



International
Labour
Office

SKILLS FOR EMPLOYMENT

Policy brief

GREENING THE GLOBAL ECONOMY- THE SKILLS CHALLENGE

This policy brief draws the attention of policy-makers and social partners in both developed and developing countries to the role of skills development in facilitating the transition to a greener economy and seizing the employment opportunities that the transition entails. It arises out of the Green Jobs Initiative, a partnership between the ILO, the United Nations Environment Programme (UNEP), the International Trade Union Confederation (ITUC) and the International Organization of Employers (IOE). It draws on policy-applied research and numerous case studies of country experiences and good practice conducted in collaboration with the European Centre for the Development of Vocational Training (Cedefop) and the European Commission:

- *Skills for green jobs*, covering 21 countries, and
- *Early identification of skill needs for the low-carbon economy*, covering more than 30 countries.

Why is skills development important to greening the economy?

The widespread adoption of more eco-friendly approaches to economic production and consumption is changing the nature of work, and thus the skills required of many workers.

While the greening of economies presents challenges, it also offers considerable potential for job creation, a matter of urgency in countries struggling to recover from the global economic crisis and to address longer-term employment concerns. The development of skills for green jobs is crucial to ensuring an efficient transition to a green economy by matching supply and demand for skills. It is also vital in helping workers adjust to a rapidly changing workplace.

Green job skills development is not only reactive, but can be an important driver of change itself. Promoting skills for green jobs fosters investment in green activities and accelerates the green transformation.



A number of factors are driving the transition to greener jobs. Change in the physical environment, brought about in part by unsustainable consumption and more than a century of emissions intensive industrialization, is already affecting the work practices and skill needs of agricultural workers, especially in arid and semi-arid regions. Environmental policy and regulation is pushing industry towards greater sustainability, increasing the demand for green job skills.

Box 1. What are green jobs?

“Green jobs” are jobs that reduce the environmental impact of enterprises and economic sectors, ultimately to levels that are sustainable. This definition covers work in agriculture, industry, services and administration that contributes to preserving or restoring the quality of the environment (UNEP/ILO/IOE/ITUC, 2008).

The ILO supports skills development to improve the employability of workers, the productivity of enterprises and the inclusiveness of economic growth.

Green innovation, from high-tech developments such as “hybrid” car engines to something as simple as the new, eco-friendly vertical shaft brick kilns being introduced in India, is obliging thousands of technicians to master new ways of working. Finally, changing consumer demand, such as the demand for organic food, is creating entirely new industries requiring skills that workers in conventional food production do not possess.

What are the key skills challenges as economies go green?

Challenge 1: Skill shortages are already hampering the transition to greener economies

A lack of the skills needed to meet the requirements of changing and newly emerging occupations impedes green investment and hinders green economic development. This equally applies to skills of established occupations for which demand is growing. Shortages generally reflect underestimates of growth and labour demand, particularly in technology-driven green sectors. In green building, for instance, skills shortages frequently arise when projects are undertaken without sufficient provision for skills development. Similarly, a lack of efficient coordination between investment in a green economy and investment in skills can lead to shortages of relevant green job skills. Many countries lack sufficient teachers and trainers in environmental awareness and specialist areas such as renewable energy.

Challenge 2: Skills and environmental policies need to come together

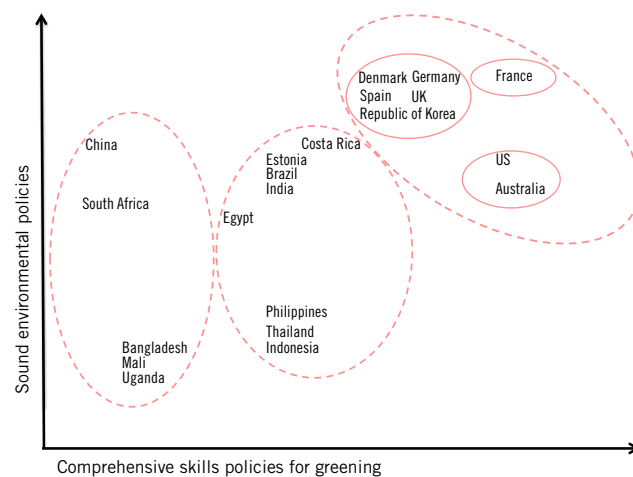
While most countries have drawn up some environmental policies, few have put in place the skills development strategies needed to implement them (see figure 1). Without coherence between skills and environmental policies, skills bottlenecks may well impede the successful transition to greener production and consumption.

European countries are taking a lead in this area, notably France (see box 3). Outside Europe, the United States and Australia stand out in terms of their training response to the challenges posed by greening.

In the least developed countries, skills development strategies are rarely included in national climate change adaptation plans. The reasons for this include weak coordination between national planning and labour ministries, and a lack of adequate resources and institutional capacity to implement such strategies.

Coordination within individual sectors is also important. In the case of renewable energies, for example, policy coordination and planning are needed to smooth the pace of investment over time so as to provide stable employment for workers, avoid periods of serious skill shortages, and make future demand for skills more predictable, both for providers of training and education and for their students.

Figure 1: Coherence between skills and environmental policies



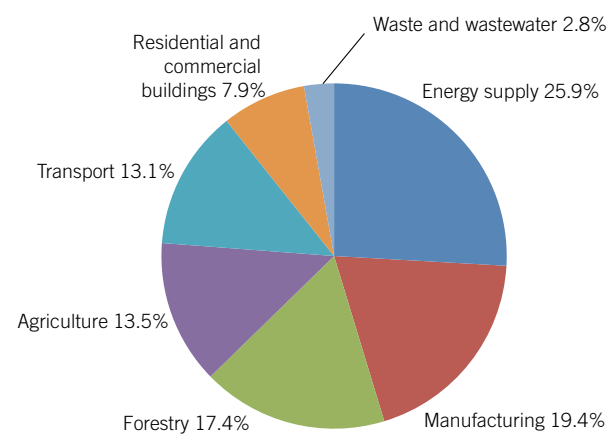
Source: Strietska-Ilina et al., 2011.

Challenge 3: Green structural change will be profound in certain sectors

High carbon emitting sectors are most likely to be negatively affected by green structural change. These include mining, fossil fuel based energy generation, manufacturing, forestry and agriculture (see figure 2). Workers moving out of declining sectors into growing ones will require retraining. The role of employment services in matching skills and jobs and in re-training workers and jobseekers is thus crucial.

The automobile industry is one of the key industries to face significant change. In many countries government policy now includes mandatory standards for fuel consumption, tax and duty reductions for vehicles with lower CO₂ emissions, special tax incentives and other fiscal green measures to promote purchases of eco-friendly cars. Such measures, in varying

Figure 2: CO₂ emissions by sector



Source: IPCC: Climate Change: Synthesis report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Figure 2.1 (Geneva, IPCC, 2007). © IPCC. Reproduced with permission.

combinations, have been introduced in Australia, Belgium, the Czech Republic, Japan, Luxembourg, the Netherlands, Spain, Sweden and India.

The mining industry has been in decline for several decades. It has also experienced restructuring involving the introduction of sustainable production practices, measures to improve the efficiency of energy and resource use, new green technologies, clean coal, and carbon capture and storage – all changes that require significant skills upgrading.

Greening agriculture will have enormous implications for workers, especially in developing countries. The agricultural sector is the largest employer in the world; it is also responsible for 13.5 per cent of greenhouse gas emissions (figure 2) world-wide. The figure is even higher in emerging economies such as China or Brazil, where the agricultural sector generates 21 per cent and 57 per cent of national emissions, respectively. Reducing emissions will require the adoption of sustainable agricultural practices which in turn will require new skills.

New job opportunities will arise in industries that are expected to grow as economies go green (table 1). While job gains are expected to outnumber job losses in the transition to greener work, workers losing “brown” jobs will not always be able to walk into green alternatives. Among the biggest challenges training systems face are how to match workers with new positions and how to retrain workers to make the most of the skills they already have. While certain activities will be phased

Box 2. Retraining in the Brazilian sugarcane industry

The Brazilian Sugarcane Industry Association (UNICA) and the environment department of the state of São Paulo have signed a protocol that will end the practice of burning of sugarcane – a primary cause of air pollution and resulting respiratory diseases – in 2014. As a consequence, a significant proportion of sugarcane cutters will have to relocate to other activities. The industry has already developed several initiatives to retrain these workers, providing better job opportunities within their own plants or in other segments of the economy.

out, the skills required to execute them can still be applied, sometimes by the same worker, in other occupations.

Challenge 4: Occupations will change at different rates and in different ways as economies go greener

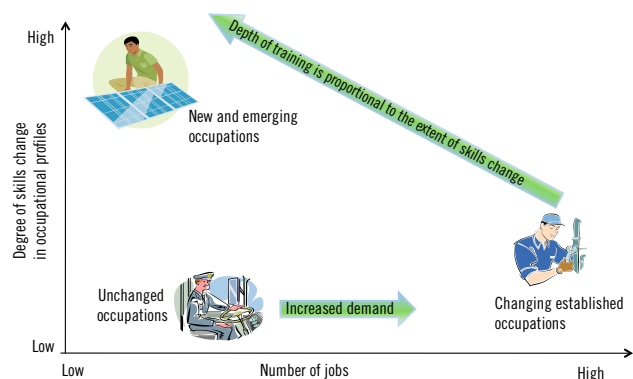
Not all greening will involve fundamental change in occupations. Some occupations will not change at all: the woman sitting behind the wheel of an eco-friendly bus fuelled by compressed natural gas (CNG) will need the same skills as drivers of other buses (figure 3).

Table 1. “Green” restructuring: industries likely to grow and associated retraining needs

Industry	Employment effect	Type of restructuring	Training needs
Renewable energies: wind, wave and tidal power, solar, hydro, biomass, geothermal	Gaining	Absorbing workers from other industries	Skills upgrading: energy efficient solutions, management and entrepreneurship skills, including project management skills Retraining from other manufacturing sectors Retraining for engineers, installers, technicians, operation and maintenance specialists
Green building and retrofitting	Stable or gaining	Restructuring within construction industry and through the value chain (energy, suppliers of materials etc.)	Skills upgrading: energy efficiency, green technologies, new materials, energy auditing/certification
Transport	Stable or gaining (although taxi drivers lose jobs as countries move to mass public transportation)	Intra-industry restructuring	Retraining and skills upgrading into various public transportation jobs
Recycling and waste management	Gaining	Intra-industry restructuring	Retraining from waste collection to recycling; skills upgrading in methane and energy recovery
Water resource management	Gaining	Intra-industry restructuring	Skills upgrading: water conservation and efficient use, wastewater treatment

Source: Strietska-Ilina et al., 2011.

Figure 3. The dynamic of change in skills, occupations and related training needs



Source: Strietska-Illina et al., 2011.

There will be far more established occupations requiring skill upgrades than brand new occupations. Where new occupations are created they often call for higher-level qualifications, either because of their dependence on new technologies or because they require sophisticated skills in, for example, networking, organization or consultancy. The core skills identified as necessary for the new green worker include environmental awareness and willingness to learn about sustainable development as well as general learning and decision-making ability. Good communication skills are also needed so that workers in different sectors can work together effectively towards green solutions. In the green building sector, for example, the ability to work with other trades is critical to improving a building's energy efficiency.

Challenge 5: Skills required in a greener economy need to be identified

Ways of classifying and measuring green jobs are only now being refined. In their absence, most countries have hitherto relied on qualitative data gathered through enterprise surveys, occupational research or consultation with experts. There is thus a need to develop complementary quantitative methods to identify the specific occupational needs of a greening economy.

Table 2: Changing and emerging occupations

Degree of skill change	Occupational change	Typical skills response	Examples
None	None or only quantitative	None or increased training in existing occupation	Bus driver in CNG-fuelled buses; forester
Low	Changing occupation	On-the-job learning or short training courses	Welder in wind turbine production; organic farmer
Medium	Changing or emerging occupation	Short courses or longer continuous training	Energy consultant in building; car mechanic for electric cars or CNG cars
High	Emerging occupation	Initial training, university degree or longer continuous training	Solar energy technician; eco-designer; biofuels technician

Source: Strietska-Illina et al., 2011.



Skill needs in a greening economy are usually first identified at the level of individual enterprises, which are quick to respond to new regulations or technologies that affect specific jobs or change markets. However, company-level change can have only a limited effect on the national workforce. Industry-level initiatives have greater impact (for an example from Australia, see box 6).

Developing countries often have much less elaborate systems for anticipating skill needs, and tend to create a parallel system of analysis running alongside the existing training system and/or labour market information system, or conduct one-off surveys.

Challenge 6: Appropriate training needs to be put in place promptly

Training systems need to respond quickly, as demand changes fast. This is a particularly challenging requirement, given that the updating of courses usually takes a couple of years. Government-sponsored training programmes have proved valuable, notably where they take advantage of formal education and training systems with well-established flows of information between industries and training institutions. General schooling and university systems have tended to respond well to new demands, but in many countries institutions offering technical

Table 3. Examples of upskilling to new occupations

Occupation	Type of training	Upskilling	New occupation
Industry electrician/energy technologist	Vocational/ tertiary engineering qualification	Knowledge of energy sources to integrate energy systems, project management	Manager in renewable energy
Industrial operator/industry electrician	Vocational upper secondary qualifications	Assembly, installation of parts, use of tools	Wind turbine operator
Transport	Retraining for engineers, installers, technicians, operation and maintenance specialists.	Intra-industry restructuring	Retraining and skills upgrading into various public transportation jobs
Plumber/electric and heating installer	Basic vocational training	Technical training, knowledge of administrative procedures, entrepreneurship skills	Solar energy entrepreneur, installation project designer
Engineer in energy sector	Tertiary engineering qualifications	Installation and maintenance of low carbon technology	Smart energy expert

Source: Cedefop, 2010.

and vocational training have reacted more slowly. This represents a major challenge since the bulk of training for green occupations is channelled through vocational training (table 3). Enterprises in most countries and public employment services in a few have proved to be efficient channels for upgrading skills.

How have countries responded effectively to these challenges?

Policy message 1: Improve policy coordination at planning, design and implementation stages

Many countries are already integrating environmental imperatives into their overall development and growth strategies, incorporating technology, industry, trade and agriculture policies. The next steps are to understand the employment potential of the green transformation, and the corresponding needs in education and training, and then to steer skills development systems towards meeting those new needs. Countries have found various effective ways to integrate skills issues with environmental policy development and to include the social partners in the development of skills and the work of line ministries on environmental policy. These include setting up task forces for human resource development for a greening economy; incorporating training and skills issues into a council for environmental development; or incorporating the functions of devising strategies, identifying skill needs, and developing skills and training, all in the context of greening, within an existing structure. In the Republic of Korea, for example, two new skills councils have been created: one on the renewable energy sector, and the second on green industry trends, risk

analysis and green finance. It is important that any such forums have authority to take decisions, to establish clear commitments among the parties concerned and to allocate adequate human and financial resources. It is also essential that clear assignment of responsibility be an integral part not just of planning but also of implementation.

More coordination does not necessarily mean more centralization: indeed, a more decentralized approach can promote policy coordination and coherence at sectoral and local levels (see box 3).

Box 3. The French Mobilization Plan for Green Jobs

France's comprehensive policy framework enables effective collaboration among different agencies. It brings together a wide range of stakeholders to address the issue of skill development for a green economy in coordination with the national environment strategy. The objective of the Mobilization Plan is to update existing training programmes and qualifications to meet environmental challenges, creating new qualifications where necessary. The steering group includes representatives of relevant ministries, social partners, economic actors, local authorities, bodies concerned with training, the employment service and a research centre. Consistency of coverage is ensured by the creation of 11 sectoral committees representing the sectors considered most promising in terms of green jobs creation. Each is charged with analysing that sector's skills and training needs, which then inform the overall environmental strategy.

Policy message 2: Focus on retraining and the development of portable skills to encourage occupational mobility

Policy-makers need to commit resources to retraining and focus in particular on the development of portable skills. This can be done by means of active labour market policy measures delivered by employment services. Short, intensive vocational training courses, tailored to employers' needs, have proved their worth in delivering retraining for specific new job opportunities (for an example see box 4). Core skills such as decision-making, leadership and readiness to learn remain essential and will continue to underpin occupational mobility. Environmental awareness is itself becoming an important core skill and merits inclusion in education from childhood and continuing through lifelong learning programmes.

The basic skills that form the foundation for future employability are acquired through initial education and training, and enable workers to adapt to new skill requirements throughout their working lives. Apprenticeship training and other types of hands-on experience are particularly valuable in increasing workers' adaptability in changing labour markets.

Box 4. Strategic skills development: Restructuring in Navarre, Spain

In the 1980s and 1990s the Spanish region of Navarre suffered a severe economic downturn. The regional government responded with an industrial policy that included retraining workers to staff an expanding renewable energy sector. Working in cooperation with the Confederation of Entrepreneurs of Navarre and the Navarra Industry Association, the regional government identified the main skills shortages in the region and set up CENIFER, a public training centre for renewable energies. Employment in renewable energies across Navarre increased – just under two-thirds of the region's electricity production is now derived from renewable sources – and unemployment dropped to the lowest levels in Spain.

Policy message 3: Prioritize training for disadvantaged groups

The growth dividend offered by the greening of the economy will only be fully realized if training is made accessible to disadvantaged youth, people with disabilities, rural communities and other vulnerable groups.

Because newly emerging occupations are not burdened by a history of gender stereotyping and segregation, they offer a unique opportunity to break existing gender barriers. Incentives to increase women's participation in green work, notably through technical training programmes, will achieve the double objective of solving skill shortage problems in this area while also increasing women's participation in technology-driven occupations (for an example see box 5).



Policy message 4: Enable trainers and teachers to keep skills for green jobs up to date

The availability of teachers and trainers with current knowledge on the environment and green technologies is crucial. Their role is critical in promoting environmental awareness among young people and in spreading environmental training beyond the formal system of education by reaching out into the adult population. The education and training of such teachers and trainers should therefore be a top priority in any skills response strategy.

Policy message 5: Improve systems for identifying and anticipating skill needs

There is an urgent need for a more rigorous approach to the analysis and anticipation of demand for green job skills. Where systems for anticipating skill needs already exist, they can be adjusted to incorporate this requirement. In less developed countries where such frameworks do not yet exist, this need represents an opportunity to put in place the beginnings of structures such as a national human resource development council involving government, employers, workers and providers of training and education, to facilitate the exchange of information, and to establish industry groupings that could later be formalized as sectoral skills councils.

Box 5. "Working for Water" in South Africa: Training unemployed people in local communities

The "Working for Water" project established under South Africa's Expanded Public Works Programme trains disadvantaged communities to control and remove invasive alien plants, which pose a significant threat both to South Africa's water security and to the sound functioning of natural ecological systems. Short-term contract jobs are created in the clearing activities, with the emphasis on endeavouring to recruit women, young people and people with disabilities.

Sector-level analyses and systems have proved very useful across developed, emerging and developing economies; however, in contexts where green activities do not fall neatly within traditional sectoral boundaries – for example, in renewable energies, where people may work within many different sectors (manufacturing, construction and transport, among others) – there is a pressing need for better coordination of labour market analysis and monitoring across sectors and occupations.

Policy message 6: Target skill needs through social dialogue

Bringing trade unions and employers' associations into the planning, design and implementation of skills development does a great deal to boost the responsiveness of education and training and can trigger green transformation on a larger scale (for an example see box 6). Collaborative approaches allow information from the 'front line' of industrial production to inform skills development and have included public-private partnerships, which match government resources to businesses' hands-on knowledge of skill relevance and quality, and multi-stakeholder approaches.

Box 6. "Green plumbing" initiative in Australia

In Australia, the main plumbing association and trade union have concluded a multi-stakeholder agreement that launched GreenPlumbers, an initiative to develop training programmes and certification on the environmental considerations associated with plumbing work. The same initiative has been exported to New Zealand and the United States.

Whatever the specific challenges faced by individual countries, industries and enterprises, a successful transition to greener work will depend on the coming together of government, trade unions and employers in constructive social dialogue. In fact, only in this way can potentially severe economic and social adjustment costs be avoided and employment growth potential be seized.



Policy checklist:

- ✓ Does your country coordinate environmental policies and policies devoted to green job skills development? If yes, how are skills issues included in national environmental strategies?
- ✓ How are training and retraining needs anticipated and met within industries undergoing substantial green transformations?
- ✓ How do public employment services provide information on and access to retraining courses for green jobs?
- ✓ Is environmental awareness a routine component in general and vocational education and training?
- ✓ Are training programmes for green jobs available to, and affordable by, disadvantaged youth, people with disabilities, rural communities and other vulnerable groups? What are the instruments used to include disadvantaged groups in the greening of the economy?
- ✓ Does your country have a policy or incentives to support female enrolment into science, engineering and other types of technical education and training?
- ✓ Do initial and continuing training programmes for teachers and trainers include components on environmental awareness, new green services and green production methods?
- ✓ Does your country have a system to detect new skill demands? Is it used to detect skills arising as a result of greening? How does your country improve the system to capture new developments in the green economy?
- ✓ Does the system for anticipating skill needs incorporate a coordinating mechanism to allow skills identification and information exchange across green sectors and line ministries? Is it used to identify skills for green jobs?

Key resources

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