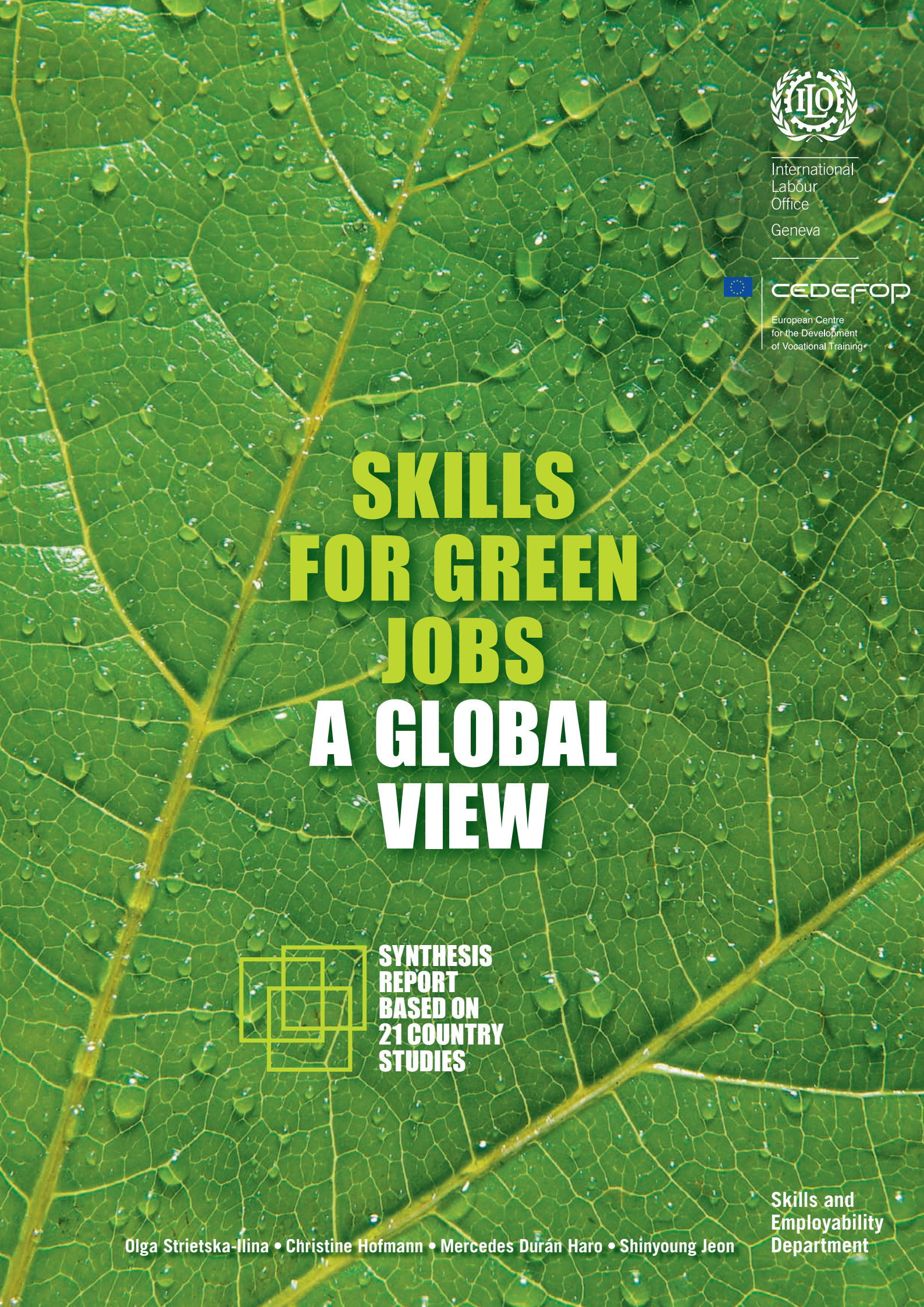

International Labour Office
Geneva

CEDEFOP
European Centre for the Development of Vocational Training

SKILLS FOR GREEN JOBS
A GLOBAL VIEW

SYNTHESIS REPORT BASED ON 21 COUNTRY STUDIES

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Foreword

Climate change and environmental degradation are jeopardizing the sustainability of many kinds of economic activity around the globe. At the same time, moving towards a greener economy is creating opportunities for new technologies, investment, and jobs.

This is the message of the *Green Jobs Report* (2008), which estimated that efforts to tackle climate change could result in the creation of millions of new "green jobs" in the coming decades.[1] This assessment was made as part of the Green Jobs Initiative, a joint effort launched by the International Labour Organization (ILO), the United Nations Environmental Programme (UNEP), the International Organization of Employers (IOE), and the International Trade Union Confederation (ITUC) to help governments and social partners turn this potential for decent work into reality by aligning environment and employment objectives.

As part of this Green Jobs Initiative, the ILO Skills and Employability Department, defined a global research project to investigate skill needs for greener economies. A series of twenty-one country studies was conducted in partnership with the European Centre for the Development of Vocational Training (Cedefop), a European Union agency located in Thessaloniki, Greece.[2] The global synthesis of these countries' experience was prepared by the ILO. Cedefop conducted the research on the six EU countries included in the study, and also published a separate summary of their findings.[3]

The analysis of countries' experience revealed that skill shortages already constrain the transition to a greener economy - in terms of preparing for some new occupations and in terms of changing the skill profile of a large number of occupations. The research also documented the need to provide opportunities for acquiring new skills to those who are at risk of losing jobs in high-emissions industries. Countries' experiences in adapting training provision to meet all of these needs vary. Some countries are developing innovative strategies and policies to proactively anticipate and address emerging skill needs; others adjust existing mechanisms and systems on a more ad-hoc basis. The report has assembled case studies across a wide spectrum of challenges, documenting a broad array of approaches to promote the transition to greener workplaces with sustainable, productive and decent employment.

A number of examples of good practices demonstrate that public policy together with private initiatives can foster the green transformation and job growth. These policies focus on equipping young people entering the labour market and older workers mid-way through their careers with the ability to learn the skills required for adopting new technologies, meeting new environmental regulations, and shifting to renewable sources of energy. National efforts are placing increasing emphasis on the core skills that enable workers to adapt to changing technologies, and are also

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1 UNEP, ILO, IOE, ITUC: *Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World* (Geneva, 2008) available at: http://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/documents/publication/wcms_098504.pdf

2 The background country reports are available at http://www.ilo.org/skills/what/inst/lang--en/WCMS_144268/index.htm

3 Cedefop: *Skills for green jobs. European synthesis report*. Luxembourg: Publications Office of the European Union, 2010.

focusing on building up competencies in mathematics, engineering, technologies and science. Many countries and communities target training and employment measures to disadvantaged groups out of concern that the green transformation also be a socially just one.

This research project on skills for green jobs builds on earlier ILO research on how skills development can improve productivity, employment growth and development.[4] Skills development systems need to go beyond matching training to labour market needs; they need to play a catalytic role in future economic growth and resilience by enabling enterprises and entrepreneurs to adapt technologies, compete in new markets, diversify economies and thus accelerate job growth. The broad availability of good quality education and training means having the capability to take advantage of opportunities and to mitigate the negative impact of change.

Propelling the transition to the green economy is a case in point. Environmental and climate change policies bring enormous employment opportunities but also the risks associated with structural changes. Countries need coherent strategies that bring together energy, environment, education and skills development objectives, policies and responsible ministries in order to adapt to climate change and shift to clean and sustainable production and consumption in ways that maximize creation of decent work and make it available to all. Countries that are succeeding in such a challenging task are placing a high premium on effective social dialogue, coordination among ministries, and communication between employers and training providers. Labour market information systems, institutions for social dialogue, and labour market mediation services are prerequisites for being able to anticipate future skill needs and to adapt skills development systems accordingly.

Every job can potentially become greener. Integration of sustainable development and environmental awareness into education and training at all levels, starting from early childhood education, is an important task. It will contribute to changing consumer behaviour and triggering market forces to push the greening agenda ahead.

The availability of workers and enterprises with the right skills for green jobs plays a critical role in triggering the green transformation and in facilitating transitions that are fair as well as efficient. Employers investing in new technologies need to be able to find workers with the right skills. Workers and communities that lose jobs in "brown" industries need opportunities for acquiring new skills and employment. This report documents both these needs and provides cause for optimism that the opportunity for job growth inherent in the green transformation will be seized, that it will not be lost for want of right-skilled workforces, and that environmental sustainability will be well served by workers, employers, and communities, who with confidence stake their future on new cleaner economic activities.

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[4] ILC: *Conclusions on skills for improved productivity, employment growth and development* (Geneva, 2008).

Executive summary

The growing importance of sustainable development and the shift to a low-carbon economy are increasing the pace of change in labour markets and skill needs. Economies moving towards greener production can seize this potential for job creation – which is particularly relevant for recovery from the current economic crisis – if they can deal effectively with the coming structural change and transformation of existing jobs.

In 2008, the ILO, the United Nations Environment Programme (UNEP), the International Organization of Employers (IOE) and the International Trade Union Confederation (ITUC) jointly launched the Green Jobs Initiative to help governments and social partners turn this potential for decent work into reality by aligning environment and employment objectives and policies.

Skills development is one of the keys to unlocking this job potential. The timely supply of relevant and quality skills is indispensable for successful transformations that boost productivity, employment growth and development.

Thus the ILO's Skills and Employability Department, in cooperation with the European Centre for the Development of Vocational Training (Cedefop), launched a global investigation of skill needs for greener economies. Investigations were carried out in 21 countries that represent 60 per cent of world population, 59 per cent of global GDP and 49 per cent of global CO_2 emissions: Australia, Bangladesh, Brazil, China, Costa Rica, Denmark, Egypt, Estonia, France, Germany, India, Indonesia, Mali, the Republic of Korea, the Philippines, South Africa, Spain, Thailand, Uganda, the United Kingdom and the United States. These **21 country studies** form the core evidence base of this report.

In each country study, analysts started by identifying the drivers of transformation to a greener economy – changes in the physical environment itself and changes induced by government regulations, more efficient technologies and changes in consumer demand. Then they assessed the effect of these changes on employment, identifying areas of job growth and of job loss. Only then could researchers start to understand how skill requirements are changing and are expected to change in the future, and to examine how well national training systems are anticipating and responding to these new needs.

The transformation wrought by greening economies affects skill needs in three ways. First, the green transformation shifts activities in the economy, for example from those that are less energy efficient and generate higher CO_2 emissions towards those that are more efficient and less polluting. This type of transformation occurs at industry level, causing structural shifts in economic activity, and thus in employment, between and within industries. This is called ***green restructuring***. Structural changes in turn decrease demand for some occupations and skill profiles and increase demand for others. An example of this source of change in skill requirements would be the growth of alternative and renewable energy sources, such as wind or solar power, and the relative decline in the production and use of fossil fuels. It calls for training to enable workers and enterprises to move from declining to growing sectors and occupations.

Second, structural changes, the introduction of new regulations, and the development of new technologies and practices result in the emergence of some entirely ***new occupations***. This process

is very much country specific. For example, a solar technician is often mentioned as a new occupation in those countries where solar energy is a new technology. Emerging occupations call for the provision of relevant training courses and the adjustment of qualification and training systems.

Third, new skills will be needed by workers in many existing occupations and industries in the process of ***greening existing jobs***. For example, within the automotive industry, workers across a range of jobs from engineering design to the assembly line will have to work with new fuel efficient technologies. In another example, farmers in many parts of the world will have to adjust to more severe drought conditions, requiring them to learn how to grow new crops or new methods for producing the same crops. This source of change in skill requirements is the most widespread: in fact, it will be pervasive, and calls for a major effort to revise existing curricula, qualification standards and training programmes at all levels of education and training.

All three sources of change – shifts between industries, development of new occupations and changing skill profiles within occupations – alter the skill profiles of occupations and thus affect training needs and delivery. The scale and extent of these changes depend in turn on the speed and breadth of technological and market changes in the green transformation. Preparation for new occupations, or for growth in demand for some occupations at the expense of others, is particularly important in preparing young men and women entering the labour market. Workers already in the labour market, midway through their careers or older, will need access to retraining to enable them, and enterprises, not only to move from declining industries and occupations into growing ones, but also to keep their skills up to date with new technologies, market demand, government regulations etc. in their existing fields of work and business.

Thus the country studies undertaken for this report were intended to reveal whether the potential for new and better jobs in greener industries is being realized, and, if so, how countries have succeeded in adjusting their training provision to meet new demand; or whether skill gaps are delaying the green transformation and in turn causing economies to miss out on new sources of job creation.

Drivers of change: How skill needs shift as economies go green

Within the country studies, changes in employment, and hence in skills, were found to be the result of four drivers of change:

- physical change in the environment;
- policies and regulation;
- technology and innovation; and
- markets for greener products and services, and consumer habits.

Changes in the physical environment – global warming, changing weather patterns, more extreme droughts, rising sea levels etc. – require adaptation measures. To the extent that these changes are already happening, humankind is obliged to adjust our consumption and production patterns to cope with them. These measures aim at reducing the social costs of adjustment and avoiding their being borne disproportionately by those already at economic and social disadvantage. In particular, the need for effective adaptation measures is becoming increasingly urgent in developing countries.

On the other hand, scientists give us encouragement that there is much that can be done to limit further environmental degradation. Changes in human activities can mitigate, or limit further, change. Reducing carbon emissions and expanding recycling efforts are examples of mitigation efforts.

The four drivers of change are interrelated. Physical change in the environment is the basis for policy decisions on environmental regulation. Regulation, in turn, can affect the development, availability and dissemination of technology. Regulation and also the availability of technology affect national and global markets. Consumer habits, and thus the demand for greener products, can affect the way companies do business and encourage them to adopt new technologies that allow them to meet new consumer needs.

In spite of the growing influence of globalization, skill changes resulting from the transition to a greener and low-carbon economy remain very much country specific, largely determined by specific environmental challenges, national policy and politics, and thus the regulatory framework, which can include credits, tax exemptions and other incentives. However, international policy and legislation are playing a greater role and are driving further change at the national policy level. This activity will eventually further bolster already vibrant global markets and business-driven technology transfer. As a result, patterns in skill changes may become more similar across countries and regions.

In this context, sharing information from these 21 country studies on the identification of skills for green jobs, on changes within existing occupations and the emergence of new ones, and on effective skills development strategies provides a relevant resource to other countries seeking to prepare themselves better for the changes ahead.

Policy context

The transition to a greener economy has enormous employment potential in the long run, creating millions of jobs both directly, and indirectly through supply chains. The challenge for environmental policy is to choose policy options that maximize productive and decent work, and the challenge for skills development policy is to integrate environmental awareness and the right technical training for green jobs into education and training provision. Thus policy objectives in the two areas are mutually supportive: without a suitably trained workforce the transformation to a greener economy will stall, and without the imperative of meeting environmental challenges the need for accelerated job growth may go unmet.

The country studies revealed that skill shortages already pose a major barrier to transitions to green economies and the creation of green jobs, a trend which is likely to be exacerbated in the future. Skill shortages for green jobs stem from a number of factors, including underestimated growth of certain green sectors, for example in energy efficiency in buildings; a general shortage of scientists and engineers – a problem shared by economies at all development levels; the low reputation and attractiveness of some sectors, such as waste management; and the general structure of the national skill base. Shortages of teachers and trainers in environmental awareness subjects and in fast-growing green sectors (e.g. renewable energy, energy efficiency) are reported in many countries, especially in developing economies.

However, in this important area of policy coordination, comparison across the countries studied revealed that coordination between environmental and skills policies ranges from comprehensive and well coordinated to fragmented or virtually non-existent:

- The skills response component in most of the documentation for adaptation and mitigation measures, policies, strategies, action plans and programmes initiated in response to climate

change and environmental degradation is either limited or non-existent. Lack of human and financial resources, unclear mandates of institutions involved, and lack of awareness of training issues among environmental policy-makers are among the obstacles that hamper the integration of human resource development into environmental strategies.

- Moreover, mechanisms for identifying, monitoring, anticipating and providing skills do not usually include representation from environment ministries. Similarly, ministries, agencies and institutions concerned with education and training are typically not involved in developing environmental policies. And even where coordination mechanisms exist for policy design, coordination for implementation is weak.

The conclusion from the cross-country comparison is that sustained inclusion of skills development in strategies to speed the greening of national economies remains limited to isolated initiatives.

In addition to this specific problem of lack of policy coordination, many of the case studies also revealed a lack of enforcement of environmental regulations already adopted. This diminishes the incentive to invest in new skills, which in turn detracts from compliance capabilities and, in a downward spiral, further exacerbates the difficulty of implementing regulations.

Finally, policy rightly focuses on the quality, as well as the quantity, of the potential new jobs. Many jobs in waste management, recycling and agriculture, especially subsistence agriculture, are characterized by extremely poor working conditions. However, the limited information gathered on the quality of green jobs indicates that efforts to upgrade skills can be accompanied by efforts to improve working conditions in respect of safety and health in the work environment, working time, work organization and employment contracts. This is another important area of policy coordination: job creation and skills upgrading in greening the economy can benefit from active labour market policies, labour inspection and social dialogue in order to promote work that is green and decent. Indeed, the ILO's promotion of green jobs fully integrates the core elements of decent work: labour law compliance, access to social protection measures and participation in social dialogue.

Green structural change and implications for skills development

In countries whose economies are energy and emissions intensive, the transition to a greener and low-carbon future may incur potentially severe adjustment costs, both economic and social. Significant regulatory reforms and emissions targets can be expected to lead to restructuring and downsizing in emissions intensive industries. The same regulatory changes will stimulate growth in renewable energies and activities to improve energy efficiency, for example. In addition, the transition from carbon intensive to energy-saving and cleaner production and service patterns will cause restructuring and downsizing in some parts of manufacturing and construction.

Different estimates and scenarios generate various opinions on the medium- to longer-term employment effects of green restructuring, although most of them agree that the net effect will be positive. However, the prospects for achieving this positive net effect, and the duration and pain of the transition, are materially affected by the extent of comprehensive planning and coordinated policy implementation. Retraining and skills upgrading measures feature prominently in well-coordinated and proactive approaches.

The country studies highlighted many sectors where extensive restructuring is anticipated, and thus where training and other active labour market policies are most needed in order to

avoid long-term displacement. Agricultural production will be affected by growth of biofuels and organic farming. Fossil fuel energy generation will decline relative to growth in renewable energy sources and in consequence of new green technologies in, for example, carbon capture and storage. Emissions intensive manufacturing, in particular the automotive sector and related supply chains, will shift focus to eco-friendly vehicles (hybrid, electric and hydrogen). In marine engineering and extractive industries, offshore oil production may decline relative to off- or onshore renewable energy, including the construction, supply and maintenance of off-/onshore wind turbines and wave and tidal energy infrastructure.

Although new job opportunities arising from greener production are estimated to offset job losses, those who will get 'green' jobs are not necessarily those who will have lost their jobs in so-called 'brown' industries. Retraining workers and upgrading skills are matters of urgency in facilitating a smooth and just transition to the low-carbon and green economy. Disadvantaged groups in the labour market need targeted assistance and preferential treatment to ensure their access to new and good quality green jobs. Low-skilled workers are especially vulnerable as it will be difficult for them to compete for new jobs.

Short and tailor-made courses, directly linked to specific job openings, have been found to be the most useful approach to retraining workers and upgrading skills in the context of restructuring measures. The ability of workers to take advantage of such training opportunities hinges on how prepared they are to learn new skills. Core skills for employability are of broad relevance rather than linked to specific occupations or technologies. They include competencies in literacy, numeracy, decision-making, teamwork, communication etc. Competencies in these areas affect the ability to learn, and thus materially affect the adaptability of workers and their occupational mobility. Opportunities to gain competence in these areas can be provided through both initial and continuing training. Such basic competencies as literacy and numeracy are acquired through early education, and many societies find a need to provide remedial education to adults who did not have the opportunity to go to school when they were young and who are faced with the challenge of learning new technical skills later in life.

Successful restructuring with efficient retraining measures can divert workers from long-term displacement and speed redeployment into new, greener industries and occupations. The key to success in such measures is shared responsibility by the government at all levels (national, regional, local), trade unions and employers. Organizing social dialogue at industry level is therefore an important prerequisite for efficiency in restructuring. Public employment services are an important delivery mechanism for active labour market policy measures, including retraining jobseekers and assisting enterprises in their restructuring.

Training activities, then, are not all that is needed to smooth transitions in the face of structural adjustments: labour market information systems, social dialogue and employment services are likewise critical assets. Ideally, mechanisms for workforce restructuring are incorporated in the overall system of active labour market measures, are informed by a well-functioning labour market information system, are delivered through efficient public employment services, and are bolstered by social protection mechanisms and institutional mechanisms for social dialogue.

How occupations change as economies go green

The change in occupational skill needs is both quantitative and qualitative. Increased investments in a green sector and increased demand for certain occupations may not affect the skills composition of the occupation: for example, demand for railway workers may increase due to greater investment

in public transportation, but the skills needed to perform the job do not change. In such cases it is the number of jobs, and hence the quantity of training required, that may change. The level of occupational change depends on the degree of skills change: from none (the example of the railway worker) to high, when new occupations emerge (for example, that of solar energy technician). In the middle of this range are numerous established occupations whose content is altered with the adoption of new green technologies or of new green methods of production. These include engineers, managers, craftspersons or technicians who install and maintain new technologies or implement new energy efficiency standards. This type of skills change – greening existing occupations – is the most widespread and concerns the largest number of jobs.

Occupational change is taking place in both blue- and white-collar jobs. New and emerging occupations more often require higher-level qualifications, while changes in existing occupations happen more often at the low and medium-skill levels.

Taking as the starting point the principle that every job can become greener, not all of the new skill needs are technical. Skill needs also pertain to knowledge about regulation and the ability to adopt, adapt, implement and maintain skills. Innovation and new markets require management, design, planning and leadership skills. Clearly some sectors are more affected by occupational change than others, but all sectors generally need certain environmental competency levels in their workforce, such as skills in energy and resource efficiency, in compliance with environmental legislation and in the reduction of environmental pollution and waste. Core skills such as entrepreneurship, risk assessment or communication skills among many others are indispensable as economies move to greener solutions.

The country studies reveal some general trends on the gender implications of changing and emerging occupations. Most evident is a generally low representation of women in science and technologies related to green jobs. In developing countries in particular there is a disproportionate representation of women in low-end green jobs such as waste collection and recycling occupations. On the other hand, green jobs present a particular opportunity to break gender barriers as gender segregation is not yet deep-rooted in new occupations.

Having identified changes in skill requirements generated by changes across industries and within occupations, we ask: What responses are proving effective in meeting this current and future demand?

- Enterprise-level responses are the fastest and most effective in developing skills matched to current, company-specific needs. They are, however, rarely coordinated and have somewhat limited impact on overall greening of the economy and no influence on the regular skills supply.

- Industry-level responses, through such bodies as industry skills councils or chambers of commerce, have already achieved considerable results in several countries. In France, for example, the main federations and business associations in the construction sector launched Qualit'ENR, a programme to develop training standards for the installation of renewable energy equipment. Since the creation of the scheme in 2006, training provision has considerably improved.

- At government level, training programmes may be delivered through the formal education and training system, involving ministries of education, manpower or labour and the universities or training centres related to the system. Responses can be designed under relevant line ministries – energy, agriculture, construction etc. – to address national, regional or local demand.

- Public–private partnerships, matching government resources to business's hands-on knowledge of skill relevance and quality, have proven effective in many cases. The involvement of trade unions and employers' associations in education and training through public–private partnerships can deliver effective training responses and trigger green transformation on a larger scale. Tripartite governance structures in vocational training in Denmark and Germany ensure that updated and new curricula take economic, social and environmental dimensions into account. In Spain, a public–private skills initiative in Navarre created a training centre for renewable energy (CENIFER) that contributed to the increase in electricity production from renewables from zero to 65 per cent in 15 years.

Countries with well-developed and responsive skills development systems are incorporating environmental considerations as cross-cutting issues in training programmes at all levels. In countries with less responsive education and training systems, companies usually account for the biggest share of skill provision. The principal deficiency reported in public systems is unresponsiveness to industry needs. This is variously attributed to poor communication channels between the training system and industry, or between the system and agencies responsible for implementing policies or programmes on greening; or to a lack of sufficient or sufficiently skilled teachers and trainers; or to institutions' slow and cumbersome procedures to develop new skill programmes. By default, then, training takes place mostly at the enterprise level, or through NGOs, and although it may meet needs, its overall outreach and thus impact on the greening of industries and the economy remains limited.

Coherent multi-level skills development responses are seen as the most effective approach to greening economies, as they address both consumption and production patterns. They influence consumption by raising environmental awareness through general schooling or mass media; and they help production move to more environmentally conscious practices through training programmes, vocational, technical and higher education and training, and lifelong learning at enterprise level.

For effective and targeted responses, the close involvement of all stakeholders concerned is key. Where this is achieved, there is most likely to be a sustained and just transition to a greener economy. In any case, investment in skills without matching investment in related job creation is not productive, and vice versa.

Anticipation and monitoring of skill needs

It is broadly acknowledged that there is a paucity of data on the classification and incidence of green jobs. Most countries rely on qualitative methods for anticipating and monitoring skill needs, such as enterprise surveys, sectoral analyses, occupational research and job analyses, sometimes in combination with quantitative analysis. A more standardized and rigorous approach to identifying and monitoring green occupations and related skills would be very helpful. Widespread agreement was reported in the country studies on the need for more standardized and rigorous approaches for the preparation of taxonomies of green jobs and related occupations and for quantitative methods of analysis.

When it comes to anticipation and monitoring of skill needs, most developed countries enjoy well-established systems which they have been able to utilize for the analysis of skills for green jobs. These systems have previously reflected changes in environmentally driven competencies, leading to new qualifications and courses, and changes to established curricula.

To the extent that the pace of change allows, these systems might be expected to continue to reflect and animate responses to emerging skill needs.

Identification of current and future skill needs as the basis of skill development responses remains very challenging in most developing countries, both with a view to market relevance in general and with a particular focus on environmentally motivated change. Here the first priority is establishing social dialogue mechanisms in a systematic way to transfer labour market signals to mechanisms for updating training programmes.

Although sector-level analyses have proved very relevant and are widely used across developed, emerging and developing economies, in contexts where green activities cannot be categorized neatly into traditional sectors there is a great need for better coordination of labour market analysis and monitoring across sectors and occupations.

Ways forward

It is important to remember that skills are not a poor servant of the economy, expected merely to react and adjust to any change. The availability of a suitably trained workforce capable of further learning inspires confidence that in turn encourages investment, technical innovation, economic diversification and job creation.

Policies need to be informed, coherent and coordinated

When policies to green the economy and policies to develop skills are not well connected, skill bottlenecks will slow the green transformation, and potential new jobs will be lost. ***Strategic, leadership and management skills*** that enable policy-makers in governments, employers' associations and trade unions to set the right incentives and create enabling conditions for cleaner production and services are an absolute priority.

Environmental awareness as an integral part of education and training at all levels, introduced as a core skill from early childhood education onwards, will eventually push consumer behaviour and preferences and the market itself.

Labour market information for anticipating and monitoring skill needs for green jobs is the critical starting point for effective policy cycles. This enables governments and businesses to anticipate changes in the labour market, identify the impact on skill requirements, incorporate changes into the system by revising training programmes and introducing new ones, and monitor the impact of training on the labour market.

The country studies that told the most successful stories prove the value of ***effective coordination among line ministries and social partners***, achieved by creating task forces for human resource development for a greening economy, or by incorporating training and skills issues into a council for environmental development. It is important that the platform for this dialogue has decision-making authority, can establish clear commitments among all those partners involved and allocate human and financial resources to them, and has agreed responsibilities not only for planning but for implementation. A win–win situation can only be achieved if environment, jobs and skills are discussed, planned and implemented in conjunction with each other.

Decentralized approaches can actually promote policy coordination and coherence at ***sectoral and local levels***. Direct dialogue between national and regional governments and social partners can be translated into action when commitments and resource allocation occur at a smaller scale and where immediate dividends are obvious for all partners involved. A good

combination of top-down coordinated policy-making with bottom-up sectoral or local initiatives can support effective training-intensive green transitions.

Policies need to be targeted

The transformation to greener economies provides an opportunity to reduce social inequalities. Social justice dictates that training initiatives target those who lose jobs during the transition, especially those who are typically at a disadvantage in the labour market and may require special assistance. The growth dividend from greening the economy will be attained only if access to new training provided as part of green measures is made accessible to disadvantaged youth, persons with disabilities, rural communities and other vulnerable groups. Incentives to increase women's participation in technical training programmes will not only increase their participation in technology-driven occupations but also help solve the skill shortage problem in this segment of the labour market.

Green transitions affect the entire training system

Taking into account all three types of skills change – that resulting from employment shifts within and across sectors as the consequence of green restructuring, that associated with new and emerging occupations, and the massive change in the content of established occupations – it becomes clear that the whole training system must be mobilized. Adjusting training programmes to green changes in the labour market is a transversal task across levels and types of education and training.

So far, compulsory level and tertiary education have been catching up rather well, whereas technical and vocational education and training has been lagging behind in adapting to the needs of the green economy. Improving adjustment here can give new impetus to employment-centred and fair green transitions and requires the following key challenges to be met:

- ***putting basic skills high on the policy agenda,*** as a foundation of flexibility and employability throughout the life cycle;
- ***matching classroom and practical training*** through apprenticeships, internships, job placements, projects on the job etc.;
- ***adjusting the length and breadth of training provision*** according to different types of skills change;
- ***equipping teachers and trainers*** with up to date knowledge on environmental issues and on green technologies – education and training which deals with preparation of teachers and trainers should be one of the first priorities in skills response strategies;
- ***enabling active labour market policy measures*** (ALMPs) to take into account green structural change and to provide access to relevant training and other employment activation measures;
- ***deploying public employment services*** (PES), as important players in job matching and training, to raise awareness about green business opportunities and related skill needs.

The linchpin of effective skills development for greening the economy is ***coordination***. The degree of coordination between public and private stakeholders and the degree of involvement of social partners are decisive. Concerted measures need to be undertaken by governments at different levels, including the community level, employers and workers, through institutional mechanisms of social dialogue, such as national or regional tripartite councils, sector or industry skills councils, public–private partnerships and the like.

Developing countries need special measures

Developing countries, and the workers and employers in them, have the least responsibility for climate change and environmental degradation but suffer their economic and social consequences disproportionately. Special measures that can speed their employment-centred green transformations include:

- capacity building for employers in the informal economy and micro and small enterprises to enter green markets in localities where they are most needed;
- entrepreneurship training and business coaching for young people and adults to start up green businesses in conjunction with microfinance projects;
- environmental awareness among decision-makers, business leaders and administrators as well as institutions of formal and non-formal training systems;
- capacity building of tripartite constituents to strengthen social dialogue mechanisms and to apply these to dialogue about accessibility of training for green jobs;
- increased capacity of formal education and training systems and institutions to provide basic skills for all and to raise the skills base of the national workforce; this includes improving apprenticeship systems and building synergies with NGOs that provide education and training.

These measures can only be taken if resources are available. It is therefore recommended that not only national governments but also international partnerships in developing countries take these recommendations into account both in environment programmes and in skills development programmes.