume 1). Available at:

<http://ec.europa.eu/social/main.jsp?catId=88&langId=en&eventsId=172&furtherEvents=yes>

GHK (2009) - “*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) Available at:

<http://ec.europa.eu/social/main.jsp?catId=88&langId=en&eventsId=172&furtherEvents=yes>

GHK (2009) - “*Thematic Expert Work on Green Jobs for DG EMPL/D1*”

High Council for Employment (2010) - *Green Jobs, Belgium*

IDEA Consult (2010) - *Green jobs. Final report*. On behalf of Federal Public Service Employment, Labour and Social Dialogue, Belgium.

Towards a greener labour market

ILO (2008): "*Global Challenges for Sustainable Development: Strategies for Green Jobs*", ILO Background Note G8 Labour and Employment Ministers Conference, Niigata, Japan. Available at: <http://www.ilo.org/public/english/bureau/dgo/speeches/somavia/2008/g8paper.pdf>

ILO (2010) - "*Skills for green jobs: a global view*", Geneva

Jackson (2006) - "*Prosperity without growth*", Schaffer and Stahmer

Joseph Stiglitz, Amartya Sen and Jean-Paul Fitoussi - "*Commission on the Measurement of Economic Performance and Social Progress*"

OECD (2009) - "*Eco-Innovation in Industry - Enabling Green Growth*", Paris

OECD (2009) - "*Green Growth: Overcoming the Crisis and Beyond*", Paris

OECD (2010) - "*Interim report on the green growth strategy: implementing our commitment for a sustainable future*", Paris.

Available at: <http://www.oecd.org/dataoecd/42/46/45312720.pdf>

OECD (2010) - "*Greening jobs and skills: The local labour market implications of addressing climate change*", Paris

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

WEBSITES

CEDEFOP - <http://www.cedefop.europa.eu/EN/index.aspx>

DG Employment - <http://ec.europa.eu/social/>

EMCO - <http://ec.europa.eu/emco>

European Commission - http://ec.europa.eu/index_en.htm

Eurostat - <http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home>

ILO - <http://www.ilo.org/global/lang--en/index.htm>

OECD - http://www.oecd.org/home/0,2987,en_2649_201185_1_1_1_1_1,00.html

ANNEXES

Annex 1: List of Indicators on employment and environment

4.2.1 Green jobs

Input	Process	Output
<ul style="list-style-type: none"> GJB1. Value added of the green sector 	<ul style="list-style-type: none"> GJB2. Share of employees working in permanent contracts or in voluntary fixed-term or part-time contract in the green sector GJB3. Wage level in the green sector GJC1. Health and safety in the green sector 	<ul style="list-style-type: none"> GJA1. Share of green jobs in total employment GJA2. Growth rate of green jobs

These indicators describe the green sector, its characteristics and its potential. The quantitative outcome, the number of green jobs, does not say anything about the quality and productivity of these jobs, just like the employment rate for the overall labour market doesn't – with good reasons. The process indicators can therefore help to correctly interpret the outcomes.

As explained in the report, the green sector is defined in accordance with the EGSS Handbook. Whenever the LFS is used as a source, the best possible approximation of the EGSS through NACE sectors is used.

A. Indicators for which data are available

GJA1. Share of green jobs in total employment

- In the short run : Share in total employment of NACE Rev. 2 section E “Water supply, sewerage, waste management and remediation services”
When available : Share of EGSS in total employment (in FTE)
- Breakdown by sex, skills level and NACE
- Possible source : short run : LFS / EGSS when available
- Status : LFS : to be checked with Eurostat / EGSS : trial data available for around 10 MS, update foreseen for second half of 2010

GJA2. Growth rate of green jobs

This indicator compensates for an (initial) lack of comparability of the data for the green sector.

- In the short run : Annual growth rate of employment in NACE Rev. 2 section E “Water supply, sewerage, waste management and remediation services”
When available : Annual growth rate of EGSS in total employment (in FTE)
- Breakdown by sex, skills level and NACE
- Possible source : short run : LFS / EGSS when available
- Status : LFS : to be checked with Eurostat / EGSS : trial data available for around 10 MS, update foreseen for second half of 2010

B. Indicators for which data could be available shortly

GJB1. Value added of the green sector

This indicator provides information about the importance of the green sector and (indirectly) about the importance of the sector in public policy.

- Value added of the green sector as a share of GDP
- Breakdown by NACE sector
- Possible source : EGSS when available
- Status: trial data available for around 10 MS, update foreseen for second half of 2010

GJB2. Share of employees working in permanent contracts or in voluntary fixed-term or part-time contract in the green sector

This indicator reflects quality in work in the green sector

- Share of employees working in permanent contracts or in voluntary fixed-term or part-time contract in the green sector (proxied by NACE E or refined NACE approach)
- Breakdown by sex, age and type of contract
- EES 21.M2 applied to the green sector – Source : LFS
- Status: to be checked with Eurostat

GJB3. Wage level in the green sector

This indicator reflects both quality in work and productivity in the green sector

- Wage level in the green sector (proxied by NACE E or refined NACE approach)
- Breakdown by sex, skills level and NACE
- LIME B11¹⁵ – Possible source : SES / SBS / EGSS (compensation of employees) when available
- Status: can be calculated by Eurostat ?

C. Indicators that have to be developed

GJC1. Health and safety in the green sector

- Accidents at work and occupational diseases in the green sector
- Breakdown by NACE sector
- EES 21.M3 and EES 21.A5 applied to the green sector – Possible sources: ESAW / EODS ?
- Status: to be checked with Eurostat

¹⁵ Within the context of the LIME note, "A" indicators are available, "B" indicators have to be developed.

4.2.2 Green skills

Input	Process	Output
<i>Generic skills</i>		
<ul style="list-style-type: none"> GSA1. Investment by enterprises in training of adults 	<ul style="list-style-type: none"> GSA2. Percentage of people taking part in LLL 	<ul style="list-style-type: none"> GSB1. People in possession of sufficient generic skills
<i>Green skills (=skills related to green jobs or the overall greening of the economy)</i>		
<ul style="list-style-type: none"> GSB2. Forecast need for skills in the green sector 	<ul style="list-style-type: none"> GSC1. Provision of skills in the green sector 	<ul style="list-style-type: none"> GSA3. Tertiary graduates in science and technology

There is a broad agreement that the evolution towards a green economy will require an investment in skills. Different types of skills needs can be identified: generic skills that are not specific for the green sector but are necessary for its development, specific skills for the green sector, specific skills related to an overall greening of the economy (e.g. related to new norms, work processes, greener workplaces...). The last category can be regrouped under the term "green skills"¹⁶.

A. Indicators for which data are available

GSA1. Investment by enterprises in training of adults

- Investment in continuous vocational education in relation to labour costs
- EES 23.A1 – Source : CVTS
- Status : available

GSA2. Percentage of people taking part in LLL

- Percentage of the adult population aged 25-64 participating in education or training (over the four weeks prior to the survey). Annual average
- Breakdown by sex and skills level
- EES 23.M4 – Source : LFS
- Status : available

GSA3. Tertiary graduates in science and technology

This indicator is considered by the LIME group to be a good proxy for the type of knowledge needed to develop green innovation.

- Tertiary graduates in science and technology per 1.000 of population aged 20-29
- Breakdown by sex
- LIME A32 – Source : LAF
- Status : available for 27 countries and 8 years

¹⁶ A more operational definition of green skills is needed, and should probably be developed together with CEDEFOP

B. Indicators for which data could be available shortly**GSB1. People in possession of sufficient generic skills**

- Number of people that have attained a certain skills level (to be defined)
- Breakdown by sex and skills level
- Possible source : PIAAC (with probably a problem of timeliness and of coverage of all countries)
- Status: to be checked with OECD

GSB2. Forecast need for skills in the green sector

- Type of skills that will be needed in the green sector by 2020
- EES 24.A1 applied to the green sector – Possible source : CEDEFOP
- Status : to be checked with CEDEFOP

C. Indicators that have to be developed**GSC1. Provision of skills in the green sector**

- Type of skills that are currently available / provided by companies in the green sector (to complement GSB2)
- Possible source: to be checked
- Status: to be checked

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4.2.3 Green workplaces

Input	Process	Output
<ul style="list-style-type: none"> • GWC1. Green workplace regulations • GWC2. Incentives for modal split of commuting 	<ul style="list-style-type: none"> • GWA1. Modal split of passenger transport • GWA2. Share of people doing tele-work • GWA3. Number of organisations and sites with an EMAS certificate • GWC3. Share of workers in EMAS-certified enterprises • GWC4. Share of workers in enterprises using ISO 26000 • GWC5. Share of carbon offsetting / carbon compensation by companies in total amount of GHG emissions • — 	<ul style="list-style-type: none"> • GWC6. GHG emissions caused by commuting • GWC7. Rate of change in use of public transport

Apart from the development of the green sector, successfully tackling climate change / environmental concerns will also require a more general greening of all workplaces and working methods. In particular, transport to and from work causes a lot of GHG emissions that can be tackled.

A. Indicators for which data are available

GWA1. Modal split of passenger transport

- Percentage of each mode (passenger cars, buses and coaches, and trains) in total inland passenger transport performance measured in passenger-km
- Possible source : transport statistics
- Status : Eurostat transport statistics provide data on modal split of (all) passenger transport by bus, passenger cars and trains. Data for many countries incomplete. Ideally, the indicator should cover percentage of workers that go to work by car(pooling)/public transport/bike/foot and people that do telework. Possibility of further details (transport for work purpose, distance, bike, foot) to be checked with Eurostat.

GWA2. Share of people doing tele-work

- Percentage of workers that do tele-work
- Breakdown by sex, skills level, frequency, distance¹⁷

¹⁷ "Distance" meaning here the distance between the "normal" workplace and the workplace for tele-working (home or another place), i.e. the commuting distance "saved" by tele-working.

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- Possible source : EWCS Eurofound / LFS (approximation : measures work at home instead of tele-work; it would clearly be desirable to change the LFS questionnaire slightly to identify tele-workers) / ICT statistics
- Status : available on a five-yearly basis from EWCS / other sources to be checked with Eurostat

GWA3. Number of EMAS-certified organisations and sites¹⁸

- Number of organisations and sites that have an EMAS-certificate (EU Eco-Management and Audit Scheme)
- Breakdown : level and evolution (for comparability issues)
- Source : EMAS
- Status : data are available on the Eurostat website¹⁹

B. Indicators for which data could be available shortly

-

C. Indicators that have to be developed**GWC1. Green workplace regulations**

- Presence of regulations that require enterprises to organise workplaces or working methods in an environmentally friendly way
- Possible source : ?
- Status : would have to be developed (and is not so easy to develop – this would require work similar to the construction of e.g. the OECD EPL-indicator)

GWC2. Incentives for modal split of commuting

- Indicator on taxation and other policies that encourages specific forms of travelling, e.g. payment by employers, tax exemptions, policies towards company cars...
- Possible source : ?
- Status : would have to be developed (and again this would be work not unlike the development of the OECD EPL-indicator)

GWC3. Share of workers in EMAS-certified enterprises

- Percentage of workers that are employed by an enterprise with an EMAS-certificate (EU Eco-Management and Audit Scheme)
- Breakdown by sex, NACE
- Possible source : EMAS
- Status : to be checked with EMAS

¹⁸ To be replaced by GWC4 once available.

¹⁹ <http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=tsdpc410>

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GWC4. Share of workers in enterprises using ISO 26000

- Percentage of workers that are employed by an enterprise using the ISO 26000 standard for Corporate Social Responsibility
- Breakdown by sex, NACE
- Possible source : to be investigated
- Status : to be investigated

GWC5. Share of carbon offsetting / carbon compensation by companies in total amount of GHG emissions

- Percentage of GHG emissions that has been compensated through systems such as carbon offsetting and carbon compensation
- Possible source : to be investigated
- Status : to be investigated

GWC6. GHG emissions caused by commuting

- Total GHG emissions caused by commuting to and from the workplace
- Breakdown by type of transport (car/public transport)
- Possible source : environmental statistics / transport statistics ?
- Status : to be checked with Eurostat

GWC7. Rate of change in use of public transport

- Annual increase/decrease of public transport use (ideally only for commuting)²⁰
- Breakdown by type of public transport
- Possible source : transport statistics
- Status : to be checked with Eurostat

²⁰ It would be even better to measure the impact on private car use.

4.2.4 Green transitions

Input	Process	Output
<ul style="list-style-type: none"> GTB1. Share of ESF funds devoted to climate change or green objectives 	<ul style="list-style-type: none"> GTA1. Share of persons with upwards mobility or with the same employment security as previous year GTB2. Job openings and unmet labour demand in the green sector GTB3. Job losses in industries at risk of carbon leakage or at disappearance for environmental reasons 	<ul style="list-style-type: none"> GTC1. Total net job creation/destruction linked with the environment (net share of “green transitions”)

The development of the green sector, the decline of some of the more polluting sectors, the restructuring within sectors and the overall greening of workplaces and working methods will necessitate massive transitions between sectors, enterprises and jobs. Although the volume of these transitions could be unprecedented, their nature will not be fundamentally different from the transitions caused by other changes in the labour market. Therefore many of the more overall transition indicators remain relevant.

A. Indicators for which data are available

GTA1. Share of persons with at least the same employment security as previous year

- Share of transitions by type of contract that provides at least the same employment security
- Flexicurity output indicator based on EES 21.M1 – Source : SILC
- Status : available

GTA2. Participants in regular activation per person wanting to work

- Number of participants in regular activation measures (LMP categories 2-7)/in assisted activation programmes (LMP sub-category 1.1.2) /number of recipients of supports (LMP categories 8-9) divided by the number of persons wanting to work (ILO unemployed plus labour reserve)
- EES 21.M2 – Source : LMP and LFS
- Status : available

B. Indicators for which data could be available shortly

GTB1. Share of ESF funds devoted to climate change or green objectives

- Share of ESF funds targeted to support climate change objectives
- Sub-indicator of LIME A16 – Source : DG REGIO
- Status : to be checked with LIME and DG REGIO

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GTB2. Job openings and unmet demand in the green sector

- Number of vacancies and hard-to-fill vacancies in the green sector
- LIME B8 – Source : JVS probably does not give enough detail ? Alternatively, we could limit ourselves to measuring overall job openings and unmet demand
- Status : to be checked with Eurostat

GTB3. Job losses in industries at risk of carbon leakage or at disappearance for environmental reasons

- Number of net jobs lost in industries that can be identified as being at risk of carbon leakage or of disappearance for environmental reasons
- Breakdown by NACE
- Source : European Restructuring Monitor (Eurofound)
- Status : to be checked with Eurofound

C. Indicators that have to be developed
--

GTC1. Total net job creation/destruction linked with the environment (net share of “green transitions”)

- Net impact of climate change / environmental policies on the number of jobs
- Source : models ? There are two ways to measure this : the net impact on the number of jobs by analysing the evolution of employment in different « sectors » between two dates or by comparing the observed number of jobs to a « Business As Usual » trend.
- Status : to be checked within the Working Group (work on models)

4.2.5 Green labour markets

Input	Process	Output
<ul style="list-style-type: none"> • GLA1. Green R&D expenditure • GLB1. Expenditure on R&D in the green sector • GLB2. Share of ESF funds devoted to climate change or green objectives (=GTB1) 	<ul style="list-style-type: none"> • GLA2. Relative fiscal pressure on labour and CO₂ • GLA3. Environmental protection expenditure per worker 	<ul style="list-style-type: none"> • GLA4. GHG emissions per worker • GLA5. GHG emissions over labour cost • GLB3. Productivity as measured through an alternative for GDP (ANS/hour worked ?) • GLC1. Natural resources used per worker

These indicators intend to bring together the overall mutual impact of employment policies, economic policies and environmental policies to shed a light on the resulting relationship between employment and climate change.

A. Indicators for which data are available

GLA1. Green R&D expenditure

- Public R&D in production, distribution and rational utilisation of energy as a percentage of GDP²¹
- Breakdown by type of investment
- LIME A36 – Source : Eurostat
- Status : available for 27 countries and 9 years

GLA2. Relative fiscal pressure on labour and CO₂

- Environmental taxes divided by labour taxes
- LIME A10 – Source : Eurostat
- Status : available for 27 countries and 10 years

GLA3. Environmental protection expenditure per worker

- Total expenditure for environmental protection divided by total employment
- Breakdown by type of environmental expenditure (air, waste water, noise, biodiversity...)
- Source : LFS and EEA
- Status : available

GLA4. GHG emissions per worker

This indicator links together the targets for EU2020 and the 20/20/20 strategy. Its aim is to measure whether sufficient progress has been made and in how much different countries or industries are contributing to this progress. In a sense, it is a synthetic indicator that encompasses both the evolution of the labour market and

²¹ Alternatively it could be calculated as a percentage of total R&D investment or of total investment

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climate change. Obviously, like all indicators it should be interpreted with care through looking at other indicators.

- GHG emissions in tons of CO₂ equivalent divided by total employment
- Breakdown by NACE
- Source : LFS and EEA
- Status : available
- Data : see annex

GLA5. GHG emissions divided by labour cost

An alternative productivity based measure could be to relate GHG emissions to total labour cost.

- Tons of CO₂ equivalent per million EUR compensation of employees (alternatively, changes in both variables could be used as an indicator)
- Breakdown by sector ?
- Source : National accounts / EEA
- Status : available
- Data : see annex

B. Indicators for which data could be available shortly

GLB1. Expenditure on R&D in the green sector

- Expenditure on R&D in the green sector as a percentage of total R&D expenditure
- Source : EGSS
- Status : will be available once the EGSS is fully operational

GLB2. Share of ESF funds devoted to climate change or green objectives (=GTB1)

GLB3. Productivity as measured through an alternative for GDP (ANS/hour worked ?)

Indicators on productivity are necessary complements to indicators on labour volume. However, as shown (again) in the Stiglitz/Sen/Fitoussi report GDP doesn't sufficiently take into account environmental consequences of growth and environmental sustainability. Therefore, alternative measures have been proposed and should be further developed. One of these is Adjusted Net Savings (or Genuine Savings), defined as follows :

$$ANS = GDP$$

- *public and private consumption*

- *net foreign borrowing*

- *depreciation of produced assets*

+ *current spending on education*

- *resource depletion*

- *pollution damage*

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In a sense, this could be the basis for a measurement of "net productivity".

- Adjusted Net Savings divided by the total number of hours worked
- Possible source : World Bank / LFS
- Status : to be checked

C. Indicators that have to be developed**GLC1. Natural resources used per worker**

- Total amount (monetary value) of natural resources used divided by total employment
- Breakdown by sector
- Possible source : environmentally extended input-output models such as Exiopol ?
- Status : to be checked with the European Commission

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4.2.6 Green growth

Input	Process	Output
<ul style="list-style-type: none"> • GGA1. Share of EU structural funds to energy and climate change projects • GGA2. Private divided by public environmental protection expenditure • GGA3. Share of electricity produced by carbon-free technologies in total electricity production • GGA4. Green R&D expenditure (=GLA1) • GGB1. Environmentally harmful subsidies 	<ul style="list-style-type: none"> • GGA5. Carbon contents of imports • GGA6. CO₂ taxes / GDP • GGA7. Green patents • GGC1. Price of carbon-free electricity / price of non-carbon free electricity 	<ul style="list-style-type: none"> • GGA8. GHG emissions / GDP • GGA9. Energy supply / GDP

Although it cannot be the role of the Employment Committee (and thus of the Working Group) to measure the overall impact of climate change / environmental policies on the economy –and vice versa– the role of the labour market cannot be completely disentangled from the broader economic context either. Therefore, this set of indicators would be incomplete if it would not include at least some of the main indicators to monitor green growth.

A. Indicators for which data are available

GGA1. Share of EU structural funds to energy and climate change projects

- Share of EU structural funds targeted to support energy and climate change objectives
- LIME A16 – Source : DG REGIO
- Status : available for 26 countries and 1 year

GGA2. Private divided by public environmental protection expenditures

This is an indicator on the leverage of environmental protection expenditure.

- Ratio of private environmental protection expenditure and public environmental expenditure
- LIME A17 – Source : Eurostat
- Status : available for 21 countries and 9 years

GGA3. Share of electricity produced by carbon-free technologies in total electricity production

- % of electricity produced by carbon-free technologies in total electricity production
- LIME A18 – Source : Eurostat
- Status : available for 27 countries and 9 years

GGA4. Green R&D expenditure (=GLA1)**GGA5. Carbon contents of imports**

This can be used as an overall indicator on the importance of carbon leakage.

- Carbon contents of import by GDP
- LIME A2 – Source FAO
- Status : available for 27 countries and 1 year (2004)

GGA6. CO₂ taxes / GDP

- CO₂ taxes as a % of GDP
- LIME A9 – Source : Le Cacheux et al.
- Status : available for 27 countries and 1 year

GGA7. Green patents

- Number of green patents
- LIME A33 – Source : OECD
- Status : available for 19 countries and 1 year (2005)

GGA8. GHG emissions / GDP

- GHG emissions in tons of CO₂ equivalent divided by GDP
- LIME A1 – Source Eurostat
- Status : available for 27 countries and 1 year

GGA9. Energy supply / GDP

- Energy supply in TOE (ton of oil equivalent) divided by GDP
- LIME A20 – Source Eurostat
- Status : available for 27 countries and 9 years

B. Indicators for which data could be available shortly

GGB1. Environmentally harmful subsidies

- Environmentally harmful subsidies as a percentage of GDP and/or as a percentage of environmental protection legislation
- Source : A Eurostat Task Force is working on the subject of environmentally related subsidies. The methods are also being discussed in the context of the planned System of Integrated Environmental and Economic Accounts (SEEA) UN standard that is due to be published in 2012.
- Status : to be checked with Eurostat

C. Indicators that have to be developed

GGC1. Price of carbon-free electricity / price of non-carbon free electricity

- Ratio of the price for carbon-free electricity and the price of non-carbon free electricity
- Possible source : environmental statistics
- Status : to be checked with Eurostat

4.2.7 Thematic key indicators for climate change policies

Since climate change is a very important part of the environmental challenges that the European labour markets are facing, it is useful to identify, within the overall set of green indicators, a series of key indicators that focus specifically on the climate-change, low carbon dimension.

	Input	Process	Output
Macro level	GGA1. Share of EU structural funds to energy and climate change projects	GLA2. Relative fiscal pressure on labour and CO ₂ GGA5. Carbon contents of imports	GLA5. GHG emissions over labour cost
Sector level	GGA3. Share of electricity produced by carbon-free technologies in total electricity production	GTB2. Job openings and unmet labour demand in the green sector	GJA3. Share of green jobs in total employment (both overall and limited to energy)
Job level	GWC2. Incentives for modal split of commuting	GJA2. Wage level in the green sector (overall and limited to energy)	GLA4. GHG emissions per worker

These indicators also allow to reflect different policy instruments that are used to tackle climate change:

- market based instruments, increasing the price of energy on the basis of emission trading (most relevant : GGA5, GLA5)
- broader policies promoting a low carbon economy (GJA3 limited to energy, GJA2 limited to energy, GGA1)
- an overall more resource efficient and waste minimising economy (GJA3 overall, GJA2 overall, GLA4)

Annex 2: Organisation and mandate of the Working Group

A. Mandate for a working group to investigate further the employment dimension of tackling climate change²²

1. Background

The fight against climate change has become a major concern of the EU and its Member States. The June 2009 Council Conclusions stress that: 'successfully combating climate change will also contribute to moving to a sustainable economy and create new jobs'²³. The *Political guidelines for the next Commission* of Jose Manuel Barroso²⁴ indicate that climate change and energy security are likely to be driving forces of the EU agenda within the new Commission. The successor of the Lisbon Strategy will need to be shaped in a way that will ensure it happens. This is why building a solid knowledge base on the employment implications of 'going green' is crucial.

The Belgian Presidency has announced that Climate change and employment consequences of climate change will be one of their political priorities and asked EMCO to prepare an opinion for the December 2010 EPSCO Council.

On 9 October 2009 EMCO endorsed an analytical report delivered by the Ad Hoc Group²⁵. The report highlights that further work will be required when it comes to reinforcing the evaluation of labour market outcomes and ensuring better monitoring of reforms. For that need EMCO should define and clarify the concepts and issues at stake, foster the work on monitoring and information dissemination, as well as on development of relevant indicators. Previously, at its meeting on 22/23 September 2009, the Indicators Group discussed and proposed the implementation of a temporary joint Ad Hoc/Indicators Group working group on the employment dimension of tackling climate change.

2. Mandate

The Employment Committee hereby establishes a temporary working group to pursue further work on policy and measurement issues concerning the employment dimension of tackling climate change, with the aim to improve the evaluation and monitoring of the labour market impact of climate policies. In particular, this work will follow-up on questions which require a more detailed and technical discussion and which were raised during recent meetings of EMCO, the Ad Hoc Group and the Indicators Group.²⁶

The working group should address the following issues:

²² Document EMCO/07/210110/EN

²³ 11225/09.

²⁴ Available at: http://ec.europa.eu/commission_barroso/president/pdf/press_20090903_EN.pdf.

²⁵ Available at: <http://ec.europa.eu/emco>

²⁶ See in particular the following notes: "The employment dimension of tackling climate change - overview of the state-of-play in Member States by the Ad Hoc Group" (ADHOC/13/280909/EN) and "Indicators for measuring the employment impact of climate change and climate policies" (INDIC/29/220909/EN).

Towards a greener labour market

- Where is the main focus from a labour market perspective? Should one concentrate mainly on the impact of tackling climate change on labour markets? Are there issues from the environmental and sustainability discussion which also should be taken into account?²⁷
- How can the labour market impact of climate policies (and possibly other environmental issues) be approached and conceptualised? Looking beyond direct or gross employment impacts, what are the broader net effects? How should the issue of labour /skills mismatching/shortages and job quality be tackled?
- What is the availability and quality of statistics (e.g. in terms of comparability across Member States, time, sectors, skill groups, occupations etc.) for analysing and monitoring the employment dimension of the issue. What are the additional user needs that employment policy makers should communicate to official statistics? What would be appropriate indicators to analyze the most important labour market impacts? For example, what would be measurable indicators on speed and quality of matching labour demand and labour supply? Can output indicators be defined (e.g. carbon emissions per job)? How would these indicators be coherent with other indicators in the European Employment Strategy and statistics used and published at an international level (e.g. OECD and ILO)?
- What are likely implications for policy formulation? What are the areas which may require specific employment policy attention in response to the climate change challenge (e.g. impact on skills needs, labour supply, matching, transitions, rapid reintegration of laid-off workers, work organisation etc.)? And what are areas in which employment policies themselves can contribute to mitigate climate change?
- Given the complexity of the issues and concepts and statistics for a large part still evolving, what is the most practical way forward in terms of policy and indicator development? What would be a feasible roadmap for EMCO to follow up on this in the short and medium term?

3. Members

The working group will consist of members of the Ad-hoc or the Indicators Group or experts from the following delegations which have volunteered to participate in this task: Belgium, Germany, Greece, France, Austria, Poland, Portugal, Slovenia, Slovakia, Finland, United Kingdom, as well as DG Employment and DG Eurostat.

4. Working methods

The secretariat of the working group will be provided by the EMCO support team and will assist the chairperson in the preparation, organisation and follow-up of the meetings of the working group.

The working group will meet three times during the course of 2010 (see roadmap in the Annex). The findings of the working group will be summarised in a report to be treated by the joint Ad Hoc /Indicators Group meeting on 28th of October 2010 and submitted to EMCO before the end of 2010.

The working group should take stock of existing work and expertise at European, national and international level (including work undertaken by OECD, ILO and others).

²⁷ For example the EU Sustainable Development Strategy includes climate change and clean energy as one of seven key priorities to be tackled for achieving sustainable development. The other six priorities are sustainable transport, sustainable consumption and production, conservation and management of natural resources, public health, social inclusion, demography and migration and global poverty. (See <http://ec.europa.eu/environment/eussd/>).

B. Members of the Working Group

Heli Saijets (FI - Chair until September 2010)

Tom Bevers (BE - Chair as of September 2010)

Johanna Poetzsch (DE)

Ioanna Palla (EL)

Nicolas Le Ru (FR)

Christine Holzer (AT)

Paweł Targoński (PL)

Antonieta Ministro (PT)

Johanna Alatalo (FI)

Simon Smith (UK)

Christoph Maier (European Commission)

C. Invited experts

Peter Szovics (Cedefop)

Paul Swaim (OECD)

Marina Anda Georgescu (Eurostat)

D. Meeting dates

9 February 2010

5 May 2010

9 June 2010

20 September 2010