

Green jobs Observatory

In collaboration with the Marco Biagi Centre for International and Comparative Studies

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The impact of green investments on labour market

edited by Carlo Stagnaro

Green employment: zero impact?

by *Michele Tiraboschi*

For nearly a decade, the effect of green employment on the economy as a whole has been at the heart of an ongoing debate among the experts in the field. The White Paper on renewable energy sources issued by the European Commission dates back to 1997. At that time, in adopting a strategic action plan, the EU considered green employment as having enormous potential, especially in terms of job opportunities, even though it was not well established at a national level. Except in the case of Spain, the impact of green employment on the international economy has been underestimated for years. However, this issue has come to the fore again recently, and now attracts considerable attention from policy- and decision-makers at international level. This is mostly due to the US government, which sees the green economy as a key instrument to cope with the on-

going economic and financial crisis. In January 2009, after visiting a small wind turbine manufacturing company in Ohio, Barack Obama, President of the United States, said: "The renewable energy policy will create thousands of new job opportunities, but we need to act now". These words received wide media coverage, attracting the attention of policy-makers, also here in Italy, raising awareness of action taken in Spain in this connection over the last 10 years. For national governments, the search for new renewable energy sources and the reduction of emissions causing air pollution are becoming critical issues. As the White Paper on the future development of the social model in Italy states, environmental policies are expected to contribute to the creation of new job opportunities in green companies, including those working with existing tech-

nologies and those developing new technologies. It is also true, however, that environmental protection gives rise to significant costs, depending on national standards, which vary from one country to another. As a result, many companies may opt to transfer production, in order to deal with international competition, with negative effects on the quality and level of employment, as argued by the Etuc, the powerful trade union confederation. Although it is an interesting topic for further investigation, today the effectiveness of green employment has been called into question, especially in terms of the creation of job opportunities,

as revealed by a recent survey. The initiative promoted by the Spanish government, which could serve as an international model in this field, as pointed out by President Obama, suffers from a number of shortcomings. A study carried out by the Juan Carlos University of Madrid on the effects of renewable energy sources on employment showed that a job created in the green economy brings about the loss of at least two jobs in the traditional labour market. Not to mention the cost of green employment, which is very high. According to the survey, the Spanish government has spent more than five thousand euros since 2000 to

support the creation of green jobs, and more than a million euros to promote employment in the wind industry.

Further research is needed to provide evidence of the real impact of the green economy on employment. There is no need to take drastic measures, but just to analyze the issue from an innovative point of view. It is important to consider current economic transformations and climate change issues, in order to promote new environmentally friendly practices and technologies.

Michele Tiraboschi

Will green jobs save the world?

by Carlo Stagnaro

Are green jobs a reality or a mirage? Obviously, any policy aimed at promoting Renewable Energy Sources (RES), as opposed to fossil fuels and nuclear power, will give momentum to the 'green industry' which, in turn, will increase the number of employed people. The real question to be asked is, rather, whether, firstly, the net impact on jobs is positive and secondly, whether in the long run, incentives towards renewables are the most efficient way to reduce Greenhouse Gas Emissions (GHGs).

How many jobs?

With regards to the question above, the evidence is mixed, as can be seen in this dossier and as

Ambra Barboni discusses, more specifically with regard to legislation discussed in the US (*US Cap-and-Trade Legislation: Change Requires Effort*). What is hardly considered, however, is the broader impact of incentive policies on the economy. The reason for this is partly because the available evidence is poor, and partly because it is very complex to assess the impact that higher-than-the-baseline energy prices, which inevitably result from inserting more RES into the energy mix, may or may not have on different economic sectors, particularly the more energy-intensive ones. Lehr et al. (2008) looked at the case of Germany, widely regarded as a model in Europe in terms of the country's ability to promote an efficient renewable industry.

They argue that the net effect of support to RES on employment may or may not be positive depending on a number of variables, such as GDP growth, oil prices, etc. However, the most important driver for that seems to be a country's ability to develop a competitive, export-oriented RES industry. The practical consequence of such a conclusion, if confirmed by further evidence, is that, only technological leaders will gain from RES incentives. To state it otherwise, countries like Germany, which were able to invest in RES soon enough, or others which will be able to develop technological breakthroughs, will gain from broader policies (such as those at the EU level) in terms of job creation or destruction, while the others will lose. Michaels and Murphy

(2009), reach similar conclusions, while critically reviewing four major US studies on green jobs. They claim that, “The study [showing how positive the effect of green jobs will be] fails to properly account for the job destruction that their recommendations would entail”. In addition to this, these studies tend to, ‘double count’ jobs that might shift from other sectors to the RES industry. More generally, the net economic impact (which is not the same as job creation) can hardly be positive. The reason for this is purely and simply, that environmental regulations result in a different resource allocation, which is almost by definition less productive than what would freely emerge from the market. There may be good reasons to do so notwithstanding, for example, if one believes that external diseconomies are occurring because of the market’s inability to correctly price the environmental consequences of fossil fuels consumption. The issue is highly disputed (for example, one might argue that the supposed, ‘solutions’ are more distortive than the problem itself, see Forte (2007), but even assuming, “some action is to be taken”, it doesn’t necessarily follow that whatever policy is implemented, even the most efficient one, is costless or even growth-enhancing. As a matter of fact, Tol and Yohe (2006) reveal that the previous studies on the costs and benefits of global warming vis-à-vis the costs and benefits of climate policies, while highly variable, tend to agree that the net impact of whatever policy is implemented (including the business-as-usual) will hardly be positive. In other

words, humanity will anyway face costs – the choice being what costs and how they are distributed over time, as well as which mix of policies might be best suited to minimize the costs (whether environmental or economic) under a great deal of uncertainty. Two clear facts emerge from the literature: on the one hand, there seems to be a consensus that the costs of climate change are of the same order of magnitude than the costs of emissions reductions; on the other hand, the famous *Stern Review* (Stern 2006) clearly finds an outlier estimate, with higher estimated costs of global warming and lower estimated costs of climate action than the previous studies. The two main reasons for this difference, which is indeed remarkable if one considers that the *Stern Review* doesn’t produce new evidence but rather relies on existing evidence, are mostly, for two reasons: (a) The Review selectively emphasizes the results from the most alarmist studies on the scientific and economic aspects of global warming, and (b) the Review questionably assumes a discount rate as low as 0.1 percent, which obviously magnifies the effects of it being a highly uncertain effect in the future. Tol and Yohe (2006), Helm (2008), Henderson et al. (2006) and Nordhaus (2008, pp. 165-190), provide persuasive criticisms of the Review’s methodology, results, and internal consistency. Helm (2008, p. 228), claims that the zero-discount approach relies upon a ‘moral argument’ that, however

The costs of global warming provide by definition an overestimate of the benefits of climate policies

philosophically relevant, tells little in terms of welfare and provides little basis for the creation of the international consensus that is needed for climate action to be taken. Others, most notably Weitzman (2009, p. 1), argue that, “The probability of a disastrous collapse of planetary welfare is nonnegligible, even if this tiny probability is not objectively knowable”. As a consequence, “The climate change economist can help [...] by stressing somewhat more openly the fact that such a [cost-benefit] estimate might conceivably be arbitrarily inaccurate depending upon what is subjectively assumed about the high-temperature damage function along with assumptions about the fatness of the tails and/or where they have been cut off” (p. 18). The position thereby endorsed is somehow paradoxical: from the assumption of not just that we don’t know, but in fact we *can’t* know the actual damage function from climate change, whether or not man-induced, the author seems to draw the conclusion that we should act *as if* the worst-case scenario was also the more probable one, if not certain. In other fields, ‘fat-tailers’ tend to emphasize that, in the presence of wide and deep uncertainties, policies should be as flexible and little-distorting as possible (see for example Taleb 2007); and the legal consequence is that, ‘simple rules’ should be adopted “for a complex world” (Epstein 1995). But when it comes to climate, a more aggressive attitude

seems to emerge, based on the assumption that, “it *might* happen so we should act as if it *will* happen”, which can be justified, again solely on moral grounds. In his seminal work on catastrophe, alas, Posner (2004), while recognizing that catastrophic risk of climate change can’t be ignored, seems to support a more relaxed, no regret policy, by suggesting that measures aimed at addressing climate change (for example emissions taxes) should be designed in a way as to also achieve other targets (for example substituting income taxes in order to reduce the deadweight loss). It should also be added that the costs of global warming can’t be immediately compared with the costs of emission reductions, insofar as the former do not coincide with the benefits of the latter. In other words, some amount of global warming is still to be expected even if the most radical policies are implemented to reduce anthropogenic GHGs. So, at least part of the costs will persist in the future. This means that the costs of global warming provide by definition an overestimate of the benefits of climate policies. The cost of climate policies, moreover, is also underestimated because it relies on an implicit assumption of efficient implementation, that is not credible. As Helm (2008, pp. 225-226) argues, “Climate change [...] is likely to be one of the largest sources of economic rents from policy interventions. There is a

The cost of climate policies is also underestimated: it relies on an implicit assumption of efficient implementation

large and growing climate change ‘pork-barrel’. It is highly unlikely that the policy costs will be zero. Indeed, there are good reasons to suppose otherwise – at every level of climate change policy”. It would be fair, hence, to describe the evidence as ‘unclear’, even though a majority of economists, including the majority of the above mentioned ones, favor some climate policies as opposed to the business-as-usual. There seems to be a consensus, indeed, that carbon emissions do have a social cost (Tol 2005), that may be small in the short run (hence the preference for moderate, not radical, immediate emission reductions, see Kelly and Kolstad 1999 and Nordhaus 2008, for example) but growing over time.

Which policy is the best?

Since immediate, dramatic impacts are unlikely, some authors have suggested that different strategies are employed, aiming not at emission reductions in the short to medium run (the so called mitigation), but at long-run-oriented goals such as preventing (rather than solving) climate change related problems or achieving an economically sustainable de-carbonization of the economy through technology improvements. Goklany (2007), for example, argues that climate change doesn’t *create* problems, it rather exacerbates existing problems, especially in the de-

veloping and the least developed world. Hunger, thirst, and malaria, as well as other negative consequences of global warming, will not arise after the global average temperature will have increased by a given amount, however defined. They all are already here. Global warming may just make them worse. The relevant fact, then, is that even the developed world used to suffer from them, and could defeat them despite the moderate increase in world temperatures observed in the last couple of centuries. As Goklany states, “Most of the improvements in climate-sensitive indicators of human well-being are because of technological progress, driven by market- and science-based economic growth, secular technological change, and trade” (p. 290). Therefore, according to this framework, it would be more rational to employ resources to fight these threats *now*, instead of trying to mitigate global warming *in the future*. With regard to climate change, Goklany suggests that a limited amount of resources is invested on adaptation. From a different perspective, Lomborg (2007), argues that the only way to achieve a more sustainable energy and economic pattern, is to invest more in innovation and the diffusion of efficient *and* cleaner technologies (not just cleaner technologies, that are for the most part very uncompetitive with conventional technologies even under the existing climate policies, that have the effect of increasing the costs of fossil fuels in order to reflect their social cost). According to Lomborg, an aggressive, short run-oriented climate policy, such as the Kyoto Protocol is both costly in the

short run and ineffective in the long run. In other words, this author suggests that we invest in innovative technologies for tomorrow, rather than investing in the existing, cleaner technologies for today (under the reasonable assumption that, at the margin, money invested for today's technological change are subtracted from innovative investments).

Ultimately, alternative strategies such as those described here, but also simpler, less distortive policies such as a revenue-neutral carbon tax (Stagnaro, 2009), may have a lower economic impact than policies based on complex reduction schemes and direct incentives to specific technologies (Prins et al. 2009). If that is true, one might derive a *prima facie* case for not subsidizing RES, letting the market operate in order for the better solutions to reduce emissions to emerge, as well as for the optimum mix between adaptation and mitigation to be discovered. What is absent is compelling evidence about the positive impact of green policies on jobs, one may well argue that their outcome is at best i.e., assuming perfect implementation and equal productivity of green investments vis-à-vis the investments that they replace – a redistributionist one.

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Bollettino Adapt

The *Bollettino Adapt*, produced in collaboration with the Marco Biagi Centre for International and Comparative Studies, consists of two series of electronic newsletters providing updated information on labour and industrial relations issues, and on issues related to the health and safety at work. There are two types of newsletter: *Bollettino ordinario* and *Bollettino speciale*.

Green employment and higher labor standards: the synergy is not that natural

by Ambra Barboni

Drivers of green employment

Public policies and growing governmental expenditures directed towards a low-carbon economy significantly shape employment trends. Worldwide, we are witnessing the development of a consistent regulatory framework aimed at tackling climate change through the implementation of mitigation (to limit the overall extent of climate change by cutting greenhouse gas emissions) and adaptation (to minimize the negative impacts of unavoidable climate change by making changes to the way we live and work) strategies. *Both market-driven mechanisms, such as cap and trade systems and international pieces of legislation which raise standards for lowering greenhouse gas emissions are changing production patterns and opening new market opportunities.* In December 2008, the European Union approved the Climate and Energy Package, which accounted for eight directives, decisions and regulations aimed at implementing the EU's Climate and Energy Policy (also known as the 20-20-20 model) targets for 2020, namely cutting greenhouse gas emissions by at least 20 percent compared to 1990 levels, increasing the use of renewable energies to 20 percent and cutting energy consumption by 20 percent. The package encompasses measures which will affect production and employment trends in a wide range of

industries: from the oil, coal and renewable sectors (at least 10 percent of transport fuel in each member state must be renewable; for power-plants and energy intensive industries emissions will be cut to 21 percent below 2005 levels), to the automobile industry (CO₂ emissions for cars will be reduced to an average of 130 g CO₂/km for the entire car fleet by 2012). The legal inputs are mainly set at an international level, while the implementation stage clearly takes place on a national or industry level. Thus, the effects on the real economy may deeply differ among countries and even production sites, according to the distinctive features of production systems and labour relations arrangements. In the United States (US), which never ratified the Kyoto Protocol, several federal policy initiatives are driving the low-carbon transition forward. The Energy Independence and Security Act of 2007 established increases in fuel efficiency standards for the road transport sector. However, recently the concern for a greener economy has risen sharply in response to the economic and job crisis, and substantial green investments have been delivered as part of stimu-

lus packages. According to the figures provided by the United Nations Environment Programme (UNEP), just in renewable energy generation projects, investments grew by 13% during 2008, to \$117 billion (UNEP, Global trends in Sustainable Energy Investment 2009). The US and China are running for the clean energy leading position worldwide. The American Recovery and Reinvestment Act allocates more than USD 65 billion to green spending (UNEP, Global Trends in Sustainable Energy Investments 2009) in a broad array of sectors related to Energy Efficiency and Renewables (residential weatherization targeting low-income families, federal building retrofits, modernization of national electric grid and so on). On the labour side, a modest USD 500 million was allocated for job training programs, in compliance with the provisions of the Workforce Investment Act, to help workers participate in the clean energy economy and make easier the burden of transition. However, more extensive funding for workforce training programs in compliance with the Green Jobs Act of 2007 would be delivered, whether the Congress passed a new cap-and-

The main driver of effective working conditions seems to rely on the fact that the transition should be driven by and soundly anchored to an institutional framework

trade legislation (the American Clean Energy and Security Act), setting an unprecedented challenge for greenhouse gas emissions standards. According to the official figures released by the government, China's \$586 billion stimulus should allocate the largest funding for energy efficiency (\$ 30.7 billion). At the EU level, in the immediate aftermath of the crisis, the largest green investment (USD 13.8 billion, according to "A Climate for Recovery" report issued by HSBC in February 2009) was delivered by Germany's twin stimulus packages, mostly in low-carbon vehicles, public transportation and building energy efficiency. Immediately afterwards, the UK's £535 million green stimulus, announced in the Pre-Budget Report in December 2009, was integrated due to a large invest-

ment of GBP 1.4 billions of extra targeted support in the low-carbon sectors. It is expected that the UK green economy is to flourish at an unprecedented pace. In March 2009, UNEP launched the Global Green New Deal, an initiative calling for a higher degree of coordination among governments' fiscal stimuli, with the aim of deploying resources for the vision of a sustainable growth model in the post-recession period. The ambitious objectives are listed within three broad categories: promotion of sustainable growth and the achievement of the Millennium Development Goals; fight carbon dependency; saving and creating jobs while protecting vulnerable groups (UNEP, Global Green New Deal, 2009).

Green jobs and working conditions Are green jobs decent jobs?

If there clear evidence exists that current expenditure is opening new market opportunities (see the article "Job creation and Job loss Related to Green Investments: an Overview of the Current Debate" by Giulia Rossi in this Dossier), further research should continue in order to understand the quality of green employment. The effects of green investments on the labor market should be recognized in the creation of new jobs, replacement of existing occupations, a potential job loss in some traditional, energy-intensive industries and transformation of jobs in terms of skills, methods and profiles (UNEP, ILO, IOE, ITUC, Green Jobs: towards decent work in a

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sustainable, low-carbon world). The correlation of such phenomena with working condition and labor standards is controversial and the related literature is quite ambiguous. The outcomes are clearly inconsistent with each other. The rationale should be found in the deep differences concerning definitory approaches, methods and contextual factors. First, the term ‘green jobs’ encompasses a vast array of occupations in different sectors, and represents a highly dynamic concept, related to technologies progress. The concept itself is just a social construction, while the underlying reality is more complex. Occupations in green sectors run across all the educational, professional and income levels. A report on the recently proposed cap-and-trade legislation states that, “the level and specialization of [green] jobs could vary from tradesmen such as electricians and welders to technical engineers or financial managers, and from intellectual design to maintenance workers” (Mark Holt, Gene Whitney, Greenhouse Gas Legislation: Summary and Analysis of H.R. 2454 as Reported by the House Committee on Energy and Commerce, 17 June 2009). However, some studies overcome this controversial point by providing for the inclusion of labour standards in the definition of green jobs itself. For example, the Apollo Alliance defines *a priori* green-collar jobs as, “Well paid, career

The kind of one-size-fits-all solutions will not be effective because of the distinctiveness of national bargaining arrangements and overall industrial relations

track jobs that contribute directly to preserving or enhancing environmental quality” (Apollo Alliance, Green for All, Center for American Progress and Center on Wisconsin Strategy, Green-Collar Jobs in America’s Cities, 2008). Then, major research relies on different methodologies: on the ground, what is regarded as a ‘green sector’ (i.e. the Green Jobs report published jointly by UNEP, ILO, IOE and ITUC do not include waste management in the definition) and the extent to which indirect jobs are included in the scope of the definition creates substantial differences in outcomes. Regardless of sectors and occupations, the expansion of green employment due to public expenditures should lead to a reduction in the unemployment rate, and thus increase workers’ bargaining power and wages (Robert Pollin, Jeannette Wicks-Lim & Heidi Garrett-Peltier, Green Prosperity: How Clean-Energy Policies can Fight Poverty and Raise Living Standards in the United States, June 2009). The relevance of the political mainstream should not be underestimated. Research at country levels tends to address the issue on the ground of national policies, public expenditures’ programs, distinctive legal and social backgrounds. For example, US literature tends to consider green jobs as ‘middle class’ jobs (see for example Center on Wisconsin Strategy, the Workforce Alliance, the Apollo Alliance,

Greener Pathways, 2008), thus implying middle-skills requirements (which may be acquired through training beyond high school but less than a bachelor degree, namely Community Colleges), middle-level incomes and sound and stable working conditions which may foster the idea of the empowerment of middle-class families.

Compared to US literature, in the EU we suffer from a lack of studies focusing on the ‘qualitative’ features of green employment. However, there are rising arguments about a correlation between the ‘flexicurity’ model promoted by the renewed Lisbon Strategy and green employment. The focus is on the issue of employability by stressing the training chances and career ladders offered by such positions. Thus, vocational training systems for employment in the field of renewable and energy efficiency are rapidly gaining more attention. Indeed, the training chances offered by green jobs are highlighted by a large amount of studies. As pointed out by the Green Recovery Report, “Green investments generate not only significant numbers of well-paying jobs with benefits but also a relatively high proportion of lower, entry level jobs that offer career ladders that can move low-paid workers into better employment positions over time” (Center for American Progress and Political Economy Research Institute at the University of Massachusetts-Amherst, *Green recovery*, 2008).

Sometimes outcomes vary significantly even within the scope of a single research project. The “High Road or Low Road? Job Quality in the Green Economy”

report (Good Job First, 2009) identified both challenges and opportunities in the green economy.

Given an extensive definition of green jobs involving renewables, waste management and industries for energy efficiency solutions, on one hand the following challenges were identified: wage rates at many wind and solar manufacturing facilities are below US national average; anti-unionist attitude is very widespread among employers in the wind, solar and energy efficiency building industries; thus, it seems that very few workers employed in such sectors were covered by collective labour agreements. On the other hand, the same research reports many case studies, at the local level, where working conditions and salaries are above the national average. Higher standards were found for locations where state and local governments attach social clauses to economic subsidies. Additionally, case studies of employers who promote a partnership approach with unions are listed in the study.

Thus, the real main driver of effective working conditions seems to rely on the fact that the transition should be driven by and soundly anchored in an institutional framework, which may ease the burden of change. This represents basically the core argument claimed by the Just Transition approach promoted by the ILO.

The model involves transition assistance, active labor market policies, social protection and a framework of social dialogue to accompany the transition of workers employed in energy-intensive sectors and ensure in-

come standards which are at least able to make a living.

Partnerships with social parties and comprehensive governmental policies

A partnership approach and instruments of social dialogue are key factors to establish a sound link between environmental and employment sustainability. Such partnership approaches may be encouraged at different stages of the strategy to tackle climate change, such as at the very beginning with planning or at the implementation stage. The kind of one-size-fits-all solutions will not be effective because of the distinctiveness of national bargaining arrangements and overall industrial relations. The case of the Spanish social dialogue roundtables for the national implementation of the Kyoto protocol is well known in literature. Here social parties were involved in the definition of the strategy itself: industry-based tripartite roundtables were established either to monitor the compliance with the emission standards or to develop criteria to allocate emissions for production sites. The synergy may be pursued further by rethinking already existing industrial relations methods: it is the case of the US Project Labor Agreements on government construction projects. Further to extend public spending under ARRA for energy efficiency buildings, such as retrofitting, the use of such instruments could be unprecedentedly revitalized. The role of government for ensuring transition assistance is at the core of the Just Transition approach as well. Whether the US bill

H.R. 2454 – also known as the American Clean Energy and Security Act – is approved, its training and adjustment assistance provisions would represent good practice. If so, the US strategy for the transition toward a green economy will pursue the high road of competition by focusing on human capital development. Especially, under the bill of public grants for developing programs of study, focusing on emerging careers and jobs in renewable energy and energy efficiency which are subject to consultation with social parties or apprenticeship programs. Such initiatives may represent a benchmark for EU countries. The lack of more comprehensive approaches addressing potential gaps in the green labor market may generate high social costs. What has made the timing of such interventions a priority is that the Climate and Energy package is expected to come into effect by 2011 at the latest.

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Dossier Adapt

Since September 2006, the Dossier has provided in-depth reports on topical issues relating to the labour market, the application of collective agreements, and recent legislative changes. It also includes comment, articles and research reports by Adapt researchers and by external experts on matters of particular national and international importance.

Job creation and job losses related to green investments: an overview of the current debate

by Giulia Rossi

As a result of the current financial and economic crisis, many countries have announced fiscal rescue packages, cutting taxes and boosting spending of varying amounts as a policy response to encourage demand. This reflects the severity of the downturn, both in terms of depth and duration. This has also ignited a debate on public spending during economic recessions. Interest in how many jobs are created by a particular type of economic activity, is one of the main points considered by policymakers when comparing the relative advantage of different stimulus options. Generally, from a macro-economic point of view a fiscal policy should begin at short-term stabilization objectives and, at the same time, enhance long-term growth, as well as pursue social and environmental objectives (see OECD, *Economic Outlook*, 2009).

The recent OECD report, "Going for Growth" (2009), identifies three broad fiscal/structural reforms that could reach the previous complementary scopes: increased spending on infrastructure, increased spending on active labour market policy (including on compulsory training courses) and reduction of personal income taxes, notably on low-income earners. In economic literature there are a number of issues associated with utilising expenditure on public works to

create jobs in times of recession. Infrastructure expenditure includes long-term investments that may lead to something durable, useful and financially productive in the future. But, at the same time, because of its long-term nature, it can be considered counter-productive in respect to the stimulus goal of quickly injecting money into the economy. To this end, two important considerations were suggested in January 2009 by the United States (US) Congress. First, a positive effect of infrastructure spending on employment will depend on how fast the stimulus will be produced. Moreover, the positive impact will hinge upon the produced amount of stimulus relative to its budgetary cost (see Copeland 2009). An important part of the stimulus measures, both in Europe and in the US, includes direct public spending and tax incentives to make green investments in areas such as public transport, energy efficiency, alternative energy supply, 'smart' electricity grids, water supply, etc. (see article by Ambra Barboni in this Dossier). For this reason a debate on the occupational effects of stimulus packages cannot leave aside the specificity of green investments. As Linda Levine states in a CRS Report for US Congress (see Levine, 2009, CRS R40080), "Today the definition of infrastructure has been expanded to in-

clude the so-called green jobs, which seemingly are those in industries that utilize renewable resources (e.g. electricity generated by wind), produce energy-efficient goods and services (e.g. mass transit), and install energy-conserving products (e.g. retrofitting buildings with thermal-pane windows" In this context, many studies, both at the academic and at the institutional level, have analysed the occupational effect of public expenditures on traditional and green infrastructure projects.

Methodologies for employment forecasts

Among methodological approaches to employment quantification, the Input-Output (I-O) analysis is the most commonly used. Introduced for the first time by Wassily Leontief in the 1930s, today it is used to estimate the direct and indirect inter-relationship and impacts (including employment) of one sector on other sectors. In other words, it describes the interrelationships between industries in the production process. The I-O table traces the sources of each sector's input, whether it is purchased from other firms in the economy, and provides a breakdown of the sector's output. The output requirements from each industry must then be converted

to employment requirements. Employment requirements are consequently derived from productivity estimates for each industry in a particular point in time. This is an approximation of both the direct and indirect employment dependent by the economic activity and it is commonly expressed as the number of jobs per billion dollars of expenditures valued in a particular year's dollar. According to the literature (see UNEP 2008, Levine 2009), a complete estimate of the number of jobs created by a particular type of economic activity has three components: the number of jobs directly attributable to the activity, the number of jobs indirectly attributable and the number of jobs introduced throughout the economy as a result of the activity. Estimates of induced jobs (also called multiplier) are not so immediate. For example, the construction of a railway station not only creates direct and indirect employment, but also can involve other changes, for example enhancing of a previously unconnected commercial areas where users of the new railway station may spend a portion of their wages. As one can easily guess, there are many possible estimates of the induced effect and they will further depend on general economic conditions. As a result, there may be a number of widely varying estimates of the multiplier effect used in job creation studies. I-O models have the advantage that produced data reflect net eco-

conomic changes in the sectors being studied. At the same time, there are some disadvantages to be considered. First, employment data in the I-O tables are not expressed in terms of full-time and part-time equivalents. It can happen that programs which draw upon industries that rely relatively more part-time workers might appear to create more jobs than programs that draw to industries employing more full-time workers (Levine, 2009). Moreover these models do not examine issues of gender, qualification or shortage of human resources, which should be taken in account by thematic surveys based on interviews, questionnaires, etc. Designing an I-O model is difficult and there are few research institutions in each country which can develop it. In the US, the Bureau of Economic Analysis (BEA) every five years develops the official I-O tables for the nation, which are updated by the Bureau of Labor Statistics (BLS) with labor productivity data in order to construct employment requirement tables. At the EU level, as reported by Isabel Blanco and Gloria Rodriguez (2009) "In the field of energy the reference model [...] are PRIMES and Green-X, prepared by the National Technical University of Athens and the University of Vienna, respectively. Employment and GDP interactions are given by ASTRA, elaborated by the Fraunhofer Institute. These models provide the figures that are published by the European

Commission in its impact assessment report, for example, its *2007 Impact Assessment on the Renewable Energy Roadmap* (European Commission, 2006)".

Job estimates and green infrastructure spending

Estimating the number of jobs dependent upon green infrastructure investments present additional challenges in comparison to the traditional infrastructure projects. The main point is that a clear definition of the so-called green sectors does not exist and internationally there is no consensus on the matter. Green investments in fact are not only those related to the development of renewable resources but they cover a much wider category. From the ILO definition (2008), these sectors should be identified on the basis of their contribution in the reduction of environmental impacts. This contribution can consist of for example: cutting the consumption of energy, raw materials and water through high-efficiency strategies, decarbonizing the economy and bringing down emissions of greenhouse gases, minimizing or avoiding all forms of waste and pollution, and protecting and restoring ecosystems and biodiversity (ILO, 2008). Because of the complexity of production systems, it is not always possible to clearly distinguish those industries that utilize renewable resources to produce their outputs from those that manufacture goods which minimize energy use. A clear example is again offered by the US case. The North American Industry Classification System (NAICS) does

The main point is that a clear definition of the so-called green sectors does not exist and internationally there is no consensus on the matter

not recognize renewable resources such as wind, solar and biomass but they are included in the 'other' category. When an economic activity requires different mix of inputs, the conventional I-O model may not guarantee a correct estimate of those jobs related to green investments (see Levine, 2009 for an in-depth analysis). Moreover, it is useful to remember that while some green jobs are easily identifiable (such as people employed in installing solar panel or operating a wind turbine), others may be far less so. This is particularly true for those jobs transformed from traditional sectors of the economy, or for those induced jobs.

Examples of thematic surveys on direct employment

Measures intended to promote energy-efficiency are consequently aimed also at boosting new industries and the generation of new jobs. However, making the transition to a low-carbon economy will not be without costs. It is also true that measures for energy-efficiency might have a negative impact, in terms of job loss, and on some industries, such as energy intensive industries (e.g. iron and steel, aluminium, ferroalloy products, paper, petrochemicals). Facing the current green investment, the open question is if the job gains due to clean technologies are substantially higher than the economy-wide losses from the traditional energy intensive/high-carbon sectors. A number of studies deal with this issue. Here we will consider some among the most significant. Recently, the World Wildlife Fund (WWF) published

estimates of new opportunities and job losses in EU countries, on the ground of new standards set by the EU Climate and Energy Package. In France, for example, the impacts of cutting CO₂ by 30 percent by 2020 seem to have a positive net effect on the labour market. According to WWF France's study, around 316,000 renewable jobs and 564,000 energy efficiency jobs will be created in this country, while 138,000 jobs in the conventional energy sector and 107,000 in the auto industry could be lost (WWF, *Low Carbon Jobs for Europe. Current Opportunities and Future Prospects*, 2009). Among thematic surveys for Europe, a comprehensive survey has been carried out by Maria Isabel Blanco and Gloria Rodrigues on direct employment in the wind energy sector. According to this study, which contains a detailed analysis of jobs in this sector divided by member states, by activity and by gender, wind energy represents an important source of employment in Europe. This is particularly relevant considering that, "Energy employment seems to follow the opposite trend to the general energy sector [...] and measures that encourage the transfer of workers from general energy to wind energy will be highly beneficial from both social and economic point of view" (M.I. Blanco, G. Rodrigues, *Direct Employment in the Wind Energy Sector: An EU study*, Energy

Policy, vol. 37, 2009). An interesting debate is still ongoing in Spain. In March 2009 a study entitled "Study of the Effects on Employment of Public Aid to Renewable Energy Sources" by researchers at Spain's Rey Juan Carlos University calculated that in Spain the creation of green jobs came at great financial cost as well as a cost in terms of jobs destroyed elsewhere in the economy. Job losses concerned where mainly in metallurgy, non-metallic mining and food processing, beverage and tobacco sectors. The authors also claim that, because of Spain's broad support in the construction and production of electricity through renewable sources, Spanish citizens are faced with an increase in electricity rates or increased taxes and a public deficit. In the US, with its recent political developments, they are about to repeat the same mistake (see G. Calzada Alvarez et al., *Study of the Effects on Employment of Public Aid to Renewable Energy Sources*, 2009). Two months after, a response to this study has been provided by researchers at

The open question is if the job gains due to clean technologies are substantially higher than the economy-wide losses from the traditional energy intensive/high-carbon sectors

Instituto Sindical de Trabajo, Ambiente y Salud (ISTAS). Here the authors report several arguments against the Calzada's paper, stating that it lacks validity and technical accuracy. For example, according to ISTAS' researchers, "The

study misconstrues the concept of green jobs as those that involve only the development and implementation of renewable

energies. This blunder leads to wrong assertions on the negative impact of green jobs on employment". If the renewable energy sector destroys jobs, it is necessary to consider the job creating capability of other green jobs sources (for a more comprehensive analysis see ISTAS, *Critical Review of the "Study of the Effects on Employment on Public Aid to Renewable Sources"* by G. Calzada, 2009). This review of thematic studies, although short and certainly incomplete shows how many features the debate on

green jobs creation can take. Of course the results might be not unambiguous, mainly depending on the industry and its energy use pattern. For this reason, it is important, and desirable to provide a general equilibrium analysis, in order to account for the impacts that a climate policy could have on the economy as a whole both in the short and long run.

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gaps is that investments and stimulus packages implemented in order to tackle the ecological challenge would eventually prove to be inefficient. The preventive adoption of adequate training policies for workforce skill development is therefore a priority that cannot be disregarded by European member States, as recently observed by the European Commission (European Commission, *New skills for new jobs. Anticipating and matching labour market and skills needs*, 2008). Therefore, unless EU countries unlock their human capital potential, they will not be able to face green challenges. In other words, a sustainable, long-lasting answer to environmental challenges can stem only from the right skills and competences.

Green skills

The definition of 'green skills' is not agreed upon amongst experts, and this is partly due to the lack of consensus on the definitions of 'green jobs' and 'green sectors'. This is true because green curricula and relative learning outcomes are designed as an answer to green sectors' skill needs. But, if there is no common agreement on what green sectors and green jobs are, we can hardly get to a widely shared definition of green skills. This is not a secondary matter, since green skills are one of the requirements for sustainable economic development. In order to outline what 'green skills' are, it is possible to analyze their relative demand and supply. From a demand-side perspective, existing literature struggles against

Green skills for green jobs

by *Lisa Rustico*

The global shift to a low-carbon economy, especially in some sectors namely: energy, water and waste treatment, construction, the transport industry, agriculture and forestry influences changing labour market needs. According to the International Labour Organization (ILO) the impact of such a transition should double the global market for green services and ecological products. This is clear proof that, firstly, new markets and job opportunities are stemming from the ecological crisis, in the sectors mentioned above as well as in many others. Secondly, that existing jobs will change in their content and skills requirements; thirdly, other jobs will simply become obsolete. The common variable in each of these three scenarios is the change in skill needs. This has a twofold meaning: on the one hand, new jobs will require new qualifications, at the forefront of technological development and innovation. On the

other hand, existing job profiles are redefined in their skills requirement, as asserted by a UNEP study (UNEP et al., *Green Jobs: Towards decent work in a sustainable low-carbon world*, 2008): the work force has to acquire transversal green competences to be applied in day-to-day work, in terms of 'greened' methodologies and behaviours. Therefore, green skills and qualifications coincide with those already existing, redefined according to technological change and ecological challenges (OECD, *Seminar Social and Environment Interface Proceedings*, 1999); yet, it is also true that new skills and qualifications have to be developed through entirely new training programs. The importance of the right competences for green jobs has an economic rationale: the lack of green skills indeed could hamper the creation of green jobs, therefore hindering the shift to a green economy. The final consequence of green skills

two definitions of 'green skills': on the one hand, some experts (OECD) state that such skills are simply traditional qualifications and skills applied to environmental issues; whilst other scholars maintain that the green industry requires new skills, still to be developed. This does not only mean that new curricula have to be designed in order to fulfil the content requirements of specific occupations:

"Knowledge of sustainable materials [...], 'carbon foot printing' skills, environmental impact assessment skills (flora, fauna), good grasp of the 'sound' sciences". Yet, green skills are most of all transversal skills, such as: "Strategic/leadership skills, adaptability/transferability skills, systems analysis [...], holistic approach, risk analysis, co-ordination skills, entrepreneurship". Nevertheless, experiences from overseas suggest green skills may turn out to be middle-level skills. Furthermore, 'green skills' is not a homogeneous category since they are needed through a vast range of levels and sectors. As far as the first are concerned, evidence suggests that green skills are provided at high and low educational levels, although experts' opinions diverge. For example, some scholars fear the risk of green labour market sharpening jobs' polarization: while high educational attainment levels are required for skilled jobs, such as environmental consultants, a vast range of green occupations are manual (e.g. waste collectors) and there-

The growing need for green skills is transversal to a wide spectrum of occupations, including new ones and the redefinition of those already existing

fore require a low-skilled labour force. Most European studies, supported by the European social parts (ETUC, *Climate Change and employment. Impact on employment in the European Union-25 of climate change and CO2 emission reduction measures by 2030*, 2007), agree in saying that green workers are going to be more qualified and therefore will require higher qualifications, while decreasing

the demand for low-skilled workers. In any case, since they require training and retraining, green competences are likely to increase labour force qualification levels, together with job quality and improve working conditions. As far as sectors are concerned, variety is even greater, since it differs from one sub-sector to another. For example, while educational attainment levels in agriculture and fishery decreased throughout Europe from 2000, the agri-food subsectors (agriculture, fishery, food and beverage) have registered a substantial increase in the level of qualifications required from 2000 to 2006. A recent report by ECORYS for the European Commission (ECORYS, *Environment and labour force skills. Overview of the links between the skills profile of the labour force and environmental factors*, 2008) recalls some of the skills needed in a number of greening sectors. For example, many of the new positions in the wind power industry (renewables) require a highly skilled workforce, equipped with qualifications

based on entirely new training programs designed according to technological development. Or, in the building sector, higher-skilled and higher-paying employment will arise due to energy-efficient equipment. Moreover, previous experience in the sector is not going to be enough since jobs will be redefined in terms of new skills, training, and certification requirements. At the top level of qualifications, researchers and engineers will find room for applying diagnostic techniques, knowledge of renewable energy, installation and organizational skills (i.e. town planning). From a supply-side perspective, green skills are offered by Vocational Education and Training (VET) institutions, since green training programs equip learners and workers with knowledge, skills and competences directly useful for the labour market. Therefore, green skills favour an optimum matching between competences offered and demand in the green job's market. This argument is even stronger, if we observe some of the already existing curricula for green competences: they encompass specific skills as well as transversal skills, such as basic literacy, soft skills, and financial management skills. Consequently, it is not clear whether training for the eco-industry should be limited to continuous VET (CVET) or whether it should start earlier, in initial VET (IVET). As already mentioned, green skills are not only tightly linked to a green occupation. Training programs for the eco-industry encompass also transversal skills, non-formal and informal learning. Such learning outcomes, indeed, once made

visible through certification processes, concern a vast range of educational level, from IVET to CVET. To conclude, and trying to summarize the two approaches (demand-supply), the growing need for green skills is transversal to a wide spectrum of occupations, including new ones and the redefinition of those already existing. Furthermore, the challenge of a sustainable economy, cannot be undertaken without a widespread cultural awareness and sensitivity of the ecological risks across all jobs. This is therefore, a cultural issue involving education providers, and calling for schools' commitment at the forefront. However, in the era of lifelong learning, no life stage and life context can be counted out: general education, vocational training, on-the-job and in-company training, as well as adult education are all venues for greening skills. In general terms, training and retraining required by the changing nature of green jobs, has the potential to contribute to the lifelong learning challenge and enhance working conditions. As already mentioned, social partners are key actors in spreading values related to eco-sustainability, thanks to their links with the labour market, education and training, and civil society. Therefore, training for ecological skills and competences should cross the whole spectrum of learning opportunities. In other words, lifelong and life-wide learning should be 'green'.

The benefits of training for green skills

By stretching the idea of 'green-

ing lifelong learning', competences for sustainable development are not only something narrowly limited to fulfil a job profile's requirements. Since climate change and eco-challenges call for everyone's commitment to a renovated 'greened' lifestyle, there is no educational or environmental reason for limiting the chances of acquiring green competences. Therefore, green VET could fit into school curricula, in specific work-based learning processes or in adult education programmes. Consequently, the target population of this new VET agenda broadens, since the latter turns out to be interesting for several bands of the labour market. This is why green training is said to have a broader potential than the short-term one, meaning that it could act as an active labour market policy. For example, skills development for the eco-industry could boost occupational mobility and open multiple pathways to employment. Moreover, green competences open chances for the weak bands of the labour market to become actively involved in a green occupation, or to re-enter the labour market (unemployed, women, low-skilled workers, migrants, young people). In a broader sense, more and better skills prompt innovation processes and ease adaptation mechanisms to new technologies; indirectly, they also help attract investments and increase competitive potential. As reported by the ILO, these effects are of greater importance for developing countries, where education and training, if available, is of poor quality and gives access just to low-skilled, low productive and scarcely remunerated jobs. Now-

adays such benefits can be narrowly perceived: skills gaps in the EU are transversal to many sectors and occupational levels. For example, according to the ECORYS Report on green skills shortages, the UK greening businesses are experiencing skills shortages of technical specialists, designers, engineers, and electricians. The German renewables industry, lacks qualified workers. In many European countries, the retail sector suffers skills gaps in sales staff and in project management, and competences and qualifications are often scarce in the renewable energy sector (i.e. consulting skills, communication skills). This is why anticipating and forecasting skill needs is of crucial importance: it prevents skills shortages and it ensures a better matching between competences' demand and supply. This was a priority already back in 2005 in the re-launched Lisbon Strategy, and it continued to be a hot topic on the EU agenda in many other policy documents. Among the other, we recall the Maastricht (2004), Helsinki (2006) and Bordeaux (2008) communiqués. As far as social partners are concerned, ETUC, UNICE, CEEP promoted the *Social partners' framework of actions for the lifelong development of competencies and qualifications*, 2002. Furthermore, the Integrated Employment Guidelines (October 2007) noticeably pointed out that anticipating skill needs is a priority for Europe to respond to climate change and environmental degradation challenges and to the global call for greener economies. The issue recently gained political momentum with the Communication of 16th December 2008 *New Skills*

for New Jobs. In this document the European Commission touches upon the issue of skills changing in response to the transition towards a low-carbon economy, quoting data from the well known ILO report from 2008. The EU initiative *New Skills for New Jobs* for enhancing and ameliorating the matching between skills supply and demand, launched a series of tools to accomplish this objective (for example, the “European Labour Market Monitor” or the online database “Match and map”). Furthermore, fostering European

anticipation and forecasting methods was also acknowledged by the European Commission in the European Recovery Plan published last 26th November 2008 (Commission Communication, *A European Recovery Plan*, COM(2008)800) as a means for avoiding skills gaps and preventing menaces to economic stability. In general, early anticipation of skill needs helps developing strategies that prevent future problems related to green occupations market. Of course, the current financial and economic crisis threatens the predictability

of labour market skills needs. However, the potential of social dialogue and social partners’ in involving businesses, workers, stakeholders and various governance levels should not be disregarded: it could work as a powerful leverage for fostering skill needs anticipation.

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Green jobs and employment creation: the working for water programme in South Africa

by *Machilu Zimba*

In the face of both an economic and environmental crisis, the question arises as to whether or not governments can tackle poverty through activities that are beneficial to the environment. Poverty reduction, food security and environmental sustainability are high on the international agenda and this is reflected in the Millennium Development Goals. At the same time, the numbers of young people entering the labour market are increasing year after year, and most of these are unable to secure decent employment. The ILO expected unemployment to grow by five million in 2008, with a majority of those unemployed being below 25 years old and in developing nations. Advocates of Green Jobs propose that developing coun-

tries can find employment potential in the creation of jobs that are designed to focus on, amongst other things, environmental conservation and rehabilitation. Green Jobs in developed countries have been described as any activity that assists in measures that reduce carbon emissions or helps realise alternative sources of energy us.

Green Jobs have received relatively more attention in developed nations where unemployment rates are comparatively lower than those in developing nations. What follows is a brief comment on the creation of Green Jobs as a route towards tackling unemployment, using as an example the Working for Water (WfW) programme in South Africa. A recent working paper

presented by the United Nations Development Programme (UNDP) discusses a possible avenue for the alleviation of poverty through the creation of environmental public employment. The paper, “Green Jobs for the Poor: A Public Employment Approach”, praises the South African WfW programme, an initiative that predates the government’s Expanded Public Works Programme (EPWP). WfW since 2004, falls under the EPWP. The working paper asserts that: “The ability of the programme to communicate and demonstrate the synergy between environmental rehabilitation, employment creation for the poor and increased availability of water remains one of the keys to its successes to date” (Lieuw-Kie-Song, 2009, p.

10).

The South African department of Public Works reports that, the EPWP in its first phase between 2004 and 2009 aimed to reduce poverty through the creation of temporary employment opportunities for the unemployed. Its target of the creation of 1 million work opportunities was met in 2008. The programme has a clear focus on its beneficiaries, 40% of which were to be women, 30% youth and 2% people with disabilities. In a country where youth unemployment rates far exceed adult unemployment rates, this youth focus is crucial. The second phase of the programme aims to create 2 million full time equivalent jobs for the unemployed by 2014, contributing to halving unemployment by 2014. WfW is a public sector funded programme centred on the removal of alien invasive vegetation across South Africa. Alien vegetation consumes a considerable amount of water and their removal is found to increase stream flows. Faced with water shortages across the country, the WfW programme was a much needed intervention. What is of concern is whether or not government programmes created to both reduce poverty and preserve and protect the environment can be successful. Governments are faced with two distinct policy objectives and meeting these goals through one programme can reduce effectiveness. It has been argued that the strong relationship between poverty and the environment calls for single initiatives focussed on both challenges. As claimed in, "The State of Food and Agriculture 2007", in most cases the world's poor are found in areas

of marginal environments depending on agriculture for their livelihoods. The WfW programme is a good example of a programme that combines poverty reduction and environmental service provision. Iftikhar et al. (2007) cited in "The State of Food and Agriculture, 2007", suggests three critical areas of evaluation of programmes designed to address both poverty and environmental concerns. Firstly, there needs to be an assessment of whether or not the programme will leave the poor at least as well off as they were before. Secondly, whether it will involve the poor in any of its benefits, and thirdly, an assessment of whether it can ensure that the poor will gain disproportionate benefits. The WfW programme can be assessed along these lines. The programme has undergone extensive research, and overall findings have found that it is not an unqualified success. If anything, it has faced a number of challenges, and much criticism. Since it began in 1995, the programme has had 119 000 people working on it. However, most of these jobs have been temporary, providing momentary relief for those who have obtained them. No evidence is provided as to whether those involved in the WfW programme find themselves more employable than before once they leave. However, South African economists in an article written by the Centre for Development and Enterprise (2009), note that once an unemployed person finds them-

selves active in the labour market, although in a temporary position, the likelihood of them finding permanent employment is higher. This is because when hiring, South African employers favour those with work experience over those with none. An additional criticism of the WfW programme discussed by Mitchell, 2008 in his article entitled "Assessing the wage transfer function and developing a minimum wage framework

Providing training for employees may assist in making them more employable once a public employment project has been completed

for the Expanded Public Works in South Africa" explains that the challenge is not only that the work opportunities it creates are of a short duration, but that the wage rates it offers are too low, doing little to lift people above the poverty line. Without a doubt, however the WfW programme has found a way to employ poor, unskilled or semi-skilled workers without too much training and this is of value towards tackling unemployment. Providing training for employees may assist in making them more employable once a public employment project has been completed. Although, the WfW programme provides training for those it employs, the training provided has been criticised as job specific, not providing knowledge that will assist employees obtain formal employment at a later stage. Lieuw-Kie-Song, in "Green Jobs for the Poor: a Public Employment Approach", makes clear that environmental initiatives should not exist without other environmental management and conser-

vation activities because of their temporary nature, and that focus should be on other complementary attempts to create sustainable livelihoods. The temporary nature of public employment programmes is a major failing while market based employment interventions tend to be more sustainable. Although it cannot be said as to whether or not the WfW programme has left those

involved in it better off than they were before, and whether its benefits both environmental and social have assisted the poor, initiatives such as the WfW programme should not be disregarded. They have an added advantage of being beneficial for the environment, and ultimately in the long run for the poor themselves. For the poor and unemployed to receive more immedi-

ate benefits of such programmes, solutions on how to improve them are needed and thus continued research and policy debate on public employment is a further need.

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US cap-and-trade legislation: change requires effort

by Ambra Barboni

In June 2009 the US House of Representatives passed the first legislation aimed at setting Greenhouse Gas (GHG) emissions standards in the US, H.R. 2998, better known as the American Clean Energy and Security Act (ACESA).

The policy sets the following challenging objectives:

- by 2012, six percent of all electricity generation should come from renewable energy sources. The renewable share should increase to 15 percent by 2020;
- by 2012, GHG emissions should account for 12 percent above 1999 emissions levels. By 2020, emissions should fall by seven percent below 1990 emissions level (as it was originally established by 2012 under the Kyoto Protocol, that the US never ratified). Most challenging, by 2050 emissions should be 80 percent below 1990 levels.

Flexible mechanisms are embedded within the legislation in order to combine regulatory standards with a market-driven ap-

proach. Thus, the bill establishes a cap-and-trade program which sets a threshold on total emissions and requires firms to hold specific allowances, starting from 2012. Allowances are subject to trading with no restrictions on transactions.

Who will bear the ultimate costs of change?

The current debate focuses on the potential costs that the enactment of such legislation would impose on the US economy. Noteworthy, the bill entered the Congress in the middle of the economic crisis (May 2009). Most of the literature agrees with the fact that such restrictions may have a minimal negative impact on the US economy in the long term. According to the analysis carried out by the American Council for Capital Formation (ACCF) and the National Association for Manufacturers (NAM) on the input im-

pacts of cap-and-trade systems as established in the America Climate Security Act of 2007, there are no significant differences between GDP figures under the baseline and two other scenarios involving cap-and-trade regulations (ACCF/NAM, Analysis of the Lieberman, Warner Climate Security Act). In fact, even with a cap-and-trade program in place, the US economy is expected to experience growth (2.5 percent under the high-cost case with cap-and-trade versus 2.6 percent under the baseline scenario) between 2007 and 2030. Additionally, a substantial increase in public revenues is expected, according to forecasting of the Congressional Budget Office (\$873 billion over the 2010-2019 period: see the statement released by the CBO Director Douglas Elmendorf on June 26 2009). Higher energy costs are listed first among the forecasted negative impacts. In fact, in order to obtain GHG emissions allowances to meet CO₂ cap re-

quirements, firms would face higher manufacturing costs and this may lead to increased energy prices for final residential consumers, namely general households. On the side of production, “Lower energy consumption may render existing capital and labour less productive, which would lower output directly and would also tend to discourage investment and work” (*Congressional Budget Office, The Distribution of Revenues from a Cap-and-Trade Program for CO₂ Emissions, May 2009*) However, certain aspects related to such theses should be further investigated. Firstly, there is a strong argument against the economy path-dependency on fossil fuels and oil (and the related risks of climate change) which addresses higher associated economic costs in the long term. Secondly, still in the long-term, such increases are essential to promote a new sustainable economic model. As stated in a report issued by the Congressional Budget Office, “The price increases would be essential to the success of the cap-and-trade program because they would be the most important mechanism through which businesses and households would be encouraged to make economically motivated changes in investment and consumption that reduced CO₂ emissions” (*Congressional Budget Office, The Distribution of Revenues from a Cap-and-Trade Program for CO₂ Emissions, May 2009*). Such policies would promote a growth model

Firms would face higher manufacturing costs and this may lead to increased energy prices for final residential consumers, namely general households

based on technological progress, by encouraging investments in green-energy alternatives and eco-innovation (development of Carbon Capture and Storage technologies, building retrofitting solutions and fuel efficiency devices for the car industry), due to the expansion of new markets. Also, most of the findings do not consider the economic benefits, especially those reflected in terms of employment gains generated by the enactment of incentive policies for low-carbon industries related to renewables and energy efficiency. Finally, forecasting models cannot include the key variables affecting the real economic output of such cap-and-trade programs, namely distribution policies. “The program’s ultimate economic effects would depend on policymakers’ decisions about how to allocate the revenues from the emission allowances” (*Congressional Budget Office, The Distribution of Revenues from a Cap-and-Trade Program for CO₂ Emissions, May 2009*). In fact, assuming that the bulk of revenues from the program are returned to households, the cap-and-trade system is likely to have a modest impact on US consumers (US Environmental Protection Agency, Analysis of H.R. 2454, June 2009).

Employment creation and labor standards

According to the study jointly carried on by the ACCF and the

NAM, the increased energy costs generated by the enactment of a cap-and-trade program will lead to job losses of between 1.2 and 1.8 million in 2020 and 3 to 4 million by 2030. Similar figures were projected by the study of a private consulting agency called CRA International, which estimates that the job losses will range between 2.3 million in 2012 to 3 million in 2050 (CRA International, Impact on the Economy of the American Clean Energy and Security Act of 2009, May 2009). The same study states that there will also be a reduction in wages due to reduced productivity growth. On the other hand, green jobs supporters claim a high job creation potential of green sectors, based on the relative labor-intensity of industries such as renewable and energy efficiency, where investments are mainly utilized for hiring and training people rather than on acquiring machines and supplies. A report by the Political Economy Research Institute (PERI), suggests that the combination of the American Recovery and Reinvestment Act (ARRA) provisions together with the ACESA ones, will lead to a net expansion in employment of at least by about 1.7 million jobs (Political Economy Research Institute, *The Economic Benefits of Investing in Clean Energy, June 2009*). Some consideration concerning the correlation between the enactments of the cap-and-trade system and working conditions may also be drawn from previous studies, since the cap-and-trade model, which inspired ACESA, should be recognized in the California’s Global Warming Solutions Act of 2006 (AB 32). According to research commis-

sioned by the California Air Resources Board, the industries subject to cap-and-trade programs have both high wages and unionization rates (Carol Zabin, Andrea Buffa, UC Berkeley Center for Labour Research and Education, *Addressing the Employment Impacts of AB 32, California's Global Warming Solutions Act, February 2009*). Breaking down the outputs by demographics, one discovers that such jobs are overrepresented by men and Latinos. While the latter is clearly a variable depending on California's overall population features, the issue of gender mainstreaming should still be addressed when considering green employment as a whole. Such background is regarded as an advantage since unions may play a key role in governing major employment changes that are

expected to occur (re-skilling at first).

Green jobs provisions

The relevant role of social partners for the governance of the transition to a low-carbon economy is currently stressed in Title IV, Subtitle B of ACESA, titled "Green Jobs and Workers Transition". The Green Jobs provisions establish subsidized education programs that are focused on emerging careers and jobs in the fields of clean energy, renewable energy, energy efficiency, climate change mitigation, and climate change adaptation. Representatives of business, labor organizations, and industry are listed among eligible partners. Unions, groups of workers and employers are also eligible to

apply for climate change adjustment assistance programs, including payments in terms of allowances, training and other services. Additionally, the title increases funding for energy workers training programs already delivered under the American Recovery and Reinvestment Act. Human capital investments are thus regarded as an effective driver both to boost the employment creation potential of low-carbon emitting industries and to accompany the job churn phenomenon that is likely to occur among a wide range of sectors.

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Green skills

Existing literature provides only a few documents entirely related to green skills.

For a definition of green skills, see OECD, *Seminar Social and Environment Interface Proceedings*, 1999, and CEDEFOP, *Future skill needs for the green economy*, 6-7 October 2008 (conference’s documents available at <http://www.cedefop.europa.eu/etv/news/default.asp?idnews=3800>).

The subject is rather studied as part of sustainable development strategies, to be developed for sustaining green jobs’ markets. For deeper analysis of this perspective: United Nations Environment Programme’s Report (UNEP), *Green jobs. Towards decent work in a sustainable, low-carbon world*, 2008. The report states that green jobs span a number of skills, educational backgrounds, and occupational profiles, but not all of them are already available. Therefore, education and training institutions

should adapt in order to equip workers with the right skills for green jobs. More research has been run overseas: the Political Economy Research Institute has delivered a Report (PERI, *Green recovery. A program to create good jobs and start building a low-carbon economy*, 2008) claiming that green skills do not relate only to technical profiles, but they include competences for traditional support activities (lawyers, office clerks, human resource managers, cashiers, and retail sales people).

At the same time, green skills are studied from an educational and training perspective. The Communication of the European Commission, *New skills for new jobs 2007/C 290/01*, 16th December 2008, encompasses skills for the eco-industry amongst competences to be anticipated and forecast, being green sectors a growing share of advanced economies' production. It clearly states that the labour market will require new and redefined skills, as a consequence of the impact of the transition towards a low-carbon economy.

An overview of green skills in a Vocational Education and Training (VET) perspective is provided by a number of PowerPoint presentation available at Cedefop's website (European centre for the development of VET, <http://www.cedefop.europa.eu/etv/News/Default.asp?idnews=3800>). These documents were presented at the International Conference on *Future skill needs for the green economy* held at Cedefop in Thessaloniki in October 2008.

Green skills, training programs and relative future skill needs are analyzed also in ECORYS, *Environment and labour force skills. Overview of the links between the skills profile of the labour force and environmental factors*, 2008. This report was commissioned by the European Commission in order to point out the relation between competences and job profiles that will be created in the eco-industry.

For an analysis of green skills' level see OECD, *Environment and Employment: An Assessment*, 2004, and EUROPEAN COMMISSION, *Commission Staff Working Document on the links between employment policies and environment policies*, 2005. They both maintain that green jobs profiles tend to be polarized in low-skilled and skilled ones.

A number of case studies are collected in a report by GHK, *The Impacts of Climate Change on European Employment and Skills in the Short to Medium-Term: Company Case Studies. Final Report*, vol. 1, 2009.

Volume 2 of the same report provides a detailed review of existing literature on the impacts of climate change and related policies on skills (GHK, *The Impacts of Climate Change on European Employment and Skills in the Short to Medium-Term: A Review of the Literature. Final Report*, vol. 2, 2009).

Future green skills' needs have not been widely analyzed in a sectoral perspective; the only information available in existing literature is an outlook in Germany's renewable sector, in the UK and in Portugal. For more information see ECORYS Report mentioned above.

US cap-and-trade legislation

Concerning the impact of the enactment of a cap-and-trade legislation on the US economy, see American Council for Capital Formation and National Association of Manufacturers, *Analysis of The Lieberman-Warner Climate Security Act (S. 2191) Using The National Energy Modeling System (NEMS/ACCF/NAM)*, 2008; L. PARKER, B. YACOBUCCI, *Climate Change: Costs and Benefits of S. 2191, CRS Report for the Congress*, May 2008; R. POLLIN, B. ZIPPERER, *United States Carbon Cap Critics Predict Healthy Economy under Cap-and-Trade*, Political Economy Research Institute (PERI), University of Massachusetts-Amherst, April 2009; A. CHAMBERLAIN, *Who pays for climate policy? New estimates of the household burden and economic impact of a U.S. cap-and-trade system*, Tax Foundation Working Paper no. 6, March 2009.

Concerning the impact of the Global Warming Solutions Act of 2006 on California's labor market, see C. ZABIN, A. BUFFA, *Addressing the employment impacts of AB 32, California's Global Warming*

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Concerning the challenges faced by South Africa in moving from an energy-intensive economy to a low carbon one, see H. WINKLER, *Changing Development Paths: From an Energy-intensive to Low-Carbon Economy in South Africa*, Energy Research Centre, University of Cape Town, 2009.

Focusing on the potential to alleviate unemployment, especially for those with low skills, see R. KIEVANI, J.H.M. TAH ET AL., *Green Jobs Creation through Sustainable Refurbishment in the Developing Countries*, Oxford Brookes University, Oxford, 2008.

For a case-study in India discussing the prospect of employment during times of stress centred on ecological generation, see Centre for Science and Environment, *NREGA Opportunities and Challenges*, New Delhi, 2008.

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