International
Labour
Office

Geneva

Report V

Sustainable development, decent work and green jobs

International Labour Conference

102nd Session, 2013

International Labour Conference, 102nd Session, 2013

Report V

Sustainable development, decent work and green jobs

Fifth item on the agenda

International Labour Office Geneva

ISBN 978-92-2-126867-3 (print)
ISBN 978-92-2-126868-0 (Web pdf)
ISSN 0074-6681

First edition 2013

Formatted by TTE: Confrep-ILC102-V[EMPEN-130111-1]-EN.docx
Printed by the International Labour Office, Geneva, Switzerland

Contents

Page

Tables

Page

Figures

Boxes

Page

Abbreviations

ACF	Australian Conservation Foundation
ACODE	Advocates Coalition for Development and Environment (Uganda)
ACTRAV	ILO Bureau for Workers' Activities
ACT/EMP	ILO Bureau for Employers' Activities
ACTU	Australian Council of Trade Unions
AfDB	African Development Bank
ALMP	active labour market policies
BAU	business as usual
BIR	Bureau of International Recycling
CBI	Confederation of British Industry
CCAP	Climate Change Adaptation Project
CCS	carbon capture and storage
CCICED	China Council for International Cooperation on Environment and Development
CEDEFOP	European Centre for the Development of Vocational Training
CEPAL	Comisión Económica para América Latina y el Caribe
CGE	computable general equilibrium (model)
CHP	combined heat and power
COSATU	Congress of South African Trade Unions
CRGE	Climate Resilient Green Economy Initiative (Ethiopia)
CSP	concentrated solar power
EASHW	European Agency for Safety and Health at Work
EC	European Commission
ECLAC	UN Economic Commission for Latin America and the Caribbean
EEA	European Environment Agency
EGSS	environmental goods and services sector
EIIP	employment-intensive investment programmes
EPWP	Extended Public Works Programmes (South Africa)
EU	European Union
FAO	UN Food and Agriculture Organization
FTE	full-time equivalent
GCN	Global Climate Network
GDP	gross domestic product

GEF	Global Environment Facility
GEL	Global Economic Linkages (model)
GESS	Green Enterprise Support Service (Mauritius)
GGKP	Green Growth Knowledge Platform
GHG	greenhouse gas
GRID	Global Resource Information Database
GTC	Green Technology Centres (Bangladesh)
IBAMA	Brazilian Institute of Environment and Renewable Natural Resources
ICC	International Chamber of Commerce
ICLS	International Conference of Labour Statisticians
IDCOL	Infrastructure Development Company Limited
IEA	International Energy Agency
IEEP	Institute for European Environmental Policy
IFAD	International Fund for Agricultural Development
IFOAM	International Federation of Organic Agriculture Movements
IIED	International Institute for Environment and Development
IILS	International Institute for Labour Studies
IISD	International Institute for Sustainable Development
ILO	International Labour Organization/Office
ILS	international labour standards
IMF	International Monetary Fund
INSS	National Institute of Social Security (Brazil)
IOE	International Organisation of Employers
IPCC	Intergovernmental Panel on Climate Change
IRENA	International Renewable Energy Agency
ITC	International Trade Centre
ITUC	International Trade Union Confederation
LECRDS	Low Emission Climate Resilient Development Strategies
MBI	market-based instrument
MDGs	Millennium Development Goals
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act (India)
MNE	multinational enterprise
MOHRSS	Ministry of Human Resources and Social Security (China)
NAPA	National Adaptation Programme of Action
NAPCC	National Action Plan on Climate Change (India)
NDRC	National Development and Reform Commission (China)
NGO	non-governmental organization
NHREP	National Human Resource and Employment Policy (Sri Lanka)

NOGAMU	National Organic Agricultural Movement of Uganda
NTVQ	National Technical and Vocational Qualification
NVQ	National Vocational Qualification
OECD	Organisation for Economic Co-operation and Development
OSH	occupational safety and health
PAGE	Partnership for Action on Green Economy
PEI	Poverty Environment Initiative
PSNP	Productive Safety Net Programme (Ethiopia)
PV	photovoltaic
PWP	public works programmes
REDD	Reduced Emissions from Deforestation and Forest Degradation
SCORE	Sustaining Competitive and Responsible Enterprises (ILO Programme)
SCPL	Sociedad Cooperativa Popular Limitada de Comodoro Rivadavia (Argentina)
SEEA	System of Environmental and Economic Accounting
SETAC	Society of Environmental Toxicology and Chemistry
SHS	solar home systems
SMEs	small and medium-sized enterprises
SNA	System of National Accounts
STEM	science, technology, engineering and mathematics (skills)
SVTC	Silicon Valley Toxics Coalition
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNCSD	United Nations Conference on Sustainable Development
UN-DESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNHCR	Office of the United Nations High Commissioner for Refugees
UNICA	Brazilian Sugarcane Industry Association
UNIDO	United Nations Industrial Development Organization
UNITAR	United Nations Institute for Training and Research
UNRISD	United Nations Research Institute for Social Development
USBLS	United States Bureau of Labor Statistics
WAVES	Wealth Accounting and the Valuation of Ecosystem Services
WCI	World Coal Institute
WEF	World Economic Forum
WIBI	Weather Index-based Insurance
WIEGO	Women in Informal Employment Globalizing and Organizing

Executive summary

This report addresses two of the defining challenges of the twenty-first century: achieving environmental sustainability and turning the vision of decent work for all into a reality. It shows that not only are both challenges urgent, but they are also intimately linked and will have to be addressed together. While it is certain that environmental degradation and climate change will increasingly require enterprises and labour markets to react and adjust, the goal of environmentally sustainable economies will not be attained without the active contribution of the world of work.

The environment and social development must no longer be treated as separate pillars of sustainable development, but rather as closely interrelated dimensions. Such an integrated approach turns the drive towards environmental sustainability into a significant avenue for development, with more and better jobs, social inclusion and poverty reduction. Positive outcomes are eminently possible; however, these require county-specific policies that seize the opportunities and address the challenges identified by integrating environmental, social and decent work elements and ensuring a smooth and just transition to sustainable economies. The opportunities for gains may in fact be greatest in developing countries and emerging economies.

It is now evident that a decisive turn away from the business as usual (BAU) policy scenario of "grow first and clean up later" is urgently needed. Most international policy institutions, among them the Organisation for Economic Co-operation and Development (OECD), the World Bank and the United Nations Environment Programme (UNEP) have made urgent calls for a change of direction. The need for an integrated approach has been articulated further by the outcome of the United Nations Conference on Sustainable Development 2012 (Rio +20), which also highlighted decent work as a central goal and driver for sustainable development and a more environmentally sustainable economy.

The ILO and its constituents have a history of active engagement and support for sustainable development, and this new emphasis from the international community provides the ILO with a particularly important opportunity to advance its mission while contributing to environmentally sustainable economies. ILO constituents can leverage the momentum in the process of structural change towards sustainable production and consumption patterns for the large-scale creation of quality employment opportunities, the extension of adequate social protection, the advancement of social inclusion and the realization of fundamental principles and rights – for current and future generations alike.

1. Environmental sustainability and decent work

Making the economy environmentally sustainable is no longer optional, it is a necessity

A greener economy, as a way to achieve sustainable development, is not optional for sustainable enterprises and labour markets, it is a necessity. Escalating natural resource use and pollution will compound the growing scarcity of fresh water and fertile land and accelerate the loss of biodiversity and climate change beyond tolerable – perhaps even manageable – levels. The overuse of natural resources, such as forests, fish and clean water, and the rising levels of pollution, including emissions of greenhouse gases (GHGs), are increasingly exceeding planetary boundaries. The damage to economies and to society caused by environmental degradation has the potential to undo many of the gains in development and poverty reduction achieved over the past decades. Sectors that are the most threatened by climate change, such as agriculture, forestry and fisheries, employ well over a billion people.

Economic output is threatened by environmental degradation

Modelling undertaken by the International Institute for Labour Studies (IILS) confirms the conclusions of other assessments: that much higher concentrations of GHGs in the atmosphere will increasingly curb economic output and aggregate productivity levels. In particular, the IILS's Global Economic Linkages (GEL) model suggests that productivity levels in 2030 would be 2.4 per cent lower than today and 7.2 per cent lower by 2050 in a BAU case. Already today, extreme weather events with likely links to climate change are leading to direct losses of jobs and incomes. In New Orleans, United States, Hurricane Katrina led to the loss of some 40,000 jobs in 2005, with African–American women the hardest hit. In Bangladesh, Cyclone Sidr disrupted several hundred thousand small businesses and adversely affected 567,000 jobs.

Unresolved social challenges add complexity to resolving environmental challenges

Unresolved social challenges, such as unemployment (particularly among youth), but also education, health, sanitation and infrastructure, add complexity to resolving environmental challenges. Working poverty and poor job quality still affect hundreds of millions of people around the world, while the widespread lack of basic social protection increases the vulnerability of many to environmental and economic shocks. Although the environmental and social challenges may appear daunting, addressing them together can lead to positive outcomes and create powerful synergies for development. For example, investment in rural water management infrastructure and social protection will not only create jobs and restore soil and water catchment areas; it will boost incomes, increase agricultural productivity and improve resilience to climate change.

Greater environmental sustainability can drive investment, economic growth and job creation

By combining policy instruments such as market-based instruments, regulations, public investment, procurement policies and awareness raising, governments can support enterprises and create an enabling environment which promotes the adoption of green workplace practices, investments in new green products and services and job creation. However, the transition also clearly implies losses as well as gains in employment, particularly when it involves a wholesale shift in the economic development model of large companies, sectors and countries.

Understanding the labour market dynamics is critical

The number of jobs created at all stages of the greening process is a function of the size of demand and investment, the effect of trade and employment elasticity. The sum of gross gains and losses is equivalent to the number of workers who will have to change jobs. Whether the overall quantitative effect on employment is positive or negative depends on the complex interplay between these job flows and the policy mix.

The sectoral composition of a national economy is also an important determinant for employment outcomes. Eight sectors are particularly implicated due to their dependence on natural resources and the climate, their large consumption of resources and their role as significant polluters. These are agriculture, forestry, fisheries, energy, resource-intensive manufacturing, recycling, building and transport. Between them they employ half the global workforce. At the enterprise level, the costs of greening, and job losses, can be attenuated by improving productivity. Numerous studies have shown that major gains in efficiency are possible and that many of these are already cost-effective with today's technology and prices.

Transitions can not only cause shifts in the overall level and composition of employment, they can affect the quality of employment. The job content and profiles of many occupations are changing, and so are working conditions as a result of new technologies, processes and practices. The jobs created in the process must be not only green but also decent, that is be productive, provide adequate incomes and social protection, respect the rights of workers and give them a say in decisions which will affect their lives.

2. Seizing the opportunities: Lessons from international experience

The shift to a sustainable, greener economy offers major opportunities for social development: (1) the creation of more jobs; (2) improvement in the quality of large numbers of jobs; and (3) social inclusion on a massive scale.

1. Creating more jobs

Most studies of the net impact on employment of environmental policy measures suggest it is positive

A review of 24 recent global, regional and country studies finds that appreciable net employment gains have been realized or can be achieved. Gains may be higher in

emerging economies and developing countries than in industrialized ones. By complementing environmental reform with labour market and social policies, the potential negative effects of these reforms can be offset. A greener economy could lead to net gains of up to 60 million jobs. These findings are in line with the double-dividend hypothesis, according to which policy measures can achieve economic benefits (in particular employment gains) and environmental improvements at the same time.

Much of the additional employment in a greener economy will be created in the production of green goods and services. While evidence is limited, it suggests that these jobs tend to be more qualified, safer and better paid than comparable jobs in the same or similar sectors. An assessment of a broad range of green jobs in the United States, for example, concluded that they compare favourably with non-green jobs in similar sectors in terms of skill levels and wages. Research in China, Germany and Spain has also found the quality of new renewable energy jobs to be good.

2. Improving the quality of existing jobs

A competent, skilled and motivated workforce is indispensable for better environmental performance

Across a number of economic sectors, there is a significant opportunity and indeed necessity for increasing the quality of work through improved working conditions, better occupational safety and health, and higher incomes to arrive at a more environmentally sustainable economy. Agriculture, waste management and recycling, and the building sector stand out in this regard, albeit for different reasons and with different options for achieving the necessary improvements.

Agriculture is the largest employer in the world, with a global workforce of over 1 billion, the sector on which most of the world's poor depend and one of the largest emitters of GHGs. It is the largest user (70 per cent) and a significant polluter of water as well as a key cause of land degradation and loss of biodiversity. The evidence suggests that these environmental challenges can be met if there is a strong drive to train and support farmers to adopt productive farming methods with a low environmental impact. Especially among small-scale farmers in developing countries, policy packages for sustainable agriculture including skills upgrading, enterprise and value-chain development, organization and investments in social protection and infrastructure can yield major increases in output and incomes.

Employment in **waste management and recycling** will continue to increase as recycling rates rise. Of the 19–24 million workers currently in the sector, only 4 million are in formal employment. The vast majority work as informal waste-pickers in developing countries, with a large percentage of them presumed to be women. Recycling will only become a truly green activity with job formalization. Examples from Brazil, Colombia and Sri Lanka, where waste-pickers have been organized into cooperatives and established enterprises, demonstrate how formalization can create significant opportunities for social inclusion and improved working conditions, safety and health, and earnings.

The **building sector**, which employs at least 110 million construction workers worldwide, has the highest potential for improving energy efficiency and reducing emissions in both industrialized and developing countries. Construction of energy- and resource-efficient buildings requires competent enterprises and skilled workers, however. Therefore, skills upgrading and certification of building firms, formalization, and improvements in working conditions to retain qualified workers will be key

components of strategies in this sector. Investments in retrofitting of buildings can have a strong immediate effect on employment generation in the construction sector and among its suppliers. For example, a large-scale renovation programme in Germany that was initiated jointly by trade unions, employers and non-governmental organizations (NGOs) has mobilized investments of almost €100 billion since 2006 and maintains as many as 300,000 jobs in the building industry. For emerging and developing countries, leapfrogging directly to high-performance new buildings will avoid a legacy of high energy, water and resource consumption which otherwise will endure for decades.

3. Advancing social inclusion

The transformation offers the possibility of greater social inclusion, including better opportunities for women

Improving access to clean energy and payment for environmental services are two areas that illustrate this. Efforts to promote affordable renewable energy can create badly needed employment in the production of that energy and greatly improve productivity in poor areas. Payments to rural and coastal communities to protect forests, manage water or produce renewable energy can offset the opportunity costs of environmental services provided and reduce poverty. Programmes that are part of national social protection floors, such as Bolsa Verde (Green Grant) in Brazil or the Extended Public Works Programme in South Africa, are particularly powerful mechanisms to link environmental and social objectives.

3. Identifying and managing the challenges

The challenges to creating decent work and increasing social inclusion in environmentally sustainable development can be grouped in three areas: (1) economic restructuring; (2) climate change and its threat to jobs and livelihoods; and (3) adverse income distribution effects originating from energy poverty.

1. Economic restructuring

The labour market challenges of economic restructuring are smaller than those triggered by globalization

Resource-intensive industries in industrialized countries and some emerging economies are most directly concerned, but employment in these industries is actually rather limited, at 10–12 per cent of the total workforce in most countries. Thus far, greening has been a relatively minor factor in employment losses. In reality, the principal causes of declining employment in industries such as mining, fossil fuel-based energy or iron and steel are the increasing automation and rising labour productivity that have been occurring over several decades. This could change if GHG emissions were cut as strongly as called for by climate science. In this case, many additional jobs would be likely to disappear in the fossil energy industries.

Modelling simulations by the OECD show that a well-designed emissions trading system could achieve sharp reductions in GHG emissions while only moderately slowing GDP growth in the coming decades. The main labour market impacts of the mitigation policies would be to alter the sectoral composition of employment, but these shifts would be considerably smaller than those that have occurred over the last two decades as a result of globalization. Both OECD and ILO modelling have also shown that the use of

an eco-tax, which uses revenue from charges on energy or emissions to reduce the cost of labour, can lead to a net increase in employment.

Greening measures can also protect existing jobs and boost employment considerably

Improving the productivity of energy and materials is therefore an important means of securing the future viability of resource-intensive industries. One area with great potential is recycling the large amount of heat generated as a by-product in basic industries. The use of combined heat and power (CHP) worldwide could create around 2 million jobs at new CHP facilities.

Efforts of individual companies and entire sectors serve as positive examples

Successful drives to green resource-intensive industries have been made by individual companies as well as by entire sectors, and the social partners have often played an important role. The global manufacturer 3M and LG Electronics are two examples of companies that have involved their workforces to make great strides in cutting emissions. Japan's Top Runner Programme, which involves manufacturers, unions, consumers and universities, has pushed the electronics sector to vastly increase the efficiency of electronic products.

Small and medium-sized enterprises (SMEs) need particular attention in making the transition

Collectively, SMEs represent over two-thirds of global permanent employment and create most new jobs, but are also significant polluters and consumers of resources. They are generally disadvantaged compared to large firms regarding access to information about green markets and skills programmes, new technologies and finance, and they have far greater difficulties in compensating for rising energy and raw material costs. Policies that enable SMEs to successfully navigate the shift to a greener economy and to seize the opportunities will be critical, and a number of countries, including EU countries, Malaysia, Philippines and United States, among others, have already explicitly addressed SME needs in their environmental policies.

Since a green transformation can be anticipated to a certain extent, governments, business and labour can work together to identify potential adjustment pressures early. Mapping of likely impacts is critical for timely and targeted measures. Lessons learned to date from major restructurings, such as the sugar industry in Brazil, the forest industry in China, commercial fishing in Norway, the coalmining industry in Poland and the steel industry in the United Kingdom, point to social security and skill development as well as diversification and creation of alternative employment as keys to success.

2. Climate change and its threat to jobs and livelihoods

Climate change will impact communities, enterprises and workers in locations exposed to storms, floods, droughts and fires

Some of the world's largest cities are in coastal areas and flood plains. In developing countries, 14 per cent of the population and 21 per cent of urban dwellers live in exposed low-elevation coastal zones. The poorer segments of the population in developing countries are particularly vulnerable because they have the least adaptive

capacity. Environmental degradation is a known driver for migration as well. In 2002, the United Nations High Commissioner for Refugees (UNHCR) estimated that 24 million people around the world became refugees because of floods, famine and other environmental factors, exceeding the number of all other refugees including armed conflicts.

Adaptation will be essential to protect enterprises, workplaces and communities

Even with drastic reductions of emissions today, global warming will continue for centuries. A 2010 study by the World Bank arrived at US$75–100 billion per year in current dollars for 2010–50 for developing countries alone.

As of November 2012, all except one of the 48 least developed countries had prepared National Adaptation Programmes of Action (NAPAs). Most emerging and advanced economies also have national programmes. While it is widely recognized that the approaches conducive to successful adaptation to climate change are similar to those for sustainable development more broadly, existing policies and strategies such as the NAPAs still pay little attention to the employment and income dimensions. Examples of national assessments from Bangladesh and Namibia on the employment and social impacts of climate change show that such assessments are necessary to inform adaptation measures. Data about the labour market, employment, and income of households and enterprises are indispensable in order to design appropriate adaptation strategies.

3. Adverse income distribution effects originating from energy poverty

Higher energy prices due to scarcity, regulatory changes or taxes can have strong adverse effects on poor households

Poor households spend a much higher proportion of their incomes on energy and energy-related goods such as food and are less able to reduce this expenditure when prices rise. According to the IILS, in nearly half the countries for which data exist the share of food expenditure in household income among the poorest population quintile is over 60 per cent – ranging from 38 per cent in Latin America to 70 per cent in Asia and 78 per cent in Africa.

It is therefore important to keep distributional impacts in mind when considering policies to promote a transition to a low-carbon economy. For example, carbon trading schemes and feed-in tariffs levied on electricity consumers tend to have stronger regressive effects than broader carbon taxes. Social protection floors can help, but given the high variability in domestic use among groups and localities, compensation can be complex. A radical expansion of eco-social investment into access to energy and energy-efficient housing and transport infrastructure is widely seen as an effective complement or even alternative. Brazil's *Programa Minha Casa, Minha Vida* (My Home, My Life) is an example of such an investment. The solar home systems programme in Bangladesh and the formation of energy cooperatives are other means of expanding access for the 1.3 billion people still without affordable clean energy, opening up countless opportunities for enterprise development.

4. Effective policies and the scope for a supportive role by the ILO

Positive outcomes for employment, decent work and sustainable enterprises from an environmentally sustainable economy require country-specific policy mixes

Countries that have large shares of resource-intensive and high-emitting industries face different challenges from those with a lighter legacy of unsustainable production patterns, but where sectors exposed to climate change (such as agriculture or tourism) may be dominant.

Macroeconomic fiscal and monetary policies can redirect demand and investment by enterprises, consumers and investors through price signals and incentives created by taxes, price guarantees, subsidies, regulation, finance and public investment. Eco-taxes which raise the price of energy consumption and pollution and reduce the cost of labour, coupled with clear and stable targets and timelines for greening and emission reductions, can be a powerful driver of green investment and net job creation. This is particularly true in times of economic crisis. China, for example, has created over 5 million jobs through its green economic stimulus package. Current fiscal austerity in the European Union (EU) and other parts of the world, on the other hand, could hinder green growth.

Sectoral policies are widely employed, generally relying on environmental regulations, financial incentives and mandates, for example the share of renewable energy in a power supply, average energy consumption thresholds for cars or biodiversity set-asides in agriculture and forestry. Most public investment for environmental sustainability is aimed at key sectors such as energy, buildings, transport, land and water management. Numerous countries have successfully used industrial policy to support greening of the economy, including Brazil (ethanol and biodiesel), China (all renewables), Denmark (wind), Germany (green buildings among others), Japan (green transport) and Spain (wind and solar).

Social and labour policies for a green transition ideally combine social protection, employment, skills development and active and passive labour market policies. Social protection measures such as Ethiopia's Productive Safety Net Programme and India's Mahatma Gandhi National Rural Employment Guarantee Scheme strengthen the adaptive capacities of the poor and provide opportunities to adopt sustainable practices. Social protection also affords poor and relocated workers income security, the possibility for skills acquisition and increased mobility. Remuneration of environmental services can link targeted access to employment opportunities to major investments in productive infrastructure.

Shortages of skilled workers and enabling measures for enterprises must be addressed

Shortages of qualified workers are already hampering the shift to a greener economy in most countries and sectors, as shown by the ILO's 2011 study Skills for green jobs: A global view. Active skills policies will therefore be important, with the main lessons pointing to: the need to anticipate future skills requirements and make

adjustments in education and training systems; the value of encouraging the acquisition of generic skills in science, technology, engineering and mathematics (STEM skills); and the need to recognize skills development as an adaptive response to climate change and restructuring of labour markets.

In the process of becoming more sustainable, enterprises will have to be able to produce a wider range of green goods and services and adapt to cleaner production methods. Therefore, policies will increasingly need to focus on enabling regulatory and fiscal measures for green products and services, in particular for SMEs, including green entrepreneurship training; greening of workplaces and value chains; and improved business resilience to adaptation through climate-proof infrastructure, disaster preparedness, and skills development and insurance.

Environmentally sustainable economies must integrate occupational safety and health into design, procurement, operations and recycling policies

ILO standards promote universal principles which are pertinent to any type of economic system or workplace, but some are also directly relevant to the protection of the environment. This is particularly true of the Chemicals Convention, 1990 (No. 170) and the Prevention of Major Industrial Accidents Convention, 1993 (No. 174).

Social dialogue at all levels and close cooperation between government and the social partners will be central to the success of a transformation

The need for participation of workers and employers in governance was recognized in Agenda 21 and received even greater emphasis in the Rio +20 outcome document. It is encouraging that a growing number of national governments are pursuing environmental sustainability and green economy or green growth initiatives, often with the support of employers and trade unions. There has also been a notable increase in countries giving consideration to green jobs policies or explicitly addressing jobs, skills, enterprise development, social protection or just transitions.

ILO constituents have expressed strong demand for capacity building, advisory services, and projects on the ground to assist national policy formulation and implementation from the launch of the joint Green Jobs Initiative by the ILO, UNEP, IOE and ITUC and the inception of the ILO's Green Jobs Programme in 2008. The priorities of the Programme have served 27 member States to date and were updated in November 2012 in the light of the outcomes of the Rio +20 Conference to give greater focus to capacity building for social dialogue, employment assessments, linking environmental protection to social protection floors, and research and knowledge management.

In recent years, a rapidly growing number of countries have embarked on strategies and policies for environmental sustainability, a green economy or green growth. In the context of Rio +20, UN agencies, other international organizations and development banks have launched or expanded initiatives to share knowledge and provide advisory services and financial support.

For ILO constituents, leveraging the process of structural change requires environmental and economic policies that are mindful of their impacts on the world of work, and social, employment, skills and labour market policies that incorporate environmental sustainability as one of their goals without undermining the prospects for sustainable enterprises and decent work. Creating institutions and governance mechanisms for environmentally sustainable development at all levels, including ministries of labour and social development, employers' organizations and trade unions, will be essential to achieve the necessary integration and coherence.

While it is clear that much relevant guidance is already contained in international labour standards and major ILO policy statements, it has never been articulated in ways that national and international policy-makers, the private sector or indeed the ILO constituents themselves can act on.

A unique opportunity to provide policy guidance

The Rio +20 outcome document, the UNFCCC Cancun Agreements on climate change and a growing number of national policy statements call for decent work for all and a just transition to low-carbon economies to be central goals as well as drivers for sustainable development. Many governments and stakeholders are looking to the ILO for guidance and support. The deliberations at the 102nd Session of the International Labour Conference in 2013 provide a unique opportunity to formulate guidance and define the role of the world of work in translating this political will into practice.

Introduction

Two defining challenges for the twenty-first century

1. This report addresses two of the defining challenges of the twenty-first century: ensuring environmental sustainability, and turning the vision of decent work for all into a reality as a basis for dignified and fulfilled lives for individuals, and social cohesion and stability for communities and countries. The report shows that both challenges are urgent and that they are intimately linked. They can and must be addressed together.

2. The overuse of natural resources, such as forests, fish and clean water, and the rising levels of pollution, including emissions of greenhouse gases, are increasingly exceeding planetary boundaries. Not only is the situation environmentally unsustainable, it has substantial economic and social costs. The natural processes and systems which are vital to the enterprise and the livelihoods of people are being disrupted, and the damage to economies and to society caused by environmental degradation and climate change threatens to undo many of the gains in development and poverty reduction achieved over the past decades, including progress towards achieving the Millennium Development Goals (MDGs). The longer the wait to address this, the worse it will get: with global unemployment levels exceeding 200 million, almost one in three workers living in working poverty and 5.1 billion people without access to essential social security, the addition of rising costs and disruption associated with environmental damage could further weaken social cohesion and increase the instability already present in a number of countries.

3. Environmental constraints, climate change and the transition to a sustainable, low-carbon economy will have profound impacts on production and consumption patterns, and on enterprises and workers. The necessary shift will be impossible without a pervasive effort towards the greening of enterprises across the economy. In addition, reducing greenhouse gas emissions implies shifts within and between economic sectors as well as between regions. Output and employment in low-carbon industries and services, in waste management and recycling and in the restoration of natural capital will grow. Energy and resource-intensive sectors, on the other hand, are likely to stagnate or even contract. With well-designed adaptation measures, climate resilience can go hand-in-hand with job creation and poverty reduction. Green jobs can serve as a bridge between MDG 1 (eradicate extreme poverty and hunger) and MDG 7 (ensure environmental sustainability).

4. The ILO and its constituents have a history of active engagement and support for sustainable development. The multiple economic, social and environmental crises besetting the world in recent years have led to a new sense of urgency. The United Nations Conference on Sustainable Development held in Rio de Janeiro in 2012 (UNCSD, Rio +20) discussed the subjects of a green economy in the context of poverty reduction, sustainable development and environmental governance. The outcome

document of this largest UN Conference ever stresses the urgency of sustainable development and the fundamental role of decent work in achieving it. This is the culmination of a remarkable evolution in the way the relation between the environment, the world of work and social development is considered in policy statements, both at the United Nations and at the ILO.

Recognizing the pivotal role of decent work for sustainable development

5. While the United Nations Conference on Environment and Development (UNCED), or Earth Summit, in Rio de Janeiro in 1992 emphasized the need for balance between the economic, social and environmental dimensions of sustainable development, the outcome document had very limited coverage of labour issues and was largely silent on their relationship to sustainable development. The United Nations Framework Convention on Climate Change (UNFCCC), one of the three environmental conventions adopted in Rio, made no reference at all to employment and labour issues. The otherwise comprehensive Agenda 21 also produced by the Summit merely called for countries to "[g]enerate remunerative employment and productive occupational opportunities compatible with country-specific factor endowments, on a scale sufficient to take care of prospective increases in the labour force and to cover backlogs". [1] Agenda 21 did, however, recognize the importance of the social partners among the major stakeholder groups; Chapters 29 (workers) and 30 (employers) set out their respective roles in dealing with sustainable development issues at the national and workplace levels. It should be noted, though, that this scant coverage of labour issues is largely a reflection of the lack of available analysis and data at the time concerning the relationship between employment and skills development and sustainable development. It is also apparent in the report to the 1990 International Labour Conference on environment and the world of work, and the conclusions which focus on the relationship between the working and the general environment.

6. Ten years later, the World Summit on Sustainable Development in Johannesburg (2002) still inserted only a short paragraph into its Declaration and the Johannesburg Plan of Implementation.

7. It was only after the World Summit on Social Development in 2005 adopted full employment and decent work as a global goal, and the subsequent inclusion of a set of employment indicators under MDG 1, that the role of decent work in sustainable development started to receive consistent recognition.

8. At the ILO as well, the close interlinkages between the environment and the world of work started to be increasingly acknowledged. The discussion of the Director-General's report to the 2007 International Labour Conference [2] and the general discussion and conclusions on sustainable enterprises reinforced the insight that "it is in workplaces that the social, economic and environmental dimensions of sustainable development come together inseparably" and also called for just transitions for workers affected by economic restructuring. [3]

[1] UN: *Agenda 21* (New York, 1993), para. 3.8(a).

[2] ILO: *Decent work for sustainable development*, Report of the Director-General, Report 1(A), International Labour Conference, 96th Session, Geneva, 2007.

[3] ILO: *Conclusions concerning the promotion of sustainable enterprises*, International Labour Conference, 96th Session, 2007, paras 3 and 8.

9. In his 2007 report, the Director-General discussed the relationship between decent work and the environment and referred for the first time to the concept of green jobs. At the same Conference the Director-General launched the Green Jobs Initiative. The Initiative is a partnership between the United Nations Environment Programme (UNEP), the International Trade Union Confederation (ITUC), the International Organisation of Employers (IOE) and the ILO, with the mission to promote opportunity, equity and a just transition to sustainable economies and to mobilize governments, employers and workers to engage in dialogue on coherent policies and effective programmes leading to a green economy with green jobs and decent work for all. In 2008, the Initiative published its first report, [4] a path-breaking analysis of the relationship between decent work and the environment. The ILO Governing Body discussed the implications of climate change for the Decent Work Agenda in general and for employment in particular in 2007 and 2008 [5] and endorsed an ILO programme of work on green jobs.

10. The Global Jobs Pact adopted by the International Labour Conference in 2009 as a response to the global financial and economic crisis calls for cooperation on "shifting to a low-carbon, environment-friendly economy that helps accelerate the jobs recovery, reduce social gaps and support development goals and realize decent work in the process". [6]

11. At the 15th Asia and Pacific ILO Regional Meeting in 2011, labour ministers and decision-makers affirmed that the greening of economies holds great potential for increased opportunities for decent work. The promotion of greener growth and green jobs was consistent with national policy priorities for the Asia and the Pacific including the Decent Work Decade. They urged that full use be made of social dialogue to anticipate and address labour market changes, including those that will come with the transition to low-carbon economies. [7] The social partners also integrated the interrelationships between employment and labour issues and the environment into their own policies and programmes.

12. The IOE adopted a policy on climate change in 2008 and has been active in providing services to members as well as participating in the Green Economy Task Force with the International Chamber of Commerce (ICC) which published the first Green Economy Roadmap produced by business as a "comprehensive framework for policies and action for business, policy-makers, and society to accelerate and scale up a transition toward a 'green economy'". [8] More than 2,300 companies have signed up to the ICC Business Charter for Sustainable Development. [9]

[4] UNEP, ILO, IOE, ITUC: *Green jobs: Towards decent work in a sustainable, low-carbon world* (Nairobi, UNEP, 2008).

[5] ILO: *Decent work for sustainable development: The challenge of climate change*, Governing Body, 300th Session, Geneva, Nov. 2007, GB.300/WP/SDG/1; ILO: *Employment and labour market implications of climate change*, Governing Body, 303rd Session, Geneva, Nov. 2008, GB.303/ESP/4.

[6] ILO: *Recovering from the crisis: A Global Jobs Pact*, International Labour Conference, 98th Session, Geneva, 2009, para. 21(3).

[7] ILO: *Report of the 15th Asia and the Pacific Regional Meeting*, APRM.15/D.4 (Geneva, 2011).

[8] ICC: Green Economy Roadmap (Paris, 2012). Available at: http://www.iccwbo.org.

[9] See International Institute for Sustainable Development website: http://www.iisd.org/business/tools/principles_icc.aspx.

13. The ITUC adopted a landmark resolution on combating climate change through sustainable development and just transition at its Second Congress in 2010. [10]

14. Also in 2010, the parties to the UNFCCC included a specific reference to decent work in the "shared vision" for a future global climate agreement. In the Cancun Agreements, [11] governments recognized that "addressing climate change requires a paradigm shift towards building a low-carbon society that offers substantial opportunities and ensures continued high growth and sustainable development … while ensuring a just transition of the workforce that creates decent work and quality jobs".

15. The United Nations Conference on Sustainable Development (UNCSD, Rio +20) in 2012 was attended by more than 100 Heads of State and Government and over 400 ministers. The Rio +20 outcome document sets out a vision of sustainable development with social inclusion. It firmly establishes the pivotal role of decent work for sustainable development, in a dedicated chapter and through numerous cross-references, emphasizing that it is vital to understand and act on the interlinkages between the economic, social and environmental pillars. It identifies the concept of a green economy as one of the pathways to sustainable development and stresses that its goal must be social inclusion and the creation of employment and decent work for all:

> … we consider green economy in the context of sustainable development and poverty eradication as one of the important tools available for achieving sustainable development and that it could provide options for policymaking but should not be a rigid set of rules. ... We emphasize that it should contribute to eradicating poverty as well as sustained economic growth, enhancing social inclusion, improving human welfare and creating opportunities for employment and decent work for all, while maintaining the healthy functioning of the Earth's ecosystems. [12]

16. While this international consensus has been emerging, a rapidly growing number of governments and enterprises have been acting on the need to achieve synergies and manage trade-offs between growth, employment and social inclusion and the preservation of the environment.

Recognizing the economic and social aspects of environmental change

17. New thinking is also permeating international organizations, including those with a mandate centred on economic development. In recent years, the World Bank, [13] the International Monetary Fund (IMF), [14] the Organisation for Economic Co-operation and Development (OECD), [15] the United Nations Industrial Development Organization (UNIDO), [16] the G20 [17] and the World Economic Forum (WEF) [18] have all published

[10] ITUC: *Resolution on combating climate change through sustainable development and just transition* (Brussels, 2010). Available at: http://www.ituc-csi.org/resolution-on-combating-climate.html.

[11] UNFCCC: *Report of the Conference of the Parties on its sixteenth session*, held in Cancun from 29 November to 10 December 2010, FCCC/CP/2010/7 (Bonn, 2010).

[12] UNCSD: *The future we want* (New York, 2012), para. 56.

[13] World Bank: *Inclusive green growth: The pathway to sustainable development* (Washington, DC, 2012).

[14] IMF: *Who's going green and why? Trends and determinants of green investment*, IMF Working Paper (Washington, DC, 2011).

[15] OECD: *Interim Report of the Green Growth Strategy: Implementing our commitment for a sustainable future*, Meeting of the OECD Council at Ministerial Level, 27–28 May 2010 (Paris, 2010).

[16] UNIDO: *Manila Declaration on Green Industry in Asia* (Vienna, 2009); *UNIDO Green Industry Initiative for sustainable industrial development: An overview of UNIDO's Green Industry Initiative* (Vienna, 2011); *UNIDO Green industry for a low-carbon future: Resource use and resource efficiency in emerging economies − A pilot*

reports and adopted strategies calling for new ways of defining and achieving development which are built around environmental sustainability and greener economies as a central tenet. They conclude that investing in the environment to increase its productivity, protect its stock of resources and harness its services is indispensable, makes economic sense and underpins growth. These organizations therefore regard green economic growth, or a green economy, as superior to conventional growth in the medium to long term.

18. In February 2012, the UN Statistical Commission approved the System of Environmental and Economic Accounts (SEEA). This new internationally agreed standard fits alongside the current System of National Accounts (SNA), which is restricted to measuring GDP. The SEEA mainstreams natural capital into economic accounts, and several governments including Australia, Mexico and the Philippines already use it to evaluate trade-offs between different policies and to assess their impacts across the economy, the environment and society. In the same way that private businesses look at assets and liabilities on their balance sheets, countries are enabled to account for their assets and natural stocks.

New opportunities for promoting decent work for all

19. The emphasis on sustainable development with decent work as a central goal in an environmentally more sustainable economy provides a major opportunity for the ILO to advance its mission. However, while analysis of the relationship between the economic and the social dimensions of sustainable development has been a mainstay for the Organization since its foundation and extensive policy guidance is available in this regard, an understanding of the policy implications of pursuing both environmental sustainability and decent work is less well developed.

20. This report therefore focuses on the links between the environmental and the social dimensions of sustainable development, including their economic implications. It summarizes the growing body of evidence that the shift to a more environmentally sustainable economy is not only indispensable, [19] including from a labour market perspective, but can in fact lead to net gains in employment, significant improvements in job quality and incomes, and advances in equity and social inclusion on a large scale.

21. These benefits are not automatic, but contingent on the right policies. Similarly, appropriate and coherent policies can mitigate the challenges environmental sustainability poses for the world of work. The ILO constituents can leverage the process of structural change towards more sustainable patterns of production and consumption into a global transition to decent work for all.

22. This should, for example, be reflected in the international development agenda emerging for post-2015. The central role assigned to decent work in the Rio +20

study on trends over the past 25 years (Vienna, 2011); *UNIDO Green industry: Policies for supporting green industry* (Vienna, 2011).

[17] G20: *G20 Leaders Declaration* (Los Cabos, Mexico, 2012).

[18] WEF: *Financing green growth in a resource-constrained world: Partnerships for triggering private finance at scale* (Geneva, 2012).

[19] This report draws heavily on the report by the International Institute for Labour Studies: *Working towards sustainable development: Opportunities for decent work and social inclusion in a green economy* (Geneva, ILO, 2012), which presents the evidence in greater detail, in particular concerning key economic sectors.

outcome document should ensure that decent work will be considered in the formulation of sustainable development goals initiated in Rio.

23. Clear understandings of the interrelationship between environmental sustainability and decent work, of good policy practices and of effective institutional mechanisms will also be crucial for effective national policy and a major contribution to the international efforts to achieve sustainable development.

Structure and content of this report

24. Chapter 1 analyses the environmental and social challenges facing the world against the backdrop of the current economic crisis. It explores the relationship between them and introduces concepts which help to evaluate social and labour market impacts. Chapter 2 identifies three major opportunities to advance decent work in a greener economy in the form of more jobs, better jobs and social inclusion. Chapter 3 explores three challenges linked to a transition to a greener economy from a world of work perspective, notably restructuring, employment losses and relocation of workers; the pressing need to adapt to climate change; and inadvertent negative impacts on income distribution. Finally, Chapter 4 outlines relevant policy initiatives at national and international levels, gives an overview of current ILO work in this area, summarizes policy lessons from national experiences and research, and explores the implications for the agendas of ILO constituents and the Office.

Chapter 1

Sustainable development and decent work

25. The transition towards a more environmentally sustainable and socially inclusive economy entails reorienting growth to ensure that equal weight is given to the economic, social and environmental dimensions when setting objectives. In this respect, the Decent Work Agenda has the potential to serve as a coherent policy framework, to the mutual benefit and improved integration of macroeconomic, investment, employment, social protection and environmental policies and objectives. However, to achieve such a framework, it will be necessary to translate the concept of sustainable development into practical policy and ensure that the three dimensions of this concept are simultaneously and equally addressed.

26. Indeed, the environmental challenges and the social challenges are inextricably linked. Economic growth, job creation and incomes depend on – and can degrade – natural resources and systems. However, they can also restore and enhance environmental sustainability. Given the scale and the urgency of the challenges, it is clear that the world will have neither the resources nor the time to tackle them separately or consecutively. They need to be addressed together, in a comprehensive and complementary manner. The questions are then whether and how an environmentally sustainable economy can offer opportunities to create decent work and improve social inclusion.

1.1. Environmental challenges – Their economic and social cost

27. Since the first United Nations (UN) Conference on the Environment in 1972, the world's population has almost doubled to over 7 billion. Meanwhile, the world economy has more than tripled in size. While this growth has pulled hundreds of millions out of extreme poverty, the benefits have been unevenly distributed and achieved at significant cost to the environment. Future economic growth with decent work, rising living standards and improved human well-being will critically hinge on preserving, managing and restoring the natural assets on which all life and economic activity depend. Failure to do so will have serious consequences, especially for the poor, and ultimately undermine the economic growth and human development prospects of future generations. [1]

28. The business as usual (BAU) scenario of "grow first and clean up later" is not sustainable. Escalating natural resource use and pollution will compound the growing scarcity of fresh water and fertile land and accelerate the loss of biodiversity and climate

[1] ILO and OECD*: Sustainable development, green growth and quality employment: Realizing the potential for mutually reinforcing policies,* Background paper for the Meeting of G20 Labour and Employment Ministers, Guadalajara, Mexico, 17–18 May 2012.

change beyond tolerable – perhaps even manageable – levels. If not addressed quickly and decisively, these environmental challenges will increasingly undercut economic growth and jobs. This cost is obvious in the case of immediate impacts such as large-scale pollution from environmental disasters, but is even higher for the less perceptible, insidious "slow onset" phenomena such as biodiversity loss and climate change, where damages are often irreversible.

29. It is important to bear in mind that these challenges are often interrelated, and positive feedback loops augment the undesired outcomes in some instances. Indeed, the OECD in its *Environmental outlook to 2050* argues that "there is compelling scientific evidence that natural systems have tipping points or biophysical boundaries beyond which rapid and damaging change becomes irreversible". [2] It warns that further delay in addressing environmental challenges risks very costly or even, in certain cases, catastrophic changes. Estimates available for some of these economic and social costs highlight that they are indeed significant.

1.1.1. Natural resource use

30. The International Resource Panel has analysed the economic effects of scarcity of natural resources. [3] In a 2011 report it examined the extraction of four categories of primary raw materials – construction minerals, ores and industrial minerals, fossil fuels and biomass. [4] It found that, in total, these materials are mined and harvested at a rate of 47 to 59 billion tonnes per year. A BAU scenario would lead to a tripling of global annual resource extraction by 2050. [5]

31. A recent study by the McKinsey Global Institute has shown that intensive resource use drives up energy and commodity prices. [6] It argues that a complete rethinking of resource management, with sharp increases in energy and material efficiency, will be needed to reconcile limited resources with soaring demand. In particular, demand increases of 30–80 per cent across all major resources will coincide with increasing difficulty and cost of finding and extracting them. The study points out that the sharp increase in commodity prices from 2000 to 2011 has wiped out the price declines of the previous 100 years. Moreover, it suggests that the global economy could face several decades of higher and more volatile resource prices, which could have adverse consequences on output. Already, the overuse of resources has led to the sharp contraction or collapse of some industries in G20 countries, such as forestry in China, Indonesia and the western United States, or fishing in parts of Canada with associated job losses ranging from tens of thousands to almost a million.

1.1.2. Pollution

32. In the absence of increased efficiency, reuse and recycling, global waste volumes will continue to escalate rapidly, adding to the pollution of soil, water and air. The World

[2] OECD: *OECD environmental outlook to 2050: The consequences of inaction* (Paris, 2012), p. 26.

[3] UNEP: *Assessing the environmental impacts of consumption and production: Priority products and materials*, International Resource Panel (Paris, 2010).

[4] UNEP: *Decoupling natural resource use and environmental impacts from economic growth*, International Resource Panel (Paris, 2011).

[5] This BAU scenario assumes no major system innovation such as faster efficiency improvement or a switch away from fossil energy.

[6] R. Dobbs et al.: *Resource revolution: Meeting the world's energy, materials, food, and water needs* (New York, McKinsey Global Institute, 2011).

Bank [7] estimates that the world will produce 2.2 billion tonnes of waste by 2025, almost doubling today's 1.3 billion tonnes.

33. Pollution of air, water and soil is a persistent local and global problem for the health of humans and ecosystems. According to the OECD, exposure to hazardous chemicals is already significant on a worldwide scale and likely to increase in coming decades, particularly in emerging economies and developing countries. The concentrations of pollutants in some cities already exceed safe levels. [8]

34. Unabated increases in pollution are likely to lead to a doubling of premature deaths caused by airborne particulate matter in urban areas, to 3.6 million per year by 2050, with most deaths occurring in China and India. At the same time, the benefit: cost ratio of acting on pollution can be as high as 10:1 in emerging economies. [9] Respiratory problems resulting from pollution could also increase, particularly in urban areas. Meanwhile, indoor air pollution from burning biomass, coal and kerosene is responsible for at least 1.5 million, and perhaps as many as 2 million, premature deaths each year. [10] Most of the victims are women and children. [11] Pollution trends in general are likely to exacerbate existing inequalities and vulnerability among the poor.

1.1.3. Water scarcity and land degradation

35. Fresh water is already scarce in many parts of the world. Water stress is projected to increase, with water supplies predicted to satisfy only 60 per cent of world demand in 20 years' time. [12] The OECD's *Environmental outlook to 2050* projects that 2.3 billion more people will be living in areas experiencing severe water stress, bringing the total to over 40 per cent of the world's population in 2050. Water shortages will hinder the growth of many economic activities. Industry, power generation, human consumption and agriculture will increasingly compete for water, a scenario which has serious implications for food security.

36. Irrigation for food production in agriculture already takes about 70 per cent of available water. And, while agriculture has experienced increasing yields thanks to the use of chemical fertilizers, more intensive farming reduces soil quality and contaminates water resources. Water and food shortages also tend to increase the workload of women. [13]

1.1.4. Biodiversity

37. The wealth of plant and animal species provides the basis for food production and raw materials for a host of commodities and products, from textiles and building materials to paper and pharmaceuticals. The number and the diversity of species are critical for the stability of ecosystems. Today, species become extinct at a rate which is

[7] World Bank: *What a waste: A global review of solid waste management* (Washington, DC, 2012).

[8] OECD: *OECD environmental outlook to 2050*, op. cit.

[9] ibid.

[10] G. Legros et al.: *The energy access situation in developing countries: A review focusing on the least developed countries and sub-Saharan Africa* (New York, UNDP, 2009). Available at: http://content.undp.org/go/cms service/stream/asset/?asset_id=2205620.

[11] WHO: *Health in the green economy* (Geneva, 2011).

[12] Water Resources Group: *Charting our water future: Economic frameworks to inform decision-making* (New York, McKinsey, 2009).

[13] UNDP: *Gender, climate change and community-based adaptation* (New York, 2010).

100–1,000 times higher than what could be considered natural. [14] Up to 30 per cent of all mammal, bird and amphibian species will be threatened with extinction this century. [15] While the main drivers of biodiversity loss have been land-use change and management (agriculture, commercial forestry, urbanization) as well as pollution, climate change is projected to become the fastest-growing driver of biodiversity loss by 2050. [16]

38. In spite of their vital functions and the enormous scale of their value, ecosystem services [17] and biodiversity are often overlooked. These values and the cost of their loss are not systematically reflected in national accounts and are rarely transmitted as market signals into business decision-making. Initial findings from the Economics of Ecosystems and Biodiversity (TEEB) series put the annual loss in biodiversity and ecosystem services due to deforestation and forests degradation at the equivalent of US$25 trillion. [18] This would be equivalent to over 30 per cent of world GDP in 2011.

39. Several hundred million people depend on forests, marine and coastal biodiversity for their livelihoods. The World Bank estimates that in 43 low-income countries natural capital makes up 36 per cent of their total wealth even without factoring in the wider range of services ecosystems provide. [19]

40. The availability and sustainable use of biodiversity by the poor are directly relevant to poverty eradication. For example, in Brazil, India and Indonesia, the standard GDP contributions of agriculture, forestry and fisheries combined, reflecting only the traded goods in the markets, were 6.1 per cent, 16.5 per cent, and 11.4 per cent respectively in 2005. For the rural poor, the share is much higher – 89.9 per cent, 46.6 per cent, and 74.6 per cent respectively. [20]

41. The cost of the above forms of environmental degradation taken together for developing countries is very significant and offsets much of the economic growth. World Bank studies of 21 developing countries [21] found the annual cost to range from 2.1 per cent of GDP in Tunisia to 9.6 per cent in Ghana with a weighted average of 8 per cent.

1.1.5. Climate change

42. One of the most serious global threats, and one which aggravates other environmental concerns such as water scarcity and biodiversity loss, is climate change. In the medium to long term, climate change leads to an increase of average global temperatures, changes in rainfall regimes and an increase in sea levels. In the short term,

[14] J. Rockström et al.: "A safe operating space for humanity", in *Nature*, Vol. 461 (2009), pp. 472–475.

[15] S. Díaz et al.: "Biodiversity regulation of ecosystem services", in H. Hassan et al. (eds): *Ecosystems and human well-being: Current state and trends* (Washington, DC, Island Press, 2005).

[16] OECD: *OECD environmental outlook to 2050*, op. cit.

[17] "Ecosystem services" are the benefits that people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as regulation of floods, drought, land degradation, and disease; supporting services.

[18] European Commission (EC): *The Economics of Ecosystems and Biodiversity (TEEB): An interim report* (Brussels, 2008).

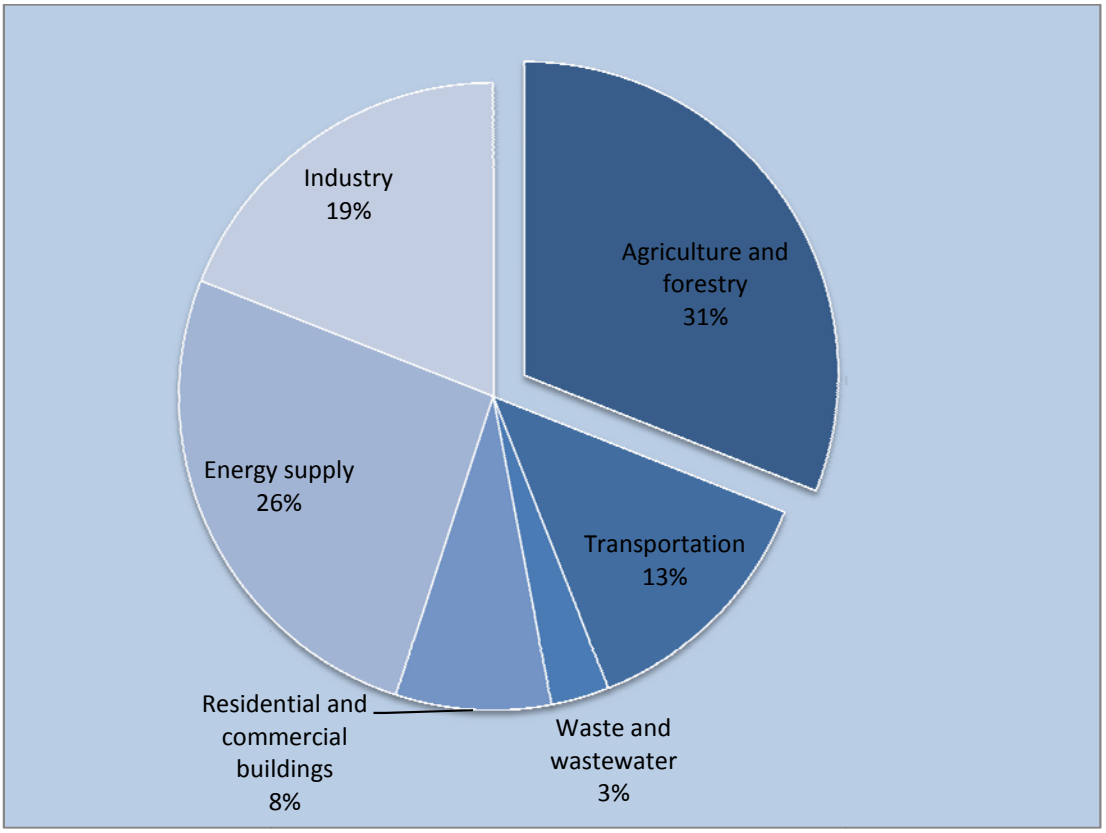
[19] World Bank: *Moving beyond GDP: How to factor natural capital into economic decision-making*, Report of the Wealth Accounting and the Valuation of Ecosystem Services (WAVES) (Washington, DC, 2012).

[20] EC: *The economics of ecosystems and biodiversity*, op. cit.

[21] M. Fay: *Greening growth: A path to sustainable development*, presentation at an ECOSOC meeting, 12 March 2012, based on World Bank: Country environmental analyses. Available at: http://www.un.org/esa/ffd/ecosoc/springmeetings/2012/Presentation_Fay.pdf. See also L. Croitoru and M. Sarraf (eds): *The cost of environmental degradation*: *Case studies from the Middle East and North Africa* (Washington, DC, World Bank, 2010).

climate change impacts are the result of erratic weather patterns and more extreme weather events. Climate change is primarily caused by increased concentrations of greenhouse gases (GHGs) [22] in the atmosphere arising mainly from the burning of fossil fuels and biomass, animal husbandry, rice field irrigation and use of nitrogenous fertilizers. These GHGs trap more of the energy reaching the earth from the sun, an effect similar to what occurs in a greenhouse. As can be seen in figure 1.1, energy supply and agriculture-related activities together account for roughly 57 per cent of total emissions. Industrial activity (i.e. manufacturing) and transport are also two major sources, accounting for 19 and 13 per cent respectively.

Figure 1.1. Shares of global GHG emissions, by sector (%)



Source: Intergovernmental Panel on Climate Change (IPCC): Fourth assessment report: Climate change 2007 (AR4) (Geneva, UNEP).

43. Between 1970 and 2005, GHGs released mostly by human activity increased by more than 70 per cent and continue to rise by about 2 ppm per year. Global average temperatures are today 0.8°C higher than before the onset of the industrial revolution, with a 0.7°C rise since 1951. As a result, the melting of glaciers in the Arctic and on Greenland has led to a global average sea level rise of 10 to 20 cm in the past 100 years, [23] weather patterns have become more erratic and extreme weather events more devastating.

[22] Mostly carbon dioxide (CO_2), nitrous oxide (NO_x) methane (CH_4) and a group of fluorinated gases.

[23] Comparison of the rate of sea level rise over the last 100 years (1.0 to 2.0 mm/yr) with the geological rate over the last two millennia (0.1 to 0.2 mm/yr) implies a comparatively recent acceleration in the rate of sea level rise.

44. High-income countries are still the largest emitters of GHG emissions per capita, remaining at about ten times the average of those of developing countries in 2011. [24]

45. Under BAU scenarios, continuously rising emissions could drive concentrations of GHGs in the atmosphere from the present-day 390.5 ppm [25] to 685 ppm by 2050, with probable consequent warming of 3–6°C. This concentration and attendant range of temperature increases would have serious and possibly unmanageable consequences and far exceed the internationally agreed maxima of 450 ppm and 2°C. [26] Because GHGs remain active in the atmosphere for long periods of time, global temperatures and sea levels will continue to rise for centuries even after GHG concentrations have been stabilized. The challenge for the future is therefore to radically and quickly reduce emissions as well as to adapt to the climate change which is already occurring and will continue for decades due to GHG emissions already released.

46. Modelling undertaken by the International Institute for Labour Studies (IILS) supports the conclusion that much higher concentrations of GHGs in the atmosphere will entail considerable costs in terms of output and aggregate productivity levels. In particular, the IILS Global Economic Linkages (GEL) model which simulates behaviour by enterprises suggests that productivity levels in 2030 would be 2.4 per cent lower than today and 7.2 per cent lower by 2050 in a BAU case (see figure 1.2). The negative effect is related to the impact of extreme weather conditions on agriculture and infrastructure, to scarcity of fresh water resources and to issues related to human health. Besides directly lowering output, this distortion also lowers the productivity of capital and labour, thereby negatively affecting the employment of these factors. The GEL model excludes the cost on individual well-being. Taking these into account would further increase the cost of inaction. Unmitigated climate change could lead to a permanent loss of global consumption per capita of 14 per cent by 2050. [27] Living standards would be significantly affected as a result.

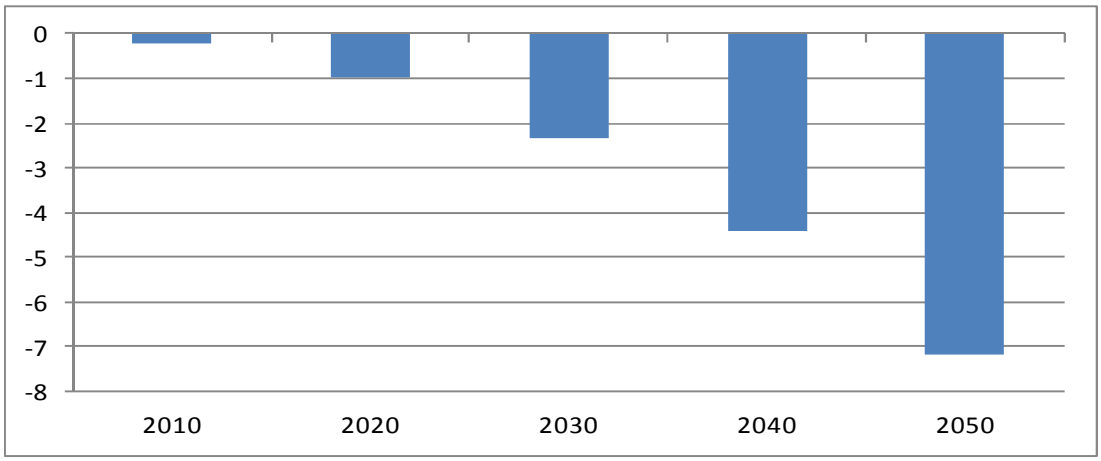
[24] UNEP: *Keeping track of our changing environment: From Rio to Rio +20 (1992–2012)* (Nairobi, 2011).

[25] T.J. Blasing: *Recent greenhouse gas concentration,* Carbon Dioxide Information Analysis Centre (CDIAC), DOI: 10.3334/CDIAC/atg.032 (Oakridge, TN, 2012). Available at: http://cdiac.ornl.gov/pns/current_ghg.html.

[26] OECD: *OECD environmental outlook to 2050*, op. cit.

[27] ibid.

Figure 1.2. Productivity loss resulting from further increases in GHG compared to the baseline, 2010−50 (in percentage points)



Note: The baseline scenario assumes that environmental damages remain at the level of the base year (2000).
Source: S. Bridji, M. Charpe and S. Kühn: *Economic transition following an emission tax in a RBC model with endogenous growth* (Geneva, IILS, 2011).

47. These estimates are in line with a number of studies assessing economic damage from climate change. Lord Stern, [28] the former chief economist of the World Bank, estimated the permanent loss of global economic output at 0–3 per cent for warming of 2–3°C and 5–10 per cent for 5–6°C (the current BAU scenario). Global consumption would be reduced between 5 and 20 per cent over the next 200 years. According to Nordhaus, [29] economic damages from climate change would increase to 3 per cent of global output by 2100 and close to 8 per cent by 2200 on current emission trends. Average annual damage from 2000 to 2200 would amount to US$26 trillion. [30]

48. In addition to the economic costs of policy inaction, there will be other effects on social well-being, such as rising health costs. For example, findings from UNFCCC show that global warming – through its impact on disease vectors – could expose an additional 400 million people to the risk of malaria before the end of the century. [31]

49. Already, there is growing evidence of how severe weather that may be linked to global warming can have a dramatic effect on the economy and society. As climate change continues to alter weather patterns, unpredictable weather conditions remain the most significant factor causing volatility in the price of agricultural products. [32] The current high prices for maize and soybean [33] following the drought in the United States illustrate the nature and the scale of the problem. In recent years, the number of people suffering from malnutrition and hunger has risen again to over 850 million, reversing

[28] N. Stern: *The economics of climate change: The Stern Review* (Cambridge, Cambridge University Press, 2007).

[29] W. Nordhaus: *The challenge of global warming: Economic models and environmental policy* (Yale, 2007).

[30] F. Ackerman and E.A. Stanton: *Climate change: The costs of inaction*, Global development and Environment Insitute (Boston, Tufts University, 2006).

[31] UNFCCC: *Climate change: Impacts, vulnerabilities and adaptation in developing countries* (Bonn, 2007).

[32] OECD and FAO: *OECD–FAO Agriculture Outlook 2011–2030* (Paris, 2011).

[33] "Joint statement from FAO, IFAD and WFP on international food prices", 4 Sep. 2012. Available at: http://www.fao.org/news/story/en/item/155472/icode/.

progress in earlier decades. The food price increases in 2008 pushed more than 105 million people into poverty [34] and triggered food riots in a number of countries.

50. There are also direct losses of jobs and incomes. For example, as a result of Hurricane Katrina in the United States in 2005, New Orleans lost some 40,000 jobs, with the hardest hit being women, mostly African–American. [35] Cyclone Sidr disrupted several hundred thousand small businesses and adversely affected 567,000 jobs in Bangladesh; the estimated value of non-agricultural private assets lost some US$25 million. [36] In both cases, poorer households were more exposed because they live in more vulnerable areas and have fewer resources to enhance resilience to climate change. In particular, climate change is likely to magnify existing patterns of gender disadvantage. [37] Worldwide, women have less access than men to financial, institutional and other resources that would enhance their capacity to adapt to climate change, including access to land, credit, agricultural inputs, decision-making bodies, technology and training services. [38] In many countries, droughts, floods and deforestation increase the burden of unpaid work on girls and women, leaving them less time for education or earning an income. The situation is worse for women attempting to recover from environmental disasters.

1.2. Social challenges and economic instability: Their link to the environment

51. The risks to livelihoods from the environmental challenges outlined compound the many existing social challenges, including unemployment. According to the UNDP, about 1.75 billion people experience multidimensional poverty in health, economic opportunities, education and living standards. [39]

52. With an additional 27 million people since 2008, there remains a backlog of 200 million unemployed. This record level of unemployment coincides with 400 million young people entering the global labour market over the next decade in search of employment opportunities. With 75 million persons aged 16–25 unable to find a job, youth account for more than a third of total unemployment. To generate sustainable growth while maintaining social cohesion, the world must therefore rise to the urgent challenge of creating 600 million productive jobs over the next decade. [40]

53. In addition to massive unemployment, poor job quality and working poverty pose even larger challenges. Some 900 million workers – almost 30 per cent of all workers –

[34] World Bank: *Global Monitoring Report 2012: Food prices, nutrition, and the Millennium Development Goals* (Washington, DC, 2012).

[35] OECD: *Gender and sustainable development: Maximizing the economic, social and environmental role of women* (Paris, 2008).

[36] ILO: *Cyclone Sidr: Preliminary assessment of the impact on decent employment and proposed recovery strategy, focusing on non-farm livelihoods* (Geneva, 2008).

[37] UNDP: *Human Development Report 2007/2008: Fighting climate change: Human solidarity in a divided world* (New York, 2007).

[38] L. Aguilar: *Is there a connection between gender and climate change?* International Union for Conservation of Nature (IUCN), Office of the Senior Gender Adviser, paper for presentation at the 3rd Global Congress of Women in Politics and Governance, Manila, Philippines, 19–22 October 2008.

[39] UNDP: *Human Development Report 2010: The real wealth of nations* (New York, 2010).

[40] ILO: *Global Employment Trends 2012: Preventing a deeper job crisis* (Geneva, 2012).

are living with their families below the US$2 a day poverty line, largely in developing countries and in precarious and informal employment.

54. A significant proportion of these workers are employed in sectors which are threatened by the overuse of natural resources and climate change such as agriculture, forestry and fisheries, which between them have a workforce of well over 1 billion. Most of the 1.4 billion people still living on less than US$1.25 a day [41] depend for their jobs and livelihoods on these sectors. The continued marginalization of employment and incomes in these sectors will further accelerate migration out of rural areas and increase pressure on urban labour markets. Many urban poor live in precarious settlements and work in informal businesses exposed to storms, floods and landslides. ILO analysis has shown that poverty is increasingly feminized, with about 829 million girls, young adult and older women living below the poverty line compared with about 522 million males. [42] Overuse of natural resources and accelerated climate change would lead to massive increases in deprivation in both rural and urban enterprises and labour markets.

55. These risks are aggravated by the lack of social protection, which could help vulnerable sectors and groups to absorb economic and environmental shocks such as harvest failures, soaring food prices, increased exposure to disease or loss of assets from floods and storms. About 5.1 billion people, 75 per cent of the world population, are not covered by adequate social security which would provide basic income security and access to health care. [43] A basic level of social security, guaranteeing at least basic income security and access to essential health care through national social protection floors, would not only reduce the suffering but become a stepping stone facilitating access to productive employment, breaking the circle of multidimensional poverty.

56. There is also a lack of access to opportunity. An important impediment to social inclusion and productive work, in particular for women, is the lack of access to clean and affordable energy suffered by 1.3 billion people, mostly in sub-Saharan Africa and South Asia.

57. The jobs and social protection deficits go hand-in-hand with a prolonged investment deficit from public and private sectors. World investment as a share of GDP fell to a record low in 2009 and at 19.8 per cent (2010) is still well below historical levels. Most of the continued shortfall of investment is caused by the advanced economies. Attempts to redress budget deficits are leading to reductions in government investment, which unlike most government spending is discretionary expenditure. In many advanced economies outright austerity measures have been adopted, with spending cuts beyond cuts in public investment.

58. The uncertain economic outlook and the reductions in public spending have also provoked a decline in private investment. The amount of cash in the accounts of large firms that is not invested has reached unprecedented levels. [44] Small firms continue to have difficulty accessing credit – in the advanced economies due to the credit crunch, in

[41] UN-DESA: *Rethinking poverty: Report on the world social situation 2010* (New York, 2009). Available at: http://www.un.org/esa/socdev/rwss/docs/2010/fullreport.pdf.

[42] ILO: *Gender equality at the heart of decent work*, Report VI, International Labour Conference, 98th Session, Geneva, 2009.

[43] ILO: *Social protection floor for a fair and inclusive globalization*, Report of the Social Protection Floor Advisory Group (Bachelet report) (Geneva, 2011); *World Social Security Report 2010/11: Providing coverage in times of crisis and beyond* (Geneva, 2011).

[44] IILS: *World of Work Report 2012: Better jobs for a better economy* (Geneva, 2012).

many developing economies due to a lack of formalization and suitable financing mechanisms.

59. Both environmental and social drivers can lead to large-scale, non-linear and disruptive environmental and social change, from the collapse of farming systems to the Arab Spring triggered by the lack of opportunity for youth. But the interlinkages can also lead to positive synergies, as will be seen in many examples throughout this report. A clear and stable policy framework for sustainable development which addresses the environmental challenges could significantly contribute to addressing the economic and social woes. Targets and strategies for energy and resource efficiency in agriculture, industry, transport and housing, the generation of clean energy and universal access as well as the restoration of natural resources would significantly stimulate demand and induce massive private investment.

60. Social protection systems would not be exposed to the risk of runaway costs from environmental degradation and an ever-increasing share of expenditure to compensate for and limit damages, but serve as a powerful vehicle for social and economic inclusion as well as environmental sustainability.

61. While increased pressure on farmers and a growing gap between incomes of rural and urban populations could worsen the employment and poverty challenges, investments in rural infrastructure such as water management and social protection can create jobs and restore soil and water catchment areas, thus enhancing resilience to climate change, improving agricultural productivity and boosting incomes.

1.3. The drive to environmental sustainability and its implications for decent work

62. The imperative of addressing the environmental challenges has been increasingly recognized by governments, the private sector and citizens at large. In the beginning, the measures adopted often aimed to remedy acute environmental problems with obvious and immediate local impacts on human health, such as water and air pollution. The selected examples below and the detailed overview in Chapter 4 demonstrate that over the last decade, more and more governments and businesses around the world have been tackling the environmental challenges.

1.3.1. An environmentally sustainable economy: The shift to sustainable patterns of production and consumption

63. Governments have been adopting national strategies for climate change, preservation of biodiversity, land and water management, waste management and recycling and shifts to sustainable production and consumption patterns. Businesses are responding by making their operations, products, services and supply chains more sustainable.

64. The farthest-reaching approach has inverted the traditional logic that preserving the environment is a cost and an impediment to economic growth. Green economy strategies, or “green growth” as they are referred to by some countries and organizations, sees environmental sustainability as a major economic opportunity, a driver of investment, economic growth and job creation. These concepts have been developed and promoted by leading international agencies in the fields of economics and the environment, including UNEP, the OECD and the World Bank (see box 1.1).

Box 1.1
Definitions of green economy and green growth

UNEP: "UNEP defines a green economy as one that results in 'improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities'. In its simplest expression, a green economy is low-carbon, resource efficient, and socially inclusive. In a green economy, growth in income and employment are driven by public and private investments that reduce carbon emissions and pollution, enhance energy and resource efficiency, and prevent the loss of biodiversity and ecosystem services."

The World Bank: "We argue that what is needed is green growth − that is, growth that is efficient in its use of natural resources, clean in that it minimizes pollution and environmental impacts, and resilient in that it accounts for natural hazards and the role of environmental management and natural capital in preventing physical disasters. And this growth needs to be inclusive."

OECD: "Green growth means fostering economic growth and development while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies. To do this it must catalyse investment and innovation which will underpin sustained growth and give rise to new economic opportunities."

Sources: UNEP: *Towards a green economy: Pathways to sustainable development and poverty eradication* (Nairobi, 2011), p. 16; World Bank: *Inclusive green growth*, op. cit., p. 2; OECD: *Towards green growth* (Paris, 2011), p. 9.

65. The green economy concept championed by UNEP is explicit about the goal of human well-being and social equity, with environmental investments as drivers of income generation and employment creation. While the World Bank refers to the need for social inclusion, it is less explicit about the mechanisms through which green growth would achieve it. The OECD, for its part, had originally put forward green growth as a way of continuing economic growth while preserving vital natural resources.

66. The outcome document of the UNCSD 2012 considers:

> ... green economy in the context of sustainable development and poverty eradication as one of the important tools available for achieving sustainable development and that it could provide options for policy-making but should not be a rigid set of rules. We emphasize that it should contribute to eradicating poverty as well as sustained economic growth, enhancing social inclusion, improving human welfare and creating opportunities for employment and decent work for all, while maintaining the healthy functioning of the Earth's ecosystems. [45]

67. Both concepts have gained currency in a growing number of countries in recent years. The Republic of Korea has made green growth the central theme – and the title – of its national development strategy. Expanding on the "Green New Deal", a package of measures to counteract the economic crisis, the Government has embarked on a longer term Green Growth Strategy. KRW91 trillion (about US$84 billion) have been invested between 2009 and 2012, lifting the number of green jobs from 610,000 in 2008 to 810,000 in 2013. [46]

68. Ethiopia and South Africa have adopted green economy strategies as components of their development plans. Because the conventional development path would lead to an unsustainable use of natural resources as well as a sharp increase in GHG emissions, Ethiopia [47] aims to achieve middle-income status by 2025 while developing a green

[45] UNCSD: *The future we want*, op. cit., para. 56.

[46] Republic of Korea: *Job creation outcomes through implementation of 5-year Green Growth National Plan*, Inter-ministerial report (Seoul, 2012).

[47] Government of Ethiopia: *Ethiopia's climate-resilient Green Economy Strategy* (Addis Ababa, 2011).

economy. Most of the investment of around US$150 billion required over the next 20 years is cost-effective, directly driving economic growth and creating additional jobs with high value added. South Africa has included green economy investments as one of ten components in a comprehensive "New Growth Path".

69. The Employment Package of the European Union [48] relies on growth in environmental industries as one of three components (the others being health and care, and information and communication technology (ICT)). Green jobs are the second largest source of new employment in both strategies, with up to 8.2 million jobs in the EU. Similarly, Japan expects 1.4 million new jobs from US$468 billion of new demand in green goods and services. The Confederation of British Industry (CBI) summarizes the development in the United Kingdom: "In trying economic times, the UK's green business has continued to grow in real terms, carving out a £122 billion share of a global market worth £3.3 trillion [in 2010/2011] and employing close to a million people." [49] Similarly, in the United States green goods and services employed 3.1 million workers (2.4 per cent of the workforce) in 2010. In particular, the "clean tech" segment expanded rapidly and outperformed the rest of the economy during the recession. [50]

70. China has increasingly embedded environmental sustainability in national development policy since 1984 and counts over 4 million green jobs today. The new five-year economic development plan (adopted in May 2012) sets out strategic targets and measures for green, low-carbon and circular economies. The plan identifies priority industries, including alternative forms of energy, energy conservation and environmental protection, biotechnology, high-end equipment manufacturing, and clean-energy vehicles. China expects these industries to account for 15 per cent of the country's GDP by 2020, up from 2 per cent today. This is expected to create new green jobs for a net gain of 10 million jobs. [51]

71. Brazil and Indonesia have adopted unilateral targets to reduce GHG emissions and are implementing programmes across a range of sectors, from agriculture and forests to energy and transport. The Indonesian Government is committed to maintaining economic growth, creating jobs in particular for the youth, reducing poverty while improving environmental sustainability and reducing carbon emissions levels. An integrated development strategy with four prongs, namely, pro-growth, pro-jobs, pro-poor and pro-environment, is being implemented under the national medium-term development plan (RPJMN) 2010–14 integrating the environmental dimension in all aspects of policy-making. Increasingly, the drive towards environmental sustainability and the related opportunities to create green jobs are reflected in employment policies. In Sri Lanka, for example, the National Human Resource and Employment Policy (NHREP) adopted in October 2012 aims at full, productive and freely chosen employment for all, and explicitly includes key sectors for employment and environment.

[48] EC: *Employment package: Towards a job-rich recovery* (Brussels, 2012).

[49] CBI: *The colour of growth: Maximising the potential of green business* (London, 2012), p. 6. Available at: http://www.cbi.org.uk/media/1552876/energy_climatechangerpt_web.pdf.

[50] M. Muro et al.: *Sizing the clean economy: A national and regional green jobs assessment* (Washington, DC, The Brookings Institution, 2011).

[51] China Council for International Cooperation on Environment and Development (CCICED): *Development mechanism and policy innovation of China's green economy*, CCICED Task Force Report, CCICED Annual General Meeting, 15–17 November 2011, pp. 220, 227.

Policy instruments for environmental sustainability

72. By combining policy instruments governments can provide incentives for the adoption of green workplace practices and investment in new green products and services. [52] The policy tools adopted are an important determinant of the nature and the extent of the impact that measures for environmental sustainability will have. Such tools can include:

- **Market-based instruments (MBIs)** such as taxes, charges, tradable permits, guaranteed prices, subsidies and loans on favourable terms. These instruments reinforce market signals such as rising prices for scarce commodities or growing consumer demand for green products and services. They can stimulate technological innovation and competitiveness, providing incentives for private investment and for the greening of enterprises. Existing subsidies on water, energy and raw materials which impede environmental efficiency in enterprises and households can also be modified or reduced. Successful MBIs require, however, an efficient system of monitoring, revenue collection and enforcement.
- **Regulatory instruments** such as norms, standards, emissions abatement policies, quotas and mandates, as well as national/regional laws and regulations ensure, for example, that biomass and other renewable materials are produced sustainably.
- **Public investment** in many instances leads the development of infrastructure with low environmental impact or the rehabilitation of natural resources such as forests, rivers or coastal areas.
- **Public procurement policies**, for example, when purchasing goods, governments can favour those product designs which are more environmentally sound.
- **Information-based instruments** such as eco-labelling, awareness raising and public disclosure can also be efficient if used with other measures such as environmental taxes. The establishment of supporting institutions for industries, assisting enterprises in meeting standards and obtaining certifications can equally be helpful.
- **Voluntary initiatives** can lower administrative and enforcement costs (when compared with regulatory instruments, for instance).

1.3.2. A more environmentally sustainable economy: Repercussions for the world of work

73. The move towards a more environmentally sustainable economy has implications for the volume and quality of employment and for the level and distribution of incomes, particularly when it involves a wholesale shift of the economic development models of large companies, sectors and entire countries. It is likely to lead to employment gains and losses and to the transformation of many jobs throughout the economy.

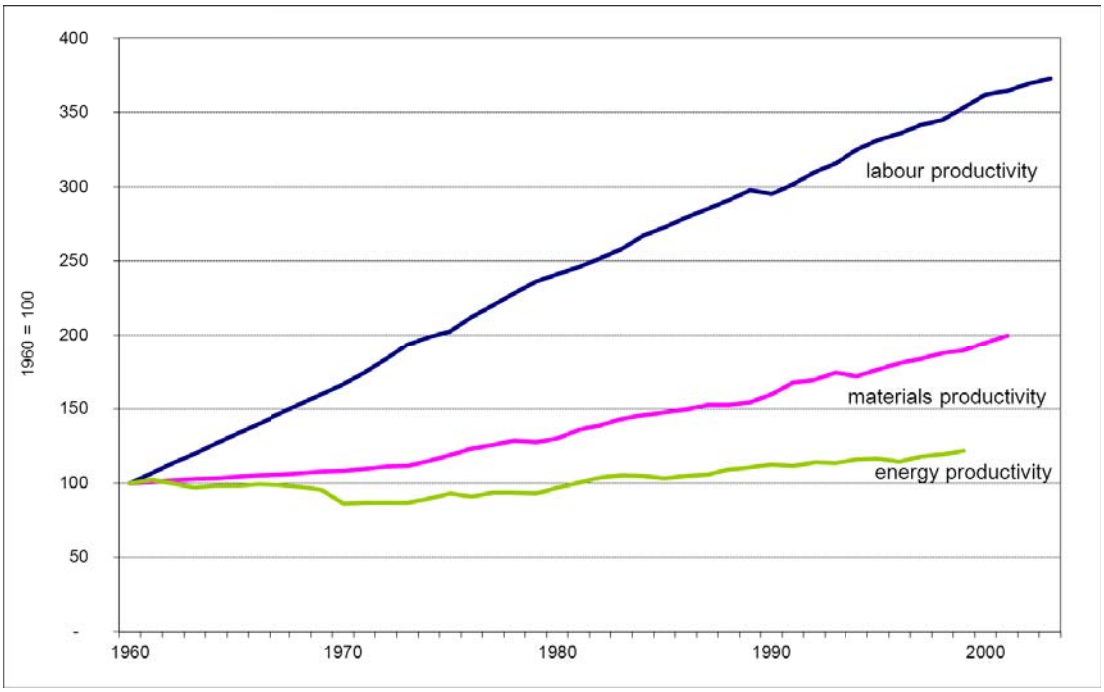
Enterprises and workplaces

74. Both resource scarcity and climate change can drive up costs and threaten the viability of an enterprise. This is particularly true if technology, production processes and practices are inefficient. Wasted resources mean low resource productivity, and this reduces profits and competitiveness. Over the past decades, productivity improvements

[52] M.S. De Gobbi: *Mainstreaming environmental issues in sustainable enterprises: An exploration of issues, experiences and options*, Employment Working Paper No. 75 (Geneva, ILO, 2011); UNIDO: *UNIDO Green industry*, op. cit.

in the use of raw materials and energy have been much slower than those in labour productivity in industrialized countries (see figure 1.3). Labour productivity has also outpaced materials and energy productivity in some emerging economies, but the gains in the latter have been very substantial, doubling or tripling over the last three decades.

Figure 1.3. Labour, materials and energy productivity, EU–15, 1960–2000



Note: **Labour productivity:** GDP per annual working hours (1999 US$ (converted at EKS PPPs) per hour); **Materials productivity:** GDP per domestic material consumption (DMC) (€ per kg); **Energy productivity:** GDP per total primary energy supply (TPES) (thousand 1995 US$ per tonne).
Source: EEA: *Sustainable use and management of natural resources*, EEA Report No. 9 (Copenhagen, 2005).

75. Numerous studies, including two extensive reviews by the McKinsey Global Institute, have shown that major gains in efficiency are possible and that many of these are already cost-effective with today's technology and prices. [53] Realizing these gains requires investment in new technology, but also adjustment in processes and practices. As Rosenfeld et al. point out, meeting the energy challenge will not be possible without the active involvement of millions of managers, workers and consumers.

76. Individual firms as well as governments are driving environmental sustainability at the enterprise level. The highly successful programme "Pollution Prevention Pays" at the multinational 3M, for example, has saved the company US$1.4 billion since 1975. In China the Government has recently launched a "Top 10,000" initiative which promotes awareness and skills for energy savings and emissions reductions at the 16,078 enterprises with the highest environmental footprint. [54]

77. Both reaping the gains of energy and resource efficiency and avoiding pollution and major industrial accidents depend critically not only on the technology but also on management systems, operational procedures, good communication and skilled and

[53] J. Rosenfeld et al.: *Averting the next energy crisis: The demand challenge* (New York, McKinsey Global Institute, 2009); Dobbs et al.: *Resource revolution*, op. cit.

[54] National Development and Reform Commission (NDRC): *10,000 enterprises energy saving and low carbon action*, NDRC policy (Beijing, 2012) (in Chinese).

motivated workers. As *The Economist* magazine put it for the case of nuclear power plants: "safety can never be a technological given, only an operational achievement". [55]

78. Where good environmental performance is achieved it becomes a comparative advantage. In addition to reducing cost and providing technological leadership, it increases brand value and can give better access to capital and to consumer markets.

Key economic sectors employing half the global workforce

79. There is no "silver bullet" for achieving environmental sustainability. Given the scale and the multiple facets of the challenge, no single measure, group of enterprises or sector can reduce the environmental footprint of economic activity enough to ensure overall sustainability. Greening will be required to varying degrees in all enterprises across the entire economy.

80. The sectoral composition of a national economy is an important determinant of the challenges – but also the potential – for economic development and environmental sustainability and for their likely impact on enterprises and workers. Those economic sectors directly dependent on natural resources and the climate, or which are large consumers of resources or significant polluters or a combination of these, have significant potential to reduce environmental impact. Eight sectors stand out because of their close relationship to environmental sustainability: agriculture, forestry, fisheries, energy, resource-intensive manufacturing, recycling, buildings and transport. As will be seen in the following chapters, many of the environmental policies adopted to date, but also of the more comprehensive green economy or green growth strategies, focus on these sectors.

81. Enterprises in a given sector share a number of relevant features which influence the transition to sustainable production and consumption patterns in the sector and its social outcomes: the types of products and services they provide, the technological options and constraints imposed by the activity, the occupational hazards and working conditions associated with the nature of the activity, the levels of productivity, the sets of relevant technical and vocational skills. There are also broad similarities in employment and workforce patterns and composition, such as seasonal work, gender composition and the structure of the sector in terms of sizes of enterprises.

82. Sectors also have specific governance instruments and institutions. A significant number of international labour standards and national labour laws are specific to individual economic sectors. Because of these shared features, employers and workers are usually organized and engage in dialogue and collective bargaining at sectoral level.

83. Both governments and the private sector typically concentrate their efforts on a limited number of these key sectors because of their current relevance for the national economy or because of their potential to boost national development. The policy instruments and measures adopted are often sector-specific. From a world of work perspective it is important to note that between them, these sectors employ half the global workforce. A very large proportion of the workforce will therefore be directly affected by the drive to achieve sustainability (see table 1.1).

[55] *The Economist*: "Blow-ups happen: Nuclear plants can be kept safe only by constantly worrying about their danger", 10 Mar. 2012. Available at: http://www.economist.com/node/21549095.

Table 1.1. Global direct employment, by sector (millions)

Sector	Direct employment
Agriculture	1 000
Forestry	44
Fisheries	25
Energy	30
Manufacturing (resource-intensive)	200
Recycling	24
Buildings	110
Transport	88
Total	**1 521**
Percentage of global employment	50.08

Source: UNEP et al.: *Green jobs*, op. cit.

84. Some of these sectors are experiencing growth and increases of employment because their products and services contribute to environmental sustainability. In contrast, sectors with a large environmental footprint are faced with slower growth or even contraction. In order to understand and monitor the impact of a transition to a greener economy for employment it is therefore helpful to distinguish between green industries (subsectors such as renewable energy, or parts of sectors such as energy-efficient construction) and non-green industries.

85. In green industries, all the employment in the sector contributes to environmental sustainability. In non-green sectors, there are workers in green occupations, responsible for monitoring and limiting negative environmental impacts. Examples are operators of waste water treatment plants in pulp mills, or logistics and facilities managers reducing energy consumption of transport fleets and buildings. Both the employees of green industries and those in green occupations directly reduce environmental impacts. These are therefore considered green jobs. The concept and its relevance for the contribution of the world of work to environmentally sustainable development are set out in greater detail in the following section and explored throughout this report.

National economies

86. A third level which is relevant for this discussion is the national economy as a whole, including its links to the global economy. Enterprises do not exist in isolation but are part of value added chains from which they source their inputs and into which they sell their products and services. This is true for green industries as well, which require many inputs from non-green industries. Price signals, whether as a result of resource scarcity or of policies penalizing pollution or encouraging environmentally friendly products, affect the behaviour of consumers and enterprises throughout the economy. This creates a complex interplay which determines labour market balances in terms of net gains or losses in employment and the volume of job reallocation associated with the transition. It may also have an impact on job quality and the level and distribution of income.

87. It is important to note that the relationship does not only work in one direction. As the *World Development Report 2013* points out: "Development happens through jobs." [56]

[56] World Bank: *World Development Report 2013: Jobs* (Washington, DC, 2012), Overview, p. 8.

This also applies to the environmental dimension of sustainable development. The investment into human and social capital, the creation of green jobs and the greening of enterprises are key elements of a growth and sustainable development agenda because they drive and enable environmentally sustainable development.

1.4. The labour market dynamics of greening economies: Green jobs creation, employment and income effects

88. The shift to an environmentally sustainable economy has given rise to green jobs, a new type of job which plays a vital role in greening enterprises and economies. Defining and measuring green jobs is instrumental in understanding the interrelationship between environmental sustainability and labour markets.

1.4.1. Creating green jobs

89. The joint UNEP/ILO/IOE/ITUC report of 2008 broadly defined a green job as any decent job that contributes to preserving or restoring the quality of the environment, be it in agriculture, industry, services or administration. [57] In practice these jobs: (i) reduce consumption of energy and raw materials; (ii) limit GHG emissions; (iii) minimize waste and pollution; (iv) protect and restore ecosystems; and (v) enable enterprises and communities to adapt to climate change.

90. An important element in this definition of green jobs is the fact that the jobs have to be not only green but also decent, i.e. jobs that are productive, provide adequate incomes and social protection, respect the rights of workers and give workers a say in decisions which will affect their lives. This definition incorporates the three dimensions of sustainable development. Green jobs are decent work which significantly reduces negative environmental impacts of economic activity, ultimately leading to sustainable enterprises and economies (see box 1.2).

Box 1.2.
Decent work and environmental sustainability: Definitions, issues and considerations

A better understanding of the impacts of a greener economy on labour markets and an assessment of the effectiveness of policy measures requires a more specific definition for consistent data collection and measurement. Operational definitions have been developed and applied in a growing number of countries and work is under way to formulate agreed statistical definitions at national, regional and international levels.

Measurement of green jobs must take account of employment in green economic sectors and industries from an output perspective, as well as of environmental occupations and job functions in all sectors from a process perspective. These two concepts complement each other and shed light on different ways of greening enterprises and economies, offering different entry points for policies. The figure below presents these relationships schematically, specifically:

A: Employment in production of environmental outputs

B: Employment in environmental processes

C: Decent jobs

D: Non-green jobs in non-environmental sector created thanks to greening

[57] UNEP, ILO, IOE, ITUC: *Green jobs: Towards decent work in a sustainable, low-carbon world* (Nairobi, UNEP, 2008).

AnB: Employment in production of environmental outputs by employing environmental processes

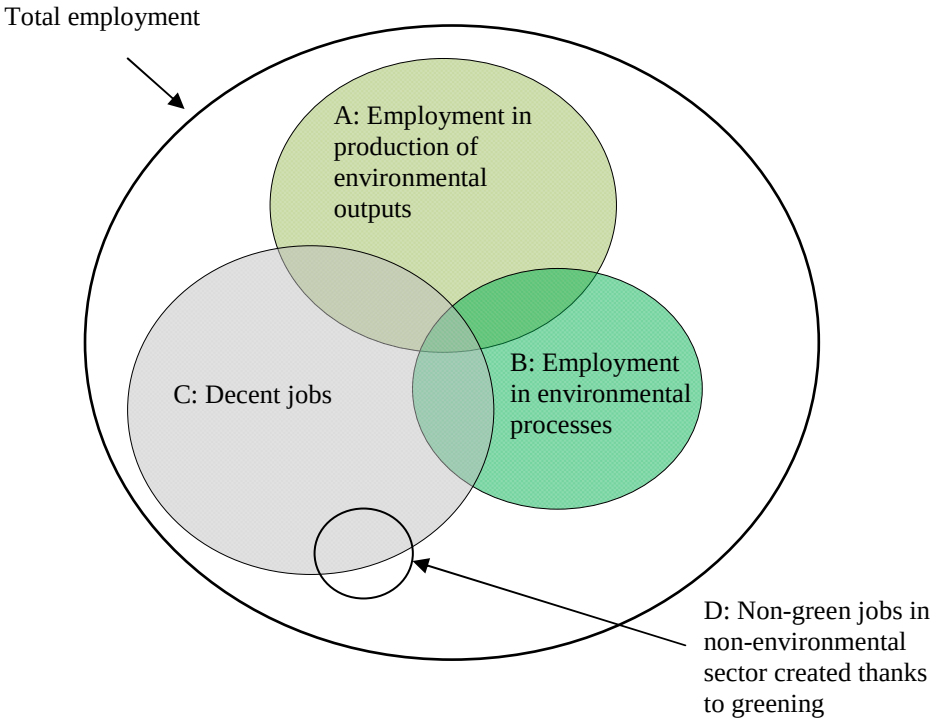
AnC: Employment in production of environmental outputs which is also decent work

BnC: Employment in environmental processes which is also decent work

AnBnC: Employment in environmental processes that produces environmental output which is also decent work

Green jobs, according to the UNEP et al. definition,* are those in segments (AnC) U (BnC).

Schematic relationships between total employment, green jobs and decent work



Most practical applications have taken an industry approach, identifying green jobs with employment in industries that are judged to produce green products and services with variations in scope and thresholds. The UNEP et al. definition is broader, in that it includes employment in green sectors which operate in an environmentally friendly manner.

A growing number of national governments are developing their own definitions of green jobs to serve as a basis for collecting statistical data and making policy choices. While these initiatives have been instructive, no consensus has been reached among researchers and practitioners. Accordingly, the ILO is working on the development of a statistical definition for green jobs, and on guidelines for statistical measurement of employment in the context of a green economy. In October 2013, the ILO will host the 19th International Conference of Labour Statisticians (ICLS) where it will present a concept paper reviewing current practice in selected countries, and suggest a standardized statistical definition for green jobs that could be applied by countries in all regions and at all stages of economic and social development.

* UNEP et al: *Green jobs*, 2008, op. cit.

Source: ILO: Proposals for the statistical definition and measurement of green jobs, preliminary paper prepared Statisticians, Geneva, 2013 (Geneva, 2012).

91. On the one hand, green jobs are an important part of the employment gains linked to a more environmentally sustainable economy. On the other hand, they are critical for

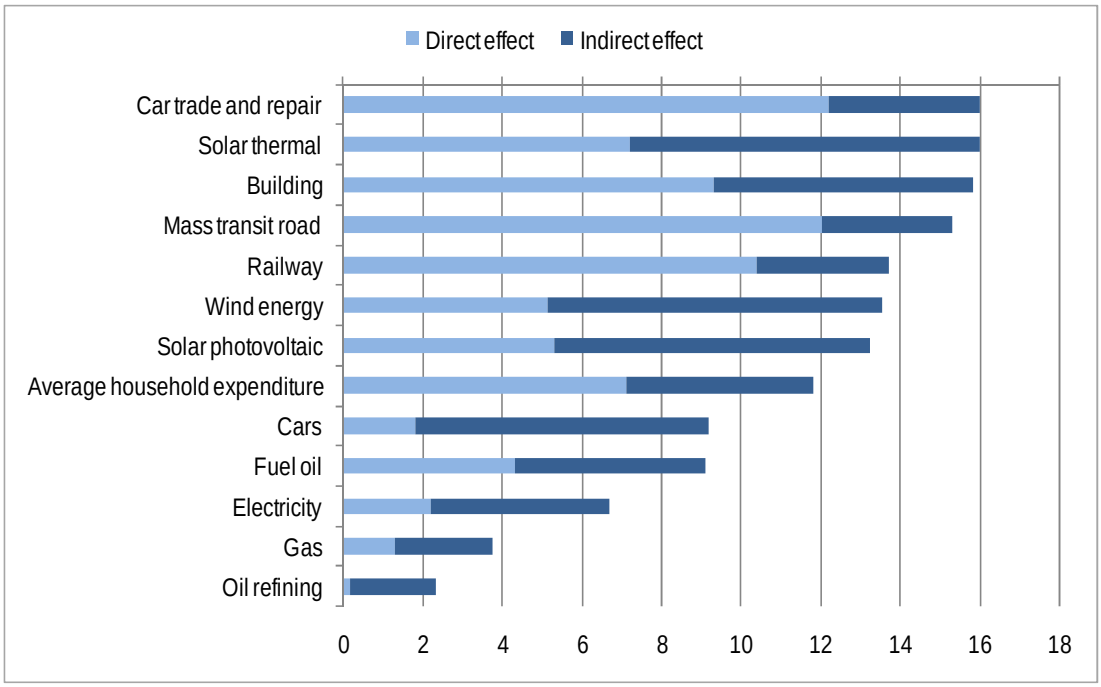
making the shift technically feasible and economically viable. Without skilled and motivated workers in new green growth sectors and in key occupations across the economy, the investment made and the technology deployed will not generate the expected benefits for sustainable development.

Employment dynamics and balances

92. On a positive note, increased demand and investment in greener products and services, as well as the equipment and infrastructure to produce them, will lead to the expansion of certain industries and enterprises. This will translate into higher labour demand and job creation (direct jobs), primarily in green sectors. In addition, due to inter-industry relations of the expanding industries, other parts of the economy which supply inputs to the expanding green sectors also benefit, creating additional employment (indirect jobs), including in non-green sectors such as high-insulation glass and cement for green buildings, or steel and carbon fibre for the blades and towers of wind turbines. The income generated by this additional economic activity is redistributed by spending on additional consumption and investment across the economy, creating further employment (induced effects) in addition to the direct and indirect jobs.

93. The number of jobs created at all stages of the greening process is a function of the size of demand and investment, of trade (where products themselves or inputs are imported, subtracting from domestic demand or export, thereby increasing domestic demand and related employment) and of the employment elasticity (jobs created or maintained per unit of demand). Using the example of France, figure 1.4 illustrates that this shift can be very favourable in terms of job creation. Demand for green goods and services tends to have higher employment elasticities than average demand and is substantially greater than demand for resource- and energy-intensive goods (with the exception of car maintenance).

Figure 1.4. Direct and indirect employment (full-time equivalents) **generated per million euros final demand for goods and services from selected sectors, France, 2005**



Source: P. Quirion and D. Demally: –30% de CO_2+ 684000 emplois, l'équation gagnante pour la France, CIRED/CNRS/WWF France (Paris, 2008).

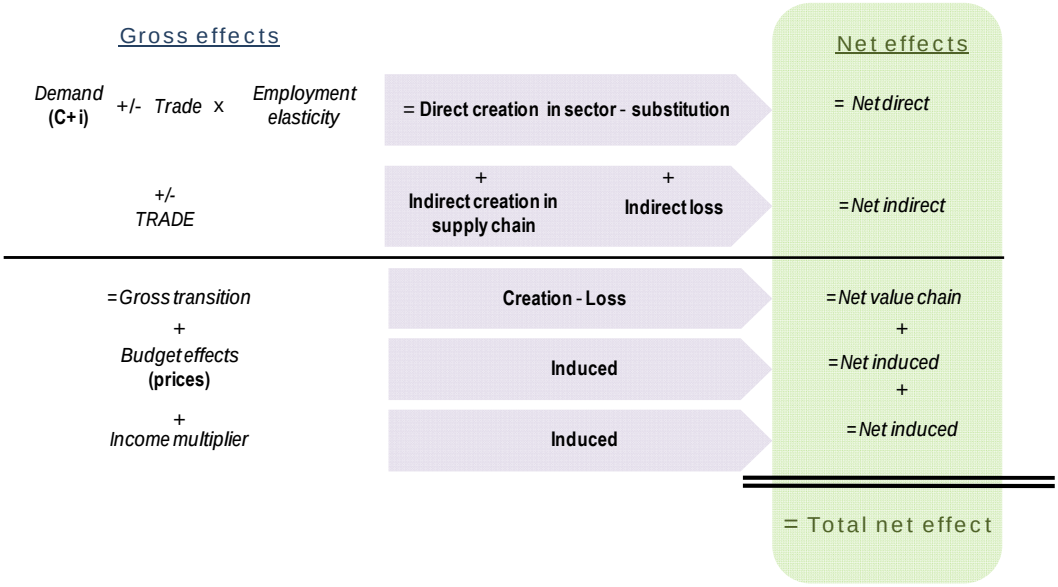
94. A further conditioning factor is "budget effects". If green products and services are more expensive than their substitutes, enterprises and households will have fewer resources left to spend on other goods and services. A negative budget effect can, for example, be associated with the introduction of renewable energy. Although the cost of power generation using renewables has been falling fast and has become increasingly competitive, it initially resulted in higher costs to consumers, albeit temporarily.

95. Conversely, positive budget effects do occur due, for example, to cost-effective investments in energy efficiency and broader resource efficiency. [58] The resulting gains shift demand away from energy consumption, which has a low employment elasticity, to goods and services with higher elasticities. Importantly, these gains are cumulative over time. Thus, the potential for job creation is not limited only to certain industries but can occur throughout the economy, with some significant spillover effects. Together, these add up to the gross gains in employment.

96. However, this mechanism also has a downside since, for every job lost, employment (and income) will be adversely affected in other parts of the economy, because a given green product or service replaces a less green one. An increase in renewable energy, for example, may reduce demand for conventional fossil power and thus for fossil power plants, as well as having an impact on supply sectors such as coalmining. The direct, indirect and reduced losses add up to a gross loss in employment.

97. Both the gross and the net effects are important. Taken together, the gross gains and losses are equivalent to the number of workers who will have to change jobs. This is an indication of the size of the transition occurring in the labour market. The direct and indirect gains and losses also help to explain the nature of the transition, as they show whether workers are likely to have to move between sectors or if the relocations will take place mainly within the same sector. The net effects are equally important because they show whether or not a greener economy will generate more jobs or result in job losses (see figure 1.5). Whether the overall, quantitative effect on employment is positive or negative depends on the complex interplay between these job flows and the policy mix (see also Chapter 2).

Figure 1.5. Impact of a green economy on the volume and composition of employment



Source: ILO and ILSS: *Working towards sustainable development*, op. cit.

[58] Rosenfeld et al.: *Averting the next energy crisis*, op. cit.; Dobbs et al., *Resource revolution*, op. cit.

Changes in employment quality, income levels and distribution

98. The transition will not only cause shifts in the overall level and composition of employment. It can also affect the quality of employment. Working conditions can change as a result of new technologies, processes and practices. These may reduce or increase exposure to occupational hazards, for example. The current focus on the transition to a low-carbon economy should look at complex environmental problems from a multidisciplinary approach, integrating environmental aspects with occupational safety and health and public health, while at the same time taking into consideration the well-being of surrounding communities.

99. Environmentally sustainable products and services will often require higher levels of skills. Higher environmental performance and competence requirements in firms and sectors may also call for more stable and formal employment and enterprises. Green growth sectors and occupations may offer more or less equal opportunity to women and men or groups of jobseekers. Similarly, these jobs may provide more or less opportunity to exercise the right to organize and bargain collectively.

100. In addition to the impacts on employment, the shift to a green economy will also affect income levels and distribution, with implications for poverty reduction. Gains in eco-efficiency and access to new and growing markets can lead to higher profits, incomes and wages. Conversely, additional costs which cannot be compensated may depress earnings. These impacts are a result of how the shifts in employment affect primary incomes, most importantly the levels of wages among workers and incomes among the self-employed, as well as the redistribution of incomes through taxation, social protection and prices.

101. Changes in taxation and prices can have strongly differentiated impacts on households of different income levels, as well as on women and men. An important case in point is energy poverty. In most countries, the poor spend a disproportionate share of their income on energy and an even higher share on related goods and services, such as food and transport. For instance, in much of Africa, Asia, Latin America and parts of Europe, the proportion of expenditure on energy by poor households is three times – and can be as much as 20 times – that of richer households. The situation is aggravated by the fact that many poor households have no access to modern energy, energy-efficient housing or transport. [59]

102. The following chapters explore the opportunities and challenges for the world of work presented by a transition to more environmentally sustainable economies.

[59] ILO and ILSS: *Working towards sustainable development*, op. cit.

Chapter 2

Seizing the opportunities: Lessons from international experience

103. This chapter explores three distinct opportunities to promote decent work in the transition to greener, environmentally sustainable economies and societies: by creating more decent jobs, by improving the quality of existing jobs and by advancing social inclusion. It highlights the state of knowledge concerning countries and sectors which have already experienced the creation of more and better jobs and improved access to new opportunities for hitherto excluded segments of society. It sheds light on the size and scope of the opportunities in greener economies, and assesses the net effects for employment. Finally, it reviews a range of policies that are conducive to positive outcomes for the labour market and decent work.

2.1. Evidence of the positive employment effects from green policies

2.1.1. Job creation

104. Most studies at global, regional and country level that have investigated the net impact on employment of environmental policy measures suggest it is positive. [1] A review of 24 studies available for nine countries and two regions (see table 2.1), and one global analysis [2] find that appreciable net employment gains have been realized or can be achieved. The results depend, not surprisingly, on the policy measures taken, the methodological approach, country-specific circumstances and the data used in the analysis. In the majority of studies, environmental reforms are accompanied by complementary government policies and incentives, including tax credits, subsidies and worker training and education. By complementing environmental reform with labour market and social policies, any negative effects of environmental reforms are offset and the net impact on employment is positive. These findings are in line with the double dividend hypothesis, according to which policy measures can achieve economic benefits – in particular employment gains – and environmental improvement at the same time. According to the IILS study at the global level, for instance, modelling shows that up to 14 million net new jobs could be created if a tax on CO_2 emissions were imposed and the resulting revenues were used to cut labour taxes. [3]

[1] A number of studies which argue that environmental policies destroy jobs apply inappropriate methods and use data selectively.

[2] This section is a brief summary of the findings. For a more detailed presentation and discussion see ILO and IILS: *Working towards sustainable development*, op. cit., Ch. 10.

[3] IILS: *World of work: The global jobs crisis and beyond* (Geneva, ILO, 2009).

Table 2.1. Estimated employment effects of greening the economy

Country	Model and employment effects
Australia	❑ An additional 770,000 jobs by 2030 (a gain of 5–6 per cent by 2030) could be created by an emissions trading system coupled with government incentives, relative to an approach relying on carbon markets only ❑ 2.5 million jobs could be created by 2025 by reducing GHG emissions 60–100 per cent by 2050, while "Factor 4" resource efficiency offers gains of 3.3 million jobs over the next 20 years, and 7.5 million by 2050 ❑ Construction and transport jobs are projected to grow significantly faster than the national average
Brazil	❑ Employment is expected to increase by 1.13 per cent annually between 2010 and 2030, and GDP could increase 0.5 per cent per year on average by reducing pasture areas and protecting forests
China	❑ 6.8 million direct and indirect jobs could be created by meeting government wind, solar and hydropower targets ❑ Losses from reduction in energy intensity of industry could be outstripped by almost 10 million jobs by increased employment in renewable industry and by shifting from basic industries towards services
European Union	❑ More than half a million net jobs could be created in 2014–20 by investing 14 per cent of the total EU budget in renewable energy, nature conservation, green buildings, and sustainable transport (about 130,000 jobs per €1 billion); shifting investment from current patterns to green sectors could increase job creation per euro by a factor of three ❑ EU could add between 1.4 and 2.8 million jobs compared with BAU by reducing the total material requirements of its economy by 17 per cent (every percentage point reduction in resource use could lead to up to 100,000 to 200,000 new jobs) ❑ A 1.3 per cent increase in employment and 8 per cent decline in CO_2 emissions between 1990 and 2010 generated by increased energy taxes, according to one economic model ❑ A 0.6 per cent rise in employment and 4.4 per cent decline in CO_2 emissions through increased energy prices and lower labour costs, according to another model ❑ An increase in employment (by up to 0.5 per cent) could be brought about by a carbon tax in six EU countries to reduce energy demand and carbon emissions, while raising GDP (despite some negative short-term transition effects)
Germany	❑ An increase in employment by 0.55 per cent and a 2 per cent cut in CO_2 emissions between 1999 and 2010, by recycling energy tax revenue to subsidize social security contributions levied on labour ❑ Slight positive employment effects and a sharp fall in CO_2 emissions in response to an increase in the tax rates and the abolition of eco-tax exemptions ❑ 250,000 jobs were created by ecological tax reform over the period 1999–2003, particularly in labour-intensive sectors, while reducing fuel consumption and CO_2 emissions by 7 per cent and 2–2.5 per cent, respectively
Indonesia	❑ a 2 per cent GDP annual green investment in energy, transportation, forestry could generate between 938,984 and 1,270,390 jobs in four sectors with decent working conditions, many being green jobs.
Republic of Korea	❑ 11.8 to 14.7 million new jobs could be created by 2020 through US$97 billion in public investment committed for 2009–13 in support of a green transition
Lebanon	❑ Employment gains projected by 2020 in forestry: 15,000; waste management: 2500; construction: 2,800; and energy: 4,000 by 2020.

Country	Model and employment effects
Norway	❑ Net employment gains of 0.5–1.5 per cent could be realized through CO_2 mitigation actions that reduce emissions by 20 per cent over the period 2008–20, when revenues from carbon pricing are used to reduce social contributions (with exact results depending on the policy package considered)
Mauritius	❑ Significantly higher employment can be generated in green activities versus conventional ones per million rupees of final demand: 5 per cent more jobs in agriculture, 67 per cent more in manufacturing and textiles, over 60 per cent more in tourism/hotel services, and 75 per cent more in renewable energy
South Africa	❑ 98,000 new direct jobs can be created in the short term (2011–12), 255,000 in the medium term (2013–17), and 462,000 in the long term (2018–25) through low-carbon energy generation, energy and resource efficiency, emission and pollution mitigation, and natural resources management ❑ Over 106,000 new renewable energy jobs can be created by 2030 under an ambitious "energy revolution scenario" (compared to only 7,500 in the IEA's reference (BAU) scenario); total energy employment (including coal export jobs) would be 56 per cent higher than in the IEA reference scenario
United States	❑ 2.7 million jobs have been created in the "clean economy" industry in recent years, mostly among low- and middle-skilled workers, in the largest US metropolitan areas ❑ 2 million jobs can be created by investing US$100 billion in green recovery measures – four times more than would result by spending the same amount in the oil industry ❑ A net gain of 1.7 million jobs (2.5 million gained in the clean energy sector, with 800,000 jobs lost in the fossil fuel industries) could result from a US$150 billion green investment programme ❑ A gain of 918,000 to 1.9 million jobs by 2020 is possible through appropriate climate and clean energy policies, depending on the rigours and effectiveness of the provisions ❑ More than 4 million full-time equivalent job-years can be created by 2030 with aggressive energy efficiency measures combined with a 30 per cent Renewable Portfolio Standard (RPS) target for renewable energy; non-fossil fuel technologies create more jobs per unit of energy than coal and natural gas

Sources: **Australia:** Australian Conservation Foundation and Australian Council of Trade Unions: *Creating jobs – cutting pollution: The roadmap for a cleaner, stronger economy* (Melbourne, 2009); S. Hatfield-Dodds et al.: *Growing the green collar economy: Skills and labour challenges in reducing our greenhouse gas emissions and national environment footprint* (Canberra, CSIRO Sustainable Ecosystems, 2008). **Brazil:** C. de Gouvello: *Brazil low-carbon country: Case study* (Washington, DC, World Bank, 2010). **China:** Global Climate Network (GCN): *Low-carbon jobs in an interconnected world*, GCN Discussion Paper No. 3 (2010). **European Union:** E. Daly, M. Pieterse and J. Medhurst: *Evaluating the Potential for Green Jobs in the Next Multi-Annual Financial Framework* (London, GHK, 2011); Gesellschaft für Wirtsschaftliche Strukturforschung (GWS): *Macroeconomic modelling of sustainable development and the links between the economy and the environment* (Osnabrück, 2011); IILS: *World of Work Report 2009: The global jobs crisis and beyond*, op. cit.; M. S. Andersen and P. Ekins: *Carbon-energy taxation: Lessons from Europe* (Oxford, Oxford University Press, 2009). **Germany:** S. Bach et al.: "The effects of environmental fiscal reforms in Germany: A simulation study", in *Energy Policy*, Vol. 30 (2002), pp. 803–811; J. Frohn et al.: *Wirkungen umweltpolitischer Massnahmen: Abschätzungen mit zwei ökonometrischen Modellen* (Heidelberg, Physica Verlag, 2003); Bach et al.: *Die ökologische Steuerreform in Deutschland: Eine modellgestützte Analyse ihrer Wirkungen auf Wirtschaft und Umwelt (Heidelberg, 2001).* **Indonesia:** ITUC: *Growing green and decent jobs* (Brussels, 2012). **Republic of Korea:** Global Green Growth Institute: *Green growth in motion: Sharing Korea's experience* (Seoul, 2011). **Lebanon:** ILO: *Green jobs assessment in Lebanon* (Geneva, 2012). **Norway:** OECD: *Supplemental material for Chapter 4 of the 2012 OECD Employment Outlook: Summary of country responses to the OECD questionnaire on green jobs* (Paris, 2012). **Mauritius:** ILO: *Assessing current and potential green jobs: The case of Mauritius, policy brief* (Geneva, 2012). **South Africa:** J. Maia et al.: *Green jobs: An estimate of the direct employment potential of a greening South African economy* (Sandown, Industrial Development Corporation, Development Bank of South Africa, 2011); J. Rutowitz: *South African energy sector jobs to 2030* (Sydney, Australia, Institute for Sustainable Futures, University of Technology, 2010). **United States:** M. Muro et al.: *Sizing the clean economy: A national and regional green jobs assessment* (Washington, DC, Brookings Institution, 2011); R. Pollin et al.: *Green recovery: A program to create good jobs and start building in a low-carbon economy* (Political Economy Research Institute, University of Massachusetts, Amherst, 2008); R. Pollin, J. Heintz and H. Garett-Peltier: *The economic benefits on investing in clean energy* (Washington, DC, Center for American Progress, 2009); D. Roland-Holst and F. Karhl: *Clean energy and climate policy for US growth and job creation* (Berkeley, University of California, 2009); M. Wei et al.: "Putting renewables and energy efficiency to work: How many jobs can the clean energy industry generate in the US?", in *Energy Policy*, Vol. 38 (2010), pp. 919–931.

105. The OECD has simulated an illustrative emissions reduction scenario with a cross-country, multi-sector general equilibrium model (ENV-Linkages) to assess impacts on growth, employment and incomes in OECD countries. [4] In an economy where wages do not adjust fully to falling demand, growth and employment would fall by up to 2 per cent, unless the revenue from an emissions tax or an emissions trading scheme were recycled. By contrast, in a moderately "rigid" labour market, an environmental tax reform which recycles the revenue to reduce the cost of labour would increase OECD employment by 0.8 per cent above the BAU levels by 2030, while maintaining real incomes. The sharpest increases would occur in renewable energy industries.

106. In emerging economies such as Brazil, China, Mauritius and South Africa, green investments were found to accelerate economic growth and employment creation. A 2010 study by the World Bank for Brazil, for example, found that by adopting a low-carbon development path, including avoiding emissions from land-use change (reducing pasture areas and protecting forests), energy efficiency and renewable energy, GDP would grow 0.5 per cent per year above the BAU scenario between 2010 and 2030, while employment creation would be 1.13 per cent faster over the same period.

107. The 24 studies span a range of advanced and emerging countries and use a variety of different analytical approaches. The scenarios analysed range from economy-wide emissions reductions to increased recycling and rehabilitation of natural resources. In spite of this diversity the findings converge, with most indicating net gains in employment of 0.5–2 per cent. This would translate into 15–60 million additional jobs, based on today's labour force.

108. Most analysis has taken relatively modest existing or envisaged environmental policies as the driver, and employment outcomes as a passive result. Three studies on Australia, Germany and the European Union as a region have investigated the effects of more ambitious environmental targets and suggest that substantially larger employment gains are possible. They could make a significant contribution to reducing unemployment.

109. In one of the studies, the Australian Conservation Foundation (ACF) and the Australian Council of Trade Unions (ACTU) commissioned an economic modelling exercise to assess how to best protect jobs across all regions of Australia under the impact of climate change and climate-change policies. [5] The model assesses the effects of two different approaches – a "weak action" scenario and a "strong action" scenario. The weak action scenario is a "markets only" approach. It assumes a price on greenhouse pollution (using an emissions trading scheme) as the sole instrument to reduce Australia's pollution levels. The strong action scenario is a "markets plus" approach where an emissions trading scheme is complemented by a targeted suite of policies to reduce greenhouse pollution domestically. The study reveals that both methods not only reduce CO_2 emissions, but also increase employment compared to BAU, with 770,000 additional jobs under the strong action scenario. This would be an employment gain of 5–6 per cent by 2030.

110. In the search for ways out of the recent financial and economic crisis, an interdisciplinary group of researchers analysed a more ambitious environmental policy for Germany. This would lead to a strong push in environmental investment, lifting GDP

[4] J. Chateau, A. Saint-Martin and T. Manfredi: *Employment impacts of climate change mitigation policies in OECD: A general-equilibrium perspective*, OECD Environment Working Paper No. 32 (Paris, OECD, 2011).

[5] ACF and ACTU: *Creating jobs – cutting pollution: The roadmap for a cleaner, stronger economy* (Melbourne, 2009).

growth for 2010–20 to over 2 per cent instead of little over 1 per cent per year in the absence of new policies. This would create about 2 million additional jobs (+5 per cent of total employment) relative to BAU. Unemployment would fall by only 1 million because more people without a job would be encouraged to look for work again. A concerted approach with other European Union countries would lead to significantly better outcomes than a "Germany alone" approach. [6]

111. A recent study on the countries of the European Union concludes that the employment outcomes from ambitious climate protection policies could be significantly more positive: "In the coming decade, Europe will need to accept the challenge of increasing economic growth while reducing both unemployment and greenhouse gas emissions." [7] New model results show that these three goals can actually reinforce one another: "… over the coming decade raising the EU's climate target from 20 per cent to 30 per cent can foster the following outcomes": (i) increase the growth rate of the European economy by up to 0.6 per cent per year; (ii) create up to 6 million additional jobs Europe-wide; (iii) boost European investments from 18 to 22 per cent of GDP in 2020; and (iv) increase European GDP in 2020 by 5.7 per cent over BAU while reducing emissions by 11 per cent. In the green growth scenario, unemployment in the EU-27 would be at 13.4 million by 2020 (5.3 per cent), as opposed to 19.4 million (7.6 per cent) under BAU – almost one third lower. [8]

112. Prospects in developing countries and emerging economies with little or no legacy of carbon- and resource-intensive infrastructure could be even better. These countries would reap the productivity and employment gains of twenty-first century environmental technology without substitution effects.

2.1.2. Job quality and the upgrading of existing jobs

113. While a growing amount of analysis has been undertaken on the changes to the numbers of jobs in a greener economy, there is only limited evidence on the evolution of job quality.

114. The quality of indirect jobs in supply industries and of induced jobs from changed expenditure patterns and respending of savings from energy and resource efficiency are unlikely to change per se as a result of greening. Changes in job quality are mostly a function of the types of jobs created and those lost.

115. Much of the additional employment in a greener economy will be created in the production of green goods and services. An assessment of a broad range of green jobs in the United States concludes that they compare favourably with non-green jobs in similar sectors in terms of higher skills levels and comparable or higher wages. Similarly, research in China, Germany and Spain has found the quality of new renewable energy jobs to be good. Data from Germany [9] and Spain [10] indicate that renewables jobs are overwhelmingly permanent, full-time positions, with only a small share of temporary

[6] C.C. Jaeger et al.:*Wege aus der Wachstumskrise* (Potsdam, European Climate Forum, 2009).

[7] C.C. Jaeger et al.: *A new growth path for Europe: Generating prosperity and jobs in the low-carbon economy, Final report* (Potsdam, European Climate Forum, 2011), p. 5.

[8] ibid., p. 80.

[9] Wissenschaftsladen Bonn: *Einstieg in Erneuerbare Energien gelingt leichter: Mehr Studiengänge und Jobs denn je*, 29 Oct. 2010. Available at: http://www.jobmotorerneuerbare.de/htdocs/index.php?detail=1&newsnr=131&lan=de&sID=0801&ToS=news.

[10] O. Strietska-Ilina et al.: *Skills for green jobs: A global view*, synthesis report based on 21 country studies (Geneva, ILO, 2011).

employment. In both countries, the renewables sector outperforms the economy as a whole in this regard. Studies in both countries also indicate that the qualification levels of workers in the renewable energy sector exceed the average for the national workforce by a substantial margin, in terms of both university degrees and vocational education and training levels. [11]

116. In China, too, workers at wind firms had higher average annual incomes and better job security, experienced better occupational conditions and enjoyed a higher level of workplace protection measures than their counterparts in conventional power plants. Some 77 per cent of Chinese wind power workers surveyed considered their work environment "very good", compared with just 18 per cent in large thermal power plants and 13 per cent in small plants. [12]

117. There is no question that switching from fossil fuels to renewables entails a vast improvement in the occupational health situation. This is especially true with regard to coalmining. Although the work tends to pay well, coalmining is one of the most hazardous industries for workers in terms of their long-term health and exposure to accidents. [13] Some occupational hazards do of course exist in the renewables sector as well, such as potential exposure to a number of toxic substances in solar PV manufacturing, which requires proper safety and waste recovery procedures. Emerging thin-film and nanotech-based solar technologies may prompt new occupational concerns. [14] In the still young concentrated solar power (CSP) industry, construction and maintenance of industrial-scale installations entails some electrical hazards, and hazards from concentrated sunlight in the form of potential exposure to high temperatures. For solar thermal equipment, installers who previously worked only on gas systems will face increased exposure to electrical work. [15]

118. As has been seen in Chapter 1, many of the jobs directly affected by environmental sustainability are in primary sectors of the economy such as agriculture, forestry, and fishing. Others are in waste collection and recycling, or building construction. In many parts of the world, these sectors involve a large number of jobs that are low-paid, strenuous or even dangerous. They typically offer little in the way of job security or social benefits, and a large proportion is in the informal economy.

119. A competent, skilled and motivated workforce is indispensable for better environmental performance. Without improvements in conditions, key sectors are unlikely to attract and retain the right calibre of workers. Across a number of economic sectors there is therefore a need and a significant opportunity for increasing the quality of work through improved working conditions, better occupational safety and health and higher incomes. Agriculture, waste management and recycling, and construction stand

[11] European Commission (EC) and ILO: *Skills and occupational needs in renewable energy* (Geneva, ILO, 2011).

[12] Institute for Labor Studies (ILS) and Chinese Ministry of Human Resources and Social Security (MOHRSS): *Study on green employment in China* (Beijing, ILO Office for China and Mongolia, 2010).

[13] S.A. Summer and P.M. Layde: "Expansion of renewable energy industries and implications for occupational health", in *Journal of the American Medical Association*, Vol. 302 (2009), No. 7, 19 Aug.

[14] Silicon Valley Toxics Coalition (SVTC): *Toward a just and sustainable solar energy industry* (San Jose, CA, 2009).

[15] European Agency for Safety and Health at Work (EASHW): *Foresight of new and emerging risks to occupational safety and health associated with new technologies in green jobs by 2020: Phase II – Key technologies* (Luxembourg, 2011).

out in this regard, [16] albeit for different reasons and with different options for achieving the necessary improvements.

Agriculture

120. In no other sector do the social and environmental challenges stand in greater contrast to one another. Even though its share has fallen over the last two decades, agriculture is the largest employer in the world, with a global workforce of over 1 billion – about one in every three workers. [17] With agricultural incomes growing more slowly than GDP, [18] it is also the sector with the highest concentration of poor people, two-thirds of whom live in rural areas. Yet agriculture is one of the largest emitters of greenhouse gases and, very probably, the sector most vulnerable to climate change. [19] Moreover, it is the largest user (70 per cent), and a significant polluter, of water and a key cause of land degradation and loss of biodiversity. [20]

121. Despite these issues, an increase of up to 70 per cent of world food production from levels in 2000 is needed to feed a growing population and provide a more resource-intensive diet. The evidence suggests [21] that these challenges can be met if there is a strong drive to train farmers in productive farming methods with a low environmental impact, especially among small-scale farmers in developing countries. Low-impact methods tend to be more labour-intensive, and therefore would allow agriculture to continue to absorb new workers in the short to medium term. These methods can also improve working conditions, in particular with regard to occupational safety and health. In particular, the responsible use and management of pesticides and other hazardous chemicals can make a major contribution to improved occupational health and safety as well as reduced environmental impact.

122. One of the most important policy measures to achieve this outcome, then, is to enhance the skills and capabilities of smallholder farmers in developing countries. To do this, investment in extension services will be required, and will need to be complemented by rural infrastructures and the development of the non-farm rural economy.

123. Successful outcomes will require a narrowing of the income gap between farm and non-farm households, which has widened over the past decades. Significantly higher incomes and poverty reduction can be achieved if output increases while production costs fall. Examples from Madagascar and India [22] as well as Uganda (see box 2.1) show that substantial improvements are possible in a relatively short time frame, relying on improved farming methods and marketing. Over the longer term, growing mechanization and an increase in the average size of farms are likely to be necessary to ensure that incomes in agriculture remain attractive relative to those in other sectors.

[16] The following text is a condensed version of the analysis presented in the respective sector chapters of ILO and IILS: *Working towards sustainable development*, op. cit. The reader is referred to these chapters for a more comprehensive consideration of the subject.

[17] ILO: *Global employment trends 2012*, op. cit.

[18] World Bank: *World Development Report 2008: Agriculture for development* (Washington, DC, 2008).

[19] IPCC: *Fourth assessment report: Climate change 2007*, op. cit.

[20] OECD: *Environmental outlook to 2030*, op. cit.

[21] UNEP: *Towards a green economy*, op. cit.

[22] See ILO and IILS: *Working towards sustainable development*, op. cit., pp. 25 and 28.

Box 2.1
Sustainable agriculture in Uganda

Agriculture is Uganda's major source of GDP and provides 69 per cent of all employment. The sector's output comes exclusively from about 4.5 million smallholder farmers, 80 per cent of whom own less than two hectares of land.

Uganda has undergone a significant process of land conversion in the past two decades, starting as early as 1994 when a few commercial companies chose to engage in organic agriculture. By 2003, a general movement towards developing sustainable agriculture as a means of improving people's livelihoods had turned Uganda's land area under organic agriculture production into the world's 13th largest, and the largest in Africa.

Since then, sustainable practices have continued to expand. In 2011 the country had 226,954 hectares under organic agricultural management (up from 210,245 hectares in 2008–09). The number of farmers certified organic went from 180,746 to 187,893. Income improved with the farm-gate prices of organic pineapple, ginger and vanilla in 2006, by 300, 185 and 150 per cent higher, respectively, than those of conventional products. Uganda's certified organic exports increased from US$3.7 million in 2003–04 to US$22.8 million in 2007–08.

Organic farming is also a low-carbon growth path. GHG emissions per hectare are estimated to be on average 64 per cent lower than emissions from conventional farms, as organic fields sequester 3–8 tonnes more carbon per hectare than conventionally cultivated fields.

Sources: G. Tumushabe et al.: *Integrated assessment of Uganda's organic agriculture subsector: Economic opportunities and policy options to mitigate negative socio-economic and environmental impacts* (Kampala, Advocates Coalition for Development and Environment (ACODE), 2007); C. Namuwoza and H. Tushemerirwe: "Uganda: Country report 2011", in H. Willer and L. Kilcher (eds): *The world of organic agriculture: Statistics and emerging trends 2011* (Bonn, International Federation of Organic Agriculture Movements (IFOAM), 2011); UNCTAD and UNEP: *Organic agriculture and food security in Africa* (New York and Geneva, UN, 2008); UNEP: *Green economy: Developing countries success stories* (Nairobi, 2010).

124. Employment guarantee schemes, as part of national social protection floors – in line with the ILO Social Protection Floors Recommendation, 2010 (No. 202) – can also play a major role in sheltering rural communities from crop failures, injecting finance into cash-starved rural areas and creating productive infrastructure. The Mahatma Gandhi National Rural Employment Guarantee Act in India (see box 2.2), for example, links direct income transfers through public works programmes on a large scale with investment in rural water management, irrigation, soil improvement and access to roads.

Box 2.2
The Mahatma Gandhi National Rural Employment Guarantee Act, India (MGNREGA)

Devised as a public employment programme, MGNREGA provides at least 100 days of guaranteed wage employment per financial year to every rural household whose adult members volunteer to undertake unskilled manual work. Environmental protection and conservation, such as soil and water conservation, drought proofing (including reforestation), flood protection, small-scale irrigation and horticulture and land development, constitute the lion's share of work performed.

There are many issues regarding the planning and technical quality of works, embedding into local development and governance. There is also room for increasing the access for adult members of families who are, in principle, entitled to guaranteed work, and for improving working conditions and building pathways out of what is essentially a transfer scheme. MGNREGA is nevertheless clearly a major step in the right direction.

The Act represents a massive investment in the rehabilitation of natural capital related to poverty reduction. The programme has an economic as well as a social and environmental function, and is part of the broader sustainable development agenda which includes the National Action Plan on Climate Change (NAPCC, 2008). An interministerial task force deals with employment issues related to climate change, renewable energies and green jobs.

According to a study conducted by the Centre for Science and the Environment in 2009, the programme has managed most notably to increase water availability and improved agricultural production through better access to irrigation. This has also led to greater crop diversity and enabled farmers to switch from single to dual crops. Similar programmes, albeit on a smaller scale, are also being implemented in South Africa.

Sources: UNDP India: Rights-based legal guarantee as development policy: The Mahatma Gandhi National Rural Employment Guarantee Act, Discussion paper (New Delhi, 2010); M.R. Lieuw-Kie-Song: Green jobs for the poor: A public employment approach, Poverty Reduction Discussion Paper PG/2009/02 (New York, UNDP, 2009); M. Harsdorff, M. Lieuw-Kie-Song and M. Tsukamoto: Towards an ILO approach to climate change adaptation, ILO Employment Working Paper No. 104 (Geneva, ILO, 2011).

125. Solutions must be adapted to specific situations, built on the local farming system and developed in cooperation with the farming communities themselves. The organization of farmers and workers is an important stepping stone to give rural communities a voice in policy-making for rural development and greening agriculture, especially the inclusion of women farmers. Organization will also be critical for acquiring the capability to implement more productive, low-environmental impact farming methods. The formation of cooperatives can help with access to know-how, inputs, finance and markets at fair prices, as illustrated by the experience of large cooperatives such as the Oromia Coffee Growers in Ethiopia which is bringing substantial benefits to over 200,000 producers of organically grown coffee, or the cocoa farmer cooperative Kuapa Kokoo in Ghana.[23] In Costa Rica and India, cooperatives have become leaders in the production of carbon-neutral coffee and in using agricultural residues for power generation.

126. In industrialized countries, skills upgrading coupled with reforms of agricultural subsidies towards remuneration of environmental services would make a major contribution and also improve incomes and export prospects in developing countries.

Waste management and recycling

127. In a world faced with escalating volumes of often hazardous waste, increased emphasis on recycling and waste management will be necessary to reduce pressure on natural resources and safeguard the environment. This will create new employment, but the biggest challenge is upgrading informal to formal employment to cope with more complex recycling processes and offer workers secure jobs with acceptable income levels, and to protect them from traditional and new hazards such as electronic waste.

128. The waste management and recycling industry is already a significant employer: an estimated 4 million workers are employed in the formal sector[24] with another 15–20 million estimated to be working as informal waste-pickers in developing countries.[25] Although little firm data exists, it is thought that a large percentage of

[23] For additional information, see ibid., p. 30.

[24] Based on studies in China, Europe and the United States; see Tellus Institute: *More jobs, less pollution: Growing the recycling economy in the U.S.* (Boston, 2011); Friends of the Earth UK: *More jobs, less waste* (London, 2010).

[25] Calculated on the basis of C. Bonner: "Waste pickers without frontiers", in *South African Labour Bulletin*, Vol. 32 (2008), No. 4.

workers involved in recycling and waste management are women, often working as waste-pickers at the lower end of the informal economy.

129. Increased recycling can lead to significant gains in energy and employment. Specifically, recycling saves large amounts of energy when compared with the mining and processing of raw materials. Recycling aluminium, for example, offers savings of 95 per cent; the rates for steel (74 per cent) and paper (65 per cent) are also substantial. [26]

130. Recycling can also lead to net gains in employment quantity and quality in comparison to traditional jobs in landfill or incineration of waste. US assessments have found that sorting and processing of recyclables sustains ten times as many jobs per tonne as landfill or incineration, a finding confirmed by a report from the United Kingdom. And a study in India puts the recycling advantage as high as 24:1. A European Environment Agency study also concluded that recycling creates more jobs at higher incomes than landfilling or incinerating waste. [27] The employment potential is particularly strong in countries whose recycling rates are currently low, as is the case in most developing countries and in Central and Eastern Europe.

131. Much greater quantities of recyclable materials are recovered by informal waste-pickers than by formal waste management companies. Informal pickers generate a net economic benefit for the municipalities where they work. However, informal recycling often involves hazardous working conditions for waste-pickers, many of whom live in poverty. Typically working without any kind of protective equipment, they are exposed to a range of toxins and microbial or parasitic infections. The recovery of valuable metals from electronic waste is also often carried out in ways that endanger the pickers' health and safety. Moreover, waste increasingly contains hazardous chemicals and nano-materials.

132. Recycling will only become a truly green activity when it is formalized. In fact, organization of workers can turn waste management and recycling into a very significant opportunity for social inclusion and help improve working conditions, safety and health and earnings. One way to achieve this is for waste-picker cooperatives to be recognized by municipal authorities, as is demonstrated by a number of examples in Latin America, especially in Brazil and Colombia, as well as Sri Lanka (see box 2.3). [28] Indeed, working with community and waste-picker organizations is infinitely preferable to trying to sideline them through ill-conceived privatization efforts.

[26] Bureau of International Recycling (BIR): *Once upon a time ... The story of BIR, 1948–2008* (Brussels, 2009).

[27] Institute for Local Self-Reliance (ILSR): *Recycling means business* (Washington, DC, n.d.). Available at: http://www.ilsr.org/recycling/recyclingmeansbusiness.html; Friends of the Earth UK: *More jobs, less waste*, op. cit.; Alliance of Indian Wastepickers: *Livelihoods with dignity* (Pune, 2010); European Environment Agency: *Earnings, jobs and innovation: The role of recycling in a green economy* (Copenhagen, 2011).

[28] C. Bonner: "Waste pickers without frontiers", op. cit.; M. Khullar, M (2009) "Surviving on scrap", in *Scrap* magazine, Sep./Oct. 2009; AVINA: *Brazilian President Launches the "CataAção" Program* (2009) and *Brazil sanctions national policy that formalizes the work of 800,000 recyclers* (2010), online articles, available at: http://www.informeavina2010.org/english/reciclaje.shtml.

Box 2.3
Upgrading recycling work in Brazil and Sri Lanka

Brazil

Brazil has the world's largest national waste-pickers' movement. The income of its some 60,000 members is three to five times higher than that of unorganized waste-pickers. This is the fruit of an effective mix of policies put in place by the Brazilian Government over the past decade. Policies include legal recognition, entrepreneurial development, municipal government contracts and facilities (sorting stations), modern recycling methods, skills development and occupational safety and health precautions, as well as measures to prevent and discourage child labour. These measures have triggered large-scale improvements in recycling efficiency, working conditions and incomes. The Brazilian poverty eradication strategy *Brasil Sem Miséria*, launched by President Rousseff in June 2011, aims to scale this up and formalize a further 250,000 waste-pickers in addition to the over 60,000 already organized.

Sri Lanka

Sri Lanka has initiated a strategy to improve working conditions and the formalization of jobs among the most vulnerable categories of informal workers, including those in waste management. A total of 4,000 waste handlers, truck drivers, waste sorters/collectors and local communities across seven zones in the Western Province have been sensitized on occupational health and safety at work. OSH standards have been integrated into the National Vocational Qualification (NVQ) certification for waste management operations, endorsed by the national Tertiary and Vocational Education Commission (TVEC). The national OSH Act was expanded to the workplaces and workers involved in waste management. The Waste Management Authority agreed to training for the 4,000 workers on bargaining and collective issues, provided by trade unions.

Sources: **Brazil:** S.M. Dias: *Overview of the legal framework for inclusion of informal recyclers in solid waste management in Brazil*, WIEGO Urban Policies Briefing Note No. 8 (Cambridge, MA, WIEGO, 2011); S.M. Dias and F.C.G. Alves: *Integration of the informal recycling sector in solid waste management in Brazil* (GTZ, 2008); **Sri Lanka:** ILO: *Employment creation model in Sri Lanka: Promoting green jobs and livelihoods in municipal solid waste management* (Jakarta, 2012).

Buildings and construction

133. Buildings are the single largest consumer of energy and the largest emitter of greenhouse gases. Yet the building sector also has the highest potential for improving energy efficiency and reducing emissions. Experience in a growing number of countries, both industrialized and developing, demonstrates that the construction of energy- and resource-efficient buildings requires competent enterprises and a skilled workforce.

134. Many investments in energy- and water-efficient buildings are cost-effective. The large stocks of older and inefficient buildings, notably in industrialized countries, mean that greater emphasis on renovation could yield substantial environmental benefits. For emerging economies and developing countries, leapfrogging directly to high-performance new buildings will avoid a legacy of high energy, water and resource consumption which otherwise would endure for decades.

135. Poorly installed equipment and materials do not yield expected gains in efficiency and emissions reduction, as a study from California shows. Worker training is part of the remedy, but must be accompanied by efforts to overcome market conditions that lead many employers to compete on cost rather than on the basis of quality, along with better enforcement of building permits, codes and standards.[29] Skills upgrading and

[29] Institute for Research on Labor and Employment: *California workforce education and training needs assessment for energy efficiency, distributed generation, and demand response* (Berkeley, CA, 2011); Good Jobs First: *High road or low road? Job quality in the new green economy*, report written by P. Mattera et al. (Washington, DC).

redesigning of work methods will also be needed to overcome traditional occupational safety and health hazards such as asbestos, a legacy which needs to be dealt with in building renovation, and to prevent possible new hazards associated with new construction materials and methods.

136. In Gaza an ILO study [30] on reconstruction works and low-cost housing showed that significant economic, employment and environmental gains can be made by using compressed earth blocks and other recycled building material as an alternative to cement. Gains are also made through the sustainable use of existing water resources and the reuse of sewage water, as well as by introducing energy-efficiency measures and using renewable energy sources such as solar and wind. Yet these gains can only be realized if the shift towards green construction is accompanied by skills development strategies that address the skills gaps at all levels of occupation.

137. Targeted investments in skills upgrading and certification of building firms, formalization (notably of SMEs, which dominate the sector) and improvements in working conditions to retain qualified workers are essential components of a successful strategy.

138. There are at least 110 million formal sector construction workers employed worldwide, and an unknown number of labourers working in informal jobs with generally poor working conditions. Even jobs in the formal construction sector are among the most hazardous forms of employment in terms of work accidents and occupational diseases. Jobs are also often temporary, with complex subcontracting arrangements. In most countries, a large part of the workforce has low skill levels and a high proportion of migrant workers.

139. The renovation of existing and the construction of new energy-efficient buildings also represent large potential employment benefits. Jobs are created not only in the construction sector, but also in industries that produce insulation and other efficiency materials, as well as in the growing energy services sector. [31] A policy mix of building standards, credit and incentives, as well as intermediaries such as energy service companies, can boost green building renovation activity, with public finance crowding in private investment.

140. Retrofitting investments can have a strong immediate effect on employment generation in the construction sector and its suppliers. Moreover, savings from improved efficiency will be channelled back into the economy with important multiplier effects on economic activity, employment creation and income generation. The International Energy Agency's *World Energy Outlook*, for example, estimates that a US$2.5 trillion additional investment in green buildings globally between 2010 and 2030 would yield US$5 trillion in energy savings over the life of the investment. [32]

141. The large-scale renovation programme for energy efficiency in Germany, for example, has mobilized investments of almost €100 billion since 2006. It directly maintains as many as 300,000 jobs in the building industry. The programme is also notable for the fact that it was initiated jointly by trade unions, employers and non-

[30] ILO: *Towards sustainable construction and green jobs in the Gaza Strip* (Geneva, 2012).

[31] Syndex, S. Partner and WMP Consult: *Climate disturbances, new industrial policies and ways out of the crisis* (ETUC, 2009); ILO: *Skills and occupational needs in green building* (Geneva, 2011); H.K. Trabish: *The multibillion-dollar value of energy service companies*, 31 Oct. 2011. Available at: http://www.greentechmedia.com/articles/read/The-Multi-Billion-Dollar- Value-of-Energy-Service-Companies/.

[32] IEA: *World Energy Outlook 2009* (Paris, 2009).

governmental organizations (NGOs) – a cooperative model rooted in social dialogue. [33] A US study found that energy efficiency retrofits of the pre-1980 building stock could reduce electricity use by 30 per cent and create more than 3.3 million cumulative job-years of employment. [34] A longer term (2011–50) assessment of the EU's Energy Performance of Buildings Directive impacts concluded that an accelerated pace of renovation could generate an average 0.5 million to 1.1 million jobs per annum. [35] Box 2.4 illustrates the potential in the case of Hungary.

Box 2.4
The employment benefits of green retrofitting in Hungary

A recent study undertaken by Ürge-Vorsatz et al. looking at the net employment impacts of a large-scale energy-efficiency renovation programme in Hungary simulates five scenarios, including a "deep retrofit, fast implementation rate" scenario which assumes that 5.7 per cent of the total floor area will be renovated per year.

A renovation programme of this scale could generate up to 131,000 net jobs in the country, whereas a less ambitious scenario would see the creation of only about 43,000 new jobs. Under the "deep renovation" scenario, job creation would peak in 2015 with a massive 184,000 new jobs, notwithstanding employment losses in the energy-supply sector. It is important to highlight that almost 38 per cent of these employment gains derive from indirect effects on sectors supplying the construction sector, as well as from the higher spending power resulting from the previous rise in employment.

Source: D. Ürge-Vorsatz et al.: *Employment impacts of a large-scale deep building energy retrofit programme in Hungary* (Budapest, Central European University, 2010).

142. Energy- and resource-efficient social housing has the potential to improve living standards and shield poor households from rising energy prices, while avoiding costly investments in power-generation capacity. This is demonstrated by the Brazilian programme *Minha Casa, Minha Vida* (My Home, My Life) for low-income families, which aims to equip 300,000 houses with solar water-heaters, saving families 40 per cent on their energy bills (see also box 3.7). The programme is also expected to create 30,000 additional skilled jobs related to the manufacturing and installation of the equipment. [36] Energy access can also have wider employment and income benefits.

2.1.3. Contributing to social inclusion

143. Chapter 1 pointed out that the poor are disproportionately affected by the deterioration of the natural environment such as pollution, biodiversity loss or the impact of climate change. While their income is heavily skewed towards direct dependence on natural resources, a much higher share of the expenditure of poor households goes for energy (direct as well as embedded energy such as food and transport) than among wealthier households. The situation is aggravated by the fact that many poor households have no access to energy-efficient housing or transport.

[33] German Federal Ministry of Transport, Building and Urban Development: *CO_2 – Gebäudesanierung – Energieeffizient Bauen und Sanieren: Die Fakten*, 23 May 2012. Available at: http://www.bmvbs.de/SharedDocs/DE/Artikel/SW/co2-gebaeudesanierung-energieeffizient-bauen-und-sanieren-die-fakten.html?nn=35748.

[34] Deutsche Bank Climate Change Advisors and Rockefeller Foundation: *United States building energy efficiency retrofits: Market sizing and financing models* (New York, 2012).

[35] Buildings Performance Institute Europe: *Europe's buildings under the microscope* (Brussels, 2011).

[36] ECLAC and ILO: "The employment situation in Latin America and the Caribbean", in *ECLAC/ILO Bulletin* No. 4, Dec. 2010; C.F. Café: *Brazil: Low-income multi-family house with individual solar water heaters and gas back-up* (Global Solar Thermal Energy Council, 2011). Available at: http://www.solarthermalworld.org/node/2810.

144. However, with the right investment and policy conditions, the transformation to environmental sustainability offers the possibility of greater social inclusion, including better opportunities for women and thus contributing to gender equality. New services and related employment opportunities can become available for people hitherto excluded or disfavoured in the labour market. Two ways in which this is starting to happen are access to clean energy and payment for environmental services.

Energy access

145. Some 1.3 billion people in developing countries have no access to clean modern energy at all and 2.7 billion do not have clean and safe cooking facilities. [37] On current trends of extending access, some 15 per cent of the world population would still be without access in 2030. The majority of them would be living in sub-Saharan Africa. [38] Greater efforts to promote income security and affordable renewable energy can make a major contribution to overcoming energy poverty and the lack of access to energy. Moreover, they can also create badly needed employment and income opportunities in the production of energy and even more so through the use of that energy. The use of electricity in particular has enormous potential to improve productivity. As pointed out in a revealing recent study shedding new light on the historic drivers of economic productivity, the highest increases sustained over the longest period have been associated with the introduction of electricity, sanitation and running water. [39]

146. A programme in Bangladesh initiated by the NGO Grameen Shakti and further scaled up with support from the Bureau of Manpower, Employment and Training demonstrates the benefits, and how access to clean energy can be achieved at scale (see box 2.5).

Box 2.5
Solar home systems in Bangladesh

Approximately half of the population of Bangladesh – some 85 million people – lacks access to grid-based electricity. The Government issued a roadmap in 2010 to extend electrification to all Bangladeshis. Since 2003, installations of solar home systems (SHS) have grown rapidly, reaching about 1.4 million units by April 2012. The driving force behind these efforts has been Grameen Shakti, a subsidiary of micro-credit pioneer Grameen Bank.

The current goal is to reach 2 million SHS by 2014. Solar home systems offer a light source that is far more powerful than highly polluting kerosene lamps, and provide battery power for mobile phones, radios and televisions. The power output facilitates the growth of small businesses, such as mobile phone-charging, and increases the hours during which children can study for school.

The most recent estimates put the number of SHS sector jobs in Bangladesh at 60,000 or more. The introduction of SHS requires a range of skills and occupations, including solar energy technicians, service engineers, branch managers and financial specialists. Most of the workers are young "field assistants" who sell and install SHS, and provide maintenance services. Grameen Shakti's goal is to reach at least 100,000 direct jobs by 2015. Technical training programmes at about 50 Green Technology Centres (GTC) have benefited several thousand people.

[37] The Secretary-General's High-level Group on Sustainable Energy for All: *Sustainable energy for all: A framework for action* (New York, 2012).

[38] IEA, UNDP and UNIDO: *Energy poverty: How to make modern energy access universal?* (Paris, IEA, 2010).

[39] R.J. Gordon: *Is U.S. economic growth over? Faltering innovation confronts the six headwinds,* NBER Working Paper No. 18315 (Cambridge, MA, 2012).

Women have been major beneficiaries. Some 5,000 women have been instructed in the proper usage of SHS, and more than 1,000 female technicians trained to assemble, install and maintain them; the GTC are run by female engineers.

Given the high priority the Government of Bangladesh has accorded to renewable energy sources,[1] the Bureau of Manpower, Employment and Training (BMET) and the ILO, in collaboration with the Infrastructure Development Company Limited (IDCOL) are partnering with Grameen Shakti to scale up and standardize skill acquisition among solar technicians and entrepreneurs. Competency-based training courses have been developed and delivered. Curricula, competency standards and occupational profiles are built into the country's National Technical and Vocational Qualification Framework (NTVQF). Trainees will thus have the opportunity to have their skills and competencies assessed and obtain a national certificate under the Framework.

[1] The National Renewable Energy Policy, 2008 sets a target for renewable energy resources to meet 10 per cent of the national demand for electricity by 2020.

Sources: O. Strietska-Ilina et al. (2011) *Skills for green jobs: A global view*, op. cit.; IDCOL: *Progress with SHS's installation up to 31 December 2011*. Available at: http://www.idcol.org/prjshsm2004.php; K. Bimesdoerfer, C. Kantz and J. R. Siegel: *Killing two birds with one stone: Driving green jobs through creating a rural renewable energy systems industry*, paper presented at UNRISD Conference on Green Economy and Sustainable Development, October 2011, Geneva; C. Arthur: "Women solar entrepreneurs transform Bangladesh", in *Policy Innovations*, 16 Aug. 2010; UNCTAD: *Trade and Environment Review 2009/2010* (New York and Geneva, 2009); UNEP: *Towards a green economy,* op. cit.

147. The example of Bangladesh shows that a greener economy could also contribute to greater gender equality. Women would be the main beneficiaries from improvements in smallholder agriculture and in recycling, for example. Access to clean energy, to energy-efficient social housing and to affordable public transport would all alleviate current burdens on women and open up new opportunities. However, broader and deeply rooted constraints to a higher involvement and proportionate benefit of women in the green economy may well persist in other situations. This is further discussed in Chapter 4.

148. Tunisia's Solar Programme (PROSOL) is another encouraging story, providing more than 50,000 families with solar hot water services to date. Over 1,000 enterprises have entered the solar installation business, creating substantial numbers of jobs. The early success convinced the Government to nearly double the target area for installed surface to 750,000 square meters in 2010–14. [40]

149. Energy access can also be enhanced through mobilizing social organizations such as cooperatives, as examples from a growing number of countries show, including Argentina, Cambodia, Germany, India, Mexico, and with a long tradition the United States (see also box 3.8).

150. The Sustainable Energy for All Initiative launched by the UN Secretary-General at the Rio +20 Conference aims at ensuring universal access to modern energy services, doubling the global rate of improvement in energy efficiency and doubling the share of renewable energy in the global energy mix by 2030. Wider initiatives to enhance income security, such as through building national social protection floors, can also help to promote access to energy.

Payment for environmental services

151. Environmental services have significant economic benefits, often way beyond the locations and the communities where they are produced. Protecting forests in mountainous areas, for example, produces clean water and shelters downstream settlements and infrastructure from floods and landslides. Preserving tropical rain forests is a major contribution to maintaining global biodiversity and to restricting GHG

[40] UNEP: *Green economy: Developing countries success stories*, op. cit. Available at: http://www.unep.org/greeneconomy/SuccessStories/SolarenergyinTunisia/tabid/29871/Default.aspx.

emissions. While the benefits accrue to downstream communities or even the world population at large, local communities incur the direct or the opportunity cost for providing the service. The rural and coastal populations concerned are often among the poorest in the country. Programmes operating as part of or linked to national social protection floors are proving to be a powerful mechanism to link environmental and social objectives.

152. Payments to such communities are often necessary in order to enable them to continue rendering the services provided. Private companies as well as governments have begun to establish arrangements with local communities. [41] Government schemes on a large scale include payments to farmers in Costa Rica [42] and in the European Union, the MGNREGA programme in India (see box 2.2), the *Bolsa Verde* Programme in Brazil and the Expanded Public Works Programme in South Africa (see box 2.6). In Indonesia, community contracts have been a very successful mode of implementation in the Rural Access and Capacity Building Project (RACBP) in Nias, which is part of the Reconstruction Continuation Plan of the Government.

Box 2.6
Green grants in Brazil and green public employment schemes in South Africa

The *Bolsa Verde* (Green Grant) Programme in Brazil compensates poor families affected by policies to reduce deforestation. It supplements the national *Fome Zero* (Zero Hunger) and *Bolsa Família* (Family Allowance) programmes which provide income support to poor households generally. The *Bolsa Verde* was introduced as part of the President's strategy for poverty eradication. In its first year it provided monthly payments of BRL70 (about US$35) each to about 16,634 poor families in protected public areas as compensation for the environmental service of preserving these areas. There are plans to extend the coverage to 300,000 families, encompassing a broader range of measures, such as clean energy use.

The Extended Public Works Programme (EPWP) in South Africa pursue a similar mix of poverty reduction and community-led development objectives through investments in economic, social, and environmental infrastructure. Acknowledging that unemployment is caused by structural rather than cyclical problems, the EPWP was launched in 2004, creating some 1 million work opportunities by 2008. The second phase of the programme aims to create almost 5 million work opportunities by 2014 (equivalent to 2 million full-time equivalent (FTE) jobs for one year). The environmental scheme "Working for Water" improves water management through the removal of invasive alien vegetation; it has created the equivalent of 14,000 FTE jobs and aims to create another 10,000 by 2017. Other schemes contributing to providing jobs to vulnerable groups and local communities involve wetland and forest rehabilitation, fire management and renewable energy production.

Sources: **Brazil:** Brazilian Government: *Brazil launches national Poverty Alleviation Plan*, press release. Available at: http://www.brasil.gov.br/para/press/press-releases/brazil-launches-national-poverty-alleviation-plan/newsitem_view?set_language=en; **South Africa:** ILO: "*Gundo Lashu* (Our Victory): Labour-intensive public roads programmes in South Africa", in *World of Work*, No. 70 (Geneva, ILO, 2010); T.I. Nzimakwe: "Addressing unemployment and poverty through public works programmes in South Africa", in *International NGO Journal*, Vol. 3 (2008).

153. One of the most promising global payment schemes involving international transfers from industrialized to developing countries is Reduced Emissions from

[41] For examples from Africa and Nicaragua see ILO and IILS: *Working towards sustainable development*, op. cit., pp. 44 and 45.

[42] R. Ortiz Malavasi, L.F. Sage Mora and C. Borge Carvajal: *Impacto del programa de pago por servicios ambientales en Costa Rica como medio de reducción de pobreza en los medios rurales* (San José, Costa Rica, RUTA, 2003).

Deforestation and Forest Degradation (REDD+) under the UNFCCC. The initiative goes beyond avoiding deforestation and forest degradation to emphasize the vital role of forest conservation, sustainable management of forests and enhancement of forest carbon sinks in reducing emissions. REDD+ can also become a vehicle for "ensuring a just transition of the workforce that creates decent work and quality jobs", as set out in the "shared vision" under the UNFCCC Cancun Agreements. [43] Directing investments towards labour-intensive value added activities, such as ecosystem restoration, and thus generating employment for forest communities, is one of the most important strategies for REDD+. One recent example is the Indonesian Government's effort to enhance green livelihoods for local communities of Central Kalimantan, which will improve access to sustainable livelihoods through employment-intensive environmental infrastructure investments that adapt to climate change using participatory local resource-based approaches.

154. Currently, there are 46 partner developing countries registered in the UN-REDD Programme, 16 of which are receiving support for their national programme activities. By March 2012, a total of US$67.3 million had been approved by the Policy Board for National Programmes. [44] Financial flows are predicted to reach US$30 billion per year. This level of investment could sustain up to 8 million additional full-time workers in developing countries. Norway has pledged US$2.5 billion for REDD programmes. Large amounts of additional funding are flowing through voluntary carbon offset programmes, the World Bank Climate Investment Funds (US$5.7 billion) and the Global Environmental Facility (over US$28 billion). [45]

2.2. Lessons learned

155. The range of studies and experiences reviewed represents a diverse range of countries and approaches, with analyses relying on a variety of different methods. In spite of this diversity, they appear to converge on a number of important results:

- In most cases, significant job-creation potential exists and considerable net gains are possible. These are mostly in the range of 0.5–2 per cent of total employment, even in advanced economies with high substitution effects.
- The most pessimistic findings are that net employment gains or losses in the countries concerned would be so insignificant as to be neutral. Even this outcome would give countries the benefit of reduced environmental impacts and their attendant social cost. For the labour market it would mean no increase in the number of jobs, but more sustainable employment with higher job security and fewer negative externalities.
- Policies matter: labour market impacts are largely a function of the policies applied. This message is consistently borne out by modelling and by practical experiences with transforming economies for environmental sustainability. Neither the number and quality of jobs created nor the net balance for employment is automatic. Policy coherence often requires coordination across sectoral policy lines such as environment, infrastructure, housing, energy, agriculture and rural development, social protection and employment.

[43] UNFCCC: The Cancun Agreements: Decision 1/CP.16 (15 Mar. 2011), para. I:10. Available at: http://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf.

[44] For the UN-REDD Programme see www.unredd.org/.

[45] Climate Fund Info (CFI). See http://www.climatefund.info/.

- Two important strands emerge in policy analysis: redistribution of cost and investment. The first focuses on the way the transition cost imposed by prices put on emissions and resource consumption is absorbed by the economy. Environmental tax reform or eco-taxes, recycling revenue from environmental tax to reduce the cost of labour, is a powerful tool to achieve coherence between economic, environmental and social outcomes.
- The second strand emphasizes the possibility of mobilizing additional investment through ambitious environmental policies. Combining this approach with eco-taxes could lead to significantly larger net gains in employment, while still reducing environmental footprints.
- The review of country evidence at the beginning of this chapter demonstrated that the location and extent of green jobs and broader employment potential depend on the structure of national economies, including their sectoral composition.
- The significance of green jobs goes beyond the creation of employment. They are not merely the passive outcome of redirecting investments into greening the economy. Rather, competent enterprises with skilled, motivated and enabled workers are critical for reaping the positive environmental and economic outcomes from the investments.
- The potential, and indeed the necessity, to upgrade existing jobs for better environmental and social outcomes exists in agriculture and recycling, where significant progress could be made in poverty reduction and social inclusion, and in the building sector in all countries.
- This will in many instances require initiatives to upgrade the competencies of enterprises and the job quality of workers. There are major opportunities to reduce exposure to traditional occupational safety and health hazards and to prevent the emergence of new ones. In addition, wider policies, in particular social protection policies, can help to enhance access to energy and promote environmentally sensitive livelihoods.
- Finally, social protection measures as part of social protection floors can be an effective mechanism to link environmental sustainability with social inclusion on a very large scale. Income transfers and public employment schemes, as well as social housing, can compensate poor households for the environmental services they render, and enhance access to energy and economic opportunity for vulnerable groups.

Chapter 3

Identifying and managing the challenges

156. The risks and challenges for labour markets and social inclusion associated with the transition to environmentally sustainable development fall into three categories:

- economic restructuring;
- climate change and threat to jobs and livelihoods;
- adverse income distribution effects originating from energy poverty.

157. After examining the available evidence concerning the nature and extent of the challenges, this chapter reviews a number of country and sector experiences with policy responses to ensure smooth and just transitions for enterprises, workers and communities. It also considers the role of ILO constituents in this process.

158. The 2007 Conclusions concerning the promotion of sustainable enterprises emphasized that:

> ... the principles and values of decent work provide as much guidance in the case of enterprises which contract or fail as they do in those which succeed and grow. In this regard, active labour market policies and social protection are very important for managing efficient and socially just transitions that take into account national circumstances. [1]

159. Although experience to date underscores the size and nature of the challenge, it has also revealed that the labour market and social outcomes are not givens, but are heavily conditioned by the policies applied. In all the cases that follow, policy approaches that integrate the three dimensions of sustainable development and make use of the inseparable and complementary nature of productive employment, social protection, labour rights and social dialogue are effective in ensuring a smooth and just transition which seizes the opportunities and minimizes the social and economic costs.

3.1. Economic restructuring

3.1.1. Nature and scope of the adjustments needed

160. Economic restructuring and related shifts in labour markets driven by environmental factors can be economy-wide or concentrated in certain sectors, regions and communities. They are generally permanent, but there are also instances of important temporary adjustments.

161. The sectors most directly concerned by such adjustments are resource- and energy-intensive industries, which are also major sources of pollution and emissions; and primary industries such as forestry and fisheries when they overuse the natural resource

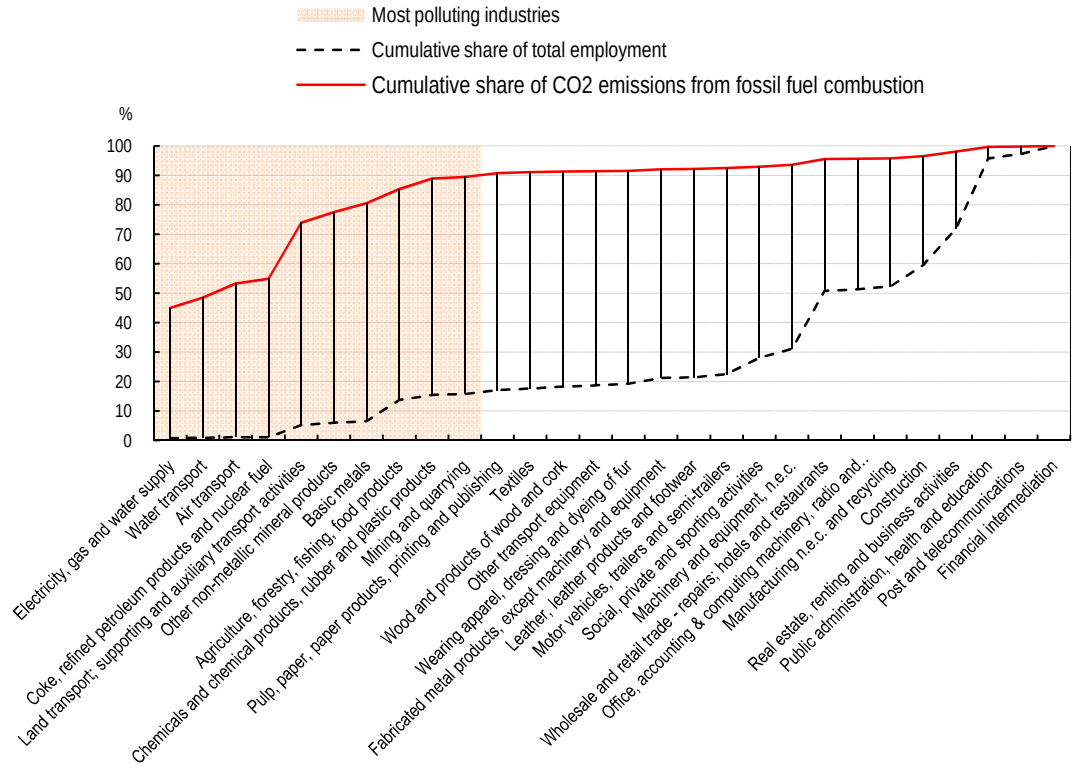
[1] ILO: Conclusions concerning the promotion of sustainable enterprises, op. cit., para. 8.

on which they depend. Restructuring in resource-intensive industries most strongly affects industrialized countries and some emerging economies. China, for example, estimates that its national energy efficiency and pollution reduction policies will lead to the loss of over 800,000 jobs in obsolete power-generation and steel-making plants in the period 2005–20. [2]

The largest polluters represent a modest share of total employment

162. So what are the losses to be expected? The evidence available to date suggests that losses in aggregate employment from environmental policies are less than one might think. One reason is the relatively modest share of total employment in the 10–15 industries which have the greatest environmental impact. In OECD countries, the seven most polluting industries account for over 80 per cent of total emissions while employing only about 10 per cent of the workforce, albeit in mostly well-paid jobs (see figure 3.1). ILO estimates for a wider range of countries arrive at similar proportions. Table 3.1 shows that energy production and some of the most energy- and resource-intensive sectors employ only about 50 million workers worldwide.

Figure 3.1. CO_2 emissions and employment, EU-25, 2005



Source: ILO and OECD: *Sustainable development, green growth and quality employment*, op. cit.

[2] Chinese Academy of Social Sciences (CASS): *Study on low carbon development and green employment in China*, Institute for Urban and Environmental Studies (IUES) (Beijing, 2010).

Table 3.1. Global employment in resource-intensive sectors

Sector/industry	**Employment** (millions)
Extraction of oil and gas	3
Coalmining [1]	7
Utilities (including water) [2]	11
Energy-intensive manufacturing [3]	11
Electric and electronic products [3]	18
Total	**50**

[1] World Coal Institute (WCI): *The coal resource: A comprehensive overview of coal* (London, 2005). [2] ILO: *Promoting decent work in a green economy* (Geneva, 2011). [3] UNEP: *Towards a green economy*, op. cit.

163. The share of employment in resource-intensive sectors tends to be higher in countries with lower GDP per capita and can be substantially higher in individual countries irrespective of the level of national income. For the time being, research is missing on potential impacts in such countries.

Greening is often a relatively minor factor in employment losses

164. Closer inspection also shows that environmental and resource issues are only one factor leading to job losses. Evidence reviewed in the ILO/IILS report [3] suggests that greening has so far been a minor factor in any reduction in employment. In fact, the principal causes of declining employment in industries such as mining, fossil fuel-based energy or iron and steel have been the increasing automation and rising labour productivity that have been occurring over several decades.

165. In most countries, employment in power plants has declined over the past two decades, following deregulation and growing automation. Some 70,000 South African power sector jobs were lost between 1980 and 2000, at the same time as electricity generation increased by more than 60 per cent. In the European Union, an estimated 300,000 jobs in the electricity generation sector were cut between 1997 and 2004. [4]

166. As the most carbon-intensive fuel producer, the coal industry will probably feel the shock of a transition towards greater sustainability more than any other sector. Even without curbs in production China has cut its workforce in coalmining by half, with an estimated 3.8 million coalminers in 2009 down from 7.6 million in 1992. [5] In the United States, too, growing automation and labour productivity have led to a steep drop in coalmining employment, from 785,000 miners in 1920 to a low of 69,000 in 2003, though recovering to 85,000 in 2012. [6]

167. The growth of the renewable energy industry so far has actually supplemented jobs in the fossil fuel sector, rather than replaced them. This may change if GHG emissions are cut as strongly as called for by climate science. Unless technologies like carbon

[3] ILO and IILS: *Working towards sustainable development*, op. cit.

[4] Global Climate Network (GCN): *Low-carbon jobs in an interconnected world*, Discussion Paper No. 3 (London, 2010).

[5] W. Qingyi: *Coal industry in China: Evolvement and prospects* (San Francisco, Nautilus Institute, 2000); Ministry of Human Resources and Social Security: *China Labour Statistical Yearbook 2010* (Beijing,, 2010).

[6] Source Watch: *Coal and jobs in the United States*, 15 June 2011. Available at: http://www.sourcewatch.org/index.php?title=Coal_and_jobs_in_the_United_States; US Bureau of Labor Statistics (USBLS) Database: *Employment, hours, and earnings from the current employment statistics survey* (national) (undated). Available at: http://data.bls.gov/cgibin/dsrv?.

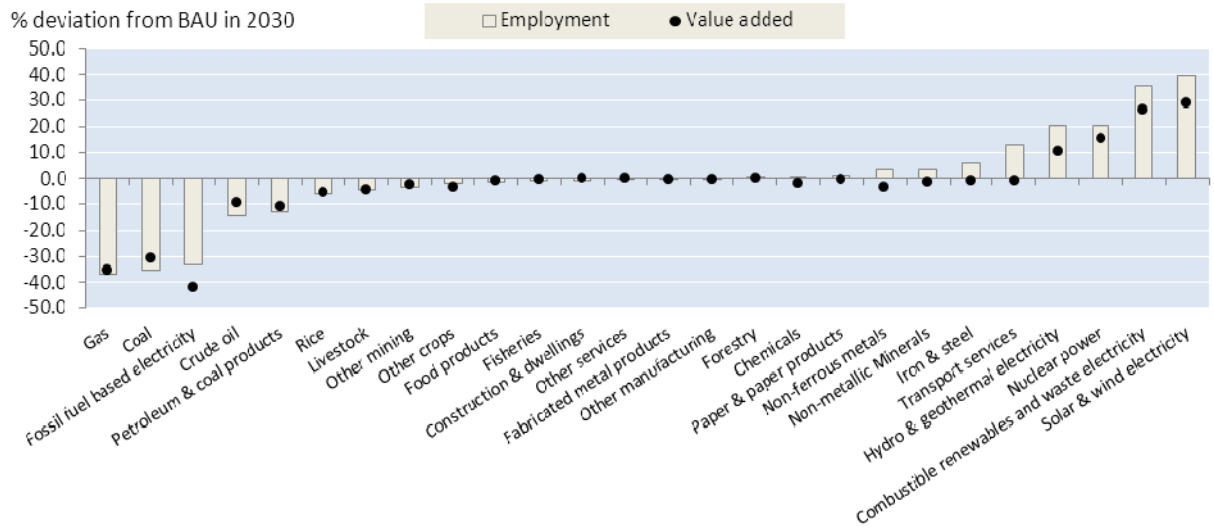
capture and storage (CCS), which would neutralize emissions from fossil fuels, become technically and economically viable, absolute reductions in fossil energy use would precipitate job losses in these industries.

168. Nonetheless, the overall extent of restructuring may be smaller than some expected, at least when considering the impact of reducing GHG emissions to levels in line with the international target of limiting global warming to a maximum of 2°C.

Climate change mitigation policies mainly affect sectoral employment composition

169. The OECD has recently made use of its global ENV-Linkages computable general equilibrium model referred to in Chapter 2 to analyse how ambitious climate change mitigation policies could affect labour market outcomes. [7] These simulations show that a well-designed emissions trading system could achieve sharp reductions in GHG emissions while only moderately slowing GDP growth in the coming decades. The main labour market impacts of the mitigation policies will be to alter the sectoral composition of employment, with fossil fuel industries experiencing the steepest declines and renewable-energy industries the sharpest increases (see figure 3.2).

Figure 3.2. Simulated changes in sectoral composition of employment associated with an ambitious climate change mitigation policy, OECD



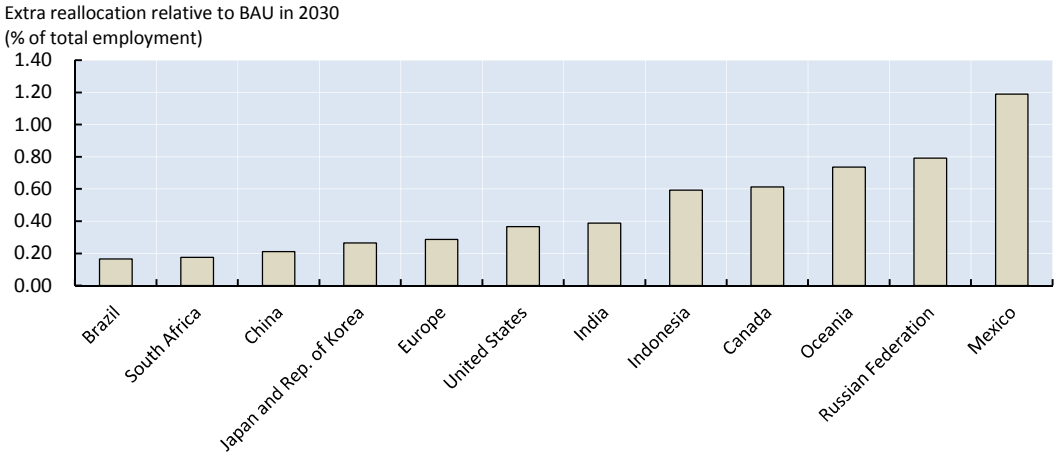
Source: J. Chateau, A. Saint-Martin and T. Manfredi, *Employment impacts of climate change*, op. cit.

170. On the whole, restructuring would lead to less than 1 per cent of all workers having to change to another economic sector. While earlier experience with restructuring suggests that the number of workers changing enterprises would be larger than those changing sectors, the shifts induced by climate change policies would be much smaller than the 20 per cent job reallocation OECD countries have experienced over the last two decades as a result of globalization. [8] In keeping with other findings on major differences between countries, the modelling shows that the intensity of the induced job reallocation varies significantly across G20 countries. Energy exporters would see the largest shifts (figure 3.3).

[7] ILO and IILS: *Working towards sustainable development*, op. cit.

[8] J. Chateau, A. Saint-Martin and T. Manfredi, *Employment impacts of climate change,* op. cit.

Figure 3.3. Simulated increase in relocation, by country



Source: ILO and IILS: *Working towards sustainable development*, op. cit.

171. OECD and earlier ILO modelling also illustrate how the functioning of the labour market itself could affect the overall cost of sharply reducing GHG emissions. If labour markets adapt smoothly, the impact of mitigation policy on GDP growth is small. This finding illustrates the importance of combining ambitious environmental policies with measures to lower the cost of labour through eco-taxes, and support to increase the adaptive capacity of labour markets for strong employment performance.

172. In conclusion, while losses in energy-intensive sectors are likely, large losses are not inevitable. In addition to policy instruments such as an eco-tax (discussed in Chapter 2), other effects and measures can contain the drop in overall employment. According to ILO studies, even resource and energy-intensive sectors could see an employment gain while energy use and emissions fall. The increase of energy cost would lead to cleaner products and processes, while reductions in the cost of labour would avoid an overall increase in the cost of products which would otherwise result in lost market share and output. Reduced labour costs would be sufficient to increase employment per unit output in energy-intensive sectors. [9]

3.1.2. Getting the best employment outcomes from greening enterprises and supply chains

Greening enterprises – Raising resource productivity is key

173. Many resource-intensive industries have two important characteristics that influence employment in a restructuring process: (1) they can benefit from increased demand in green growth sectors to which they supply important inputs; and (2) they are sensitive to price signals related to resource scarcity and environmental policy measures. Improving energy and materials productivities is therefore one important means toward securing the future viability of these industries and their workforces.

174. This is, in fact, already happening. A recent survey of US manufacturing by the US Bureau of Labor Statistics (USBLS), for example, found that almost 100,000 jobs – out of a total of about 700,000 jobs in four basic industries – can be considered green

[9] IILS: *World of Work Report 2009*, op. cit., Ch. 4.

because they produce green goods and services. The largest share is found in the steel sector. [10]

175. Greening measures protect existing jobs and in some cases can actually boost employment considerably. One example is the recycling of the large amounts of heat produced by basic industries. Using the employment per gigawatt of combined heat and power (CHP) found dissipated in the United States, the global CHP capacity of 330 GW could provide more than 820,000 jobs at new CHP facilities. [11] Direct jobs are complemented by indirect employment at supplier companies, site developers, firms involved in designing, constructing and installing CHP facilities and related equipment, as well as those in energy efficiency consulting. CHP promises more employment than do conventional power plants and represents a win–win solution for manufacturing industries. In the United States, a large-scale expansion of CHP could provide 20 per cent of electricity-generating capacity by 2030 and create nearly 1 million highly skilled jobs. [12] The International Energy Agency (IEA) [13] offers a projection of CHP potential by 2030 for the G8 + 5 countries [14] of 833 GW, or about 500 GW more than today. Disregarding improvements in labour productivity, the same rough formula would suggest a global employment potential of more than 2 million jobs.

176. Green manufacturing can act as a catalyst for life-cycle innovation and green job creation – as well as job retention – in the manufacturing sector and its value chains, including services for product eco-design, industrial ecology, energy efficiency and renewable energy, waste management and valuation of natural assets. The greening of manufacturing can lead to significant reductions in resource use and pollution in these energy-intensive industries and help to save existing jobs by improving overall efficiency and generating new revenue from former waste materials and energy.

Getting employees and the social partners involved

177. Successful drives to greening resource-intensive industries have been made by individual companies as well as by entire sectors. The social partners have often played an important role. The highly successful case of the workplace cooperation at the large, global manufacturer 3M is described in box 3.1.

Box 3.1
Higher resource efficiency in enterprises – The example of 3M

The conglomerate 3M has applied an integrated strategy to improve the company's resource use, measuring and tracking progress of the business benefits and engaging employees to ensure continual improvement. 3M had reduced its worldwide GHG emissions by 72 per cent in 2011 compared to a 1990 baseline, and emissions of volatile organic compounds by 95 per cent.

[10] USBLS: *Employment in green goods and services – 2010*, news release, 22 Mar. 2012.

[11] D. Munson: Private communication with Paul Gardiner, 2 Feb. 2009 (London, Combined Heat and Power Association); IEA: *Combined heat and power: Evaluating the benefits of greater global investment* (Paris, 2008).

[12] Recycled Energy Development: *Businesses and advocates unite to promote legislation to strengthen US manufacturing competitiveness*, press release, 12 Apr. 2010 (Westmount, IL). Available at: http://www.recycledenergy.com/newsroom/press-releases/businesses_promote_legislation_strengthening_manufacturing_competitiveness/.

[13] IEA: *Combined heat and power*, op. cit.

[14] The G8 + 5 are: Canada, France, Germany, Italy, Japan, Russian Federation, United Kingdom and United States plus Brazil, China, India, Mexico and South Africa.

The company's Pollution Prevention Pays or 3P programme, initiated in 1975, has cumulatively prevented more than 1.4 billion kilograms of pollutants and saved the company US$1.4 billion.

The 3P programme depends directly on the voluntary participation of 3M employees, who have completed over 8,600 3P projects to date. Projects must meet criteria such as reducing energy use, making more efficient use of materials and resources and saving money (for example, through reduced operating and materials expenses and increased sales of products).

The company's 2015 Sustainability Goals include targets to reduce waste by 10 per cent by 2015 from a 2010 base year, and to improve energy efficiency by 25 per cent by 2015 from a 2005 base year. 3M is also planning to review suppliers in Brazil, China, India, Malaysia, Mexico, Republic of Korea, Russian Federation, Taiwan (China), China, Thailand and Turkey, to ensure compliance with its environmental, health and safety, transportation, labour and human relations standards by 2015.

Source: 3M Company: *Sustainability report* (Maplewood, Minnesota, 2011).

178. Another example is the Korean electronics company LG Electronics [15] which has also actively encouraged its employees to engage in such efforts. It recently established a global labour policy, defining a baseline for over 120 worksites and offices worldwide. Its LGE Labour Union has issued a Union Social Responsibility Charter and established an action plan covering seven core subject areas, including governance, labour and environment (advancing a "low-carbon culture"). By 2010, the company claimed that GHG emissions from its manufacturing operations were 160,000 tonnes below the 2008 level, and that GHG emissions from the use of its products were 12.75 million tonnes lower than would have been the case in the absence of efficiency measures. Its online climate change training had a participation rate of over 20,000 employees based in China, Europe and North America in 2010–11.

179. An innovative example of policy designed to promote efficiency standards for a whole sector is Japan's Top Runner Programme for electrical appliances in buildings and transport. Instead of setting a minimum efficiency standard, the most efficient model on the market is identified and others have to match it within 4–8 years. This provides time for manufacturers to adapt and/or invent an even more efficient product. The Top Runner standards are set by committees with representatives from the manufacturing industry, trade unions, universities and consumer organizations.

180. Such initiatives in greening enterprises play a vital role not only for reducing environmental impact, but also for improving competitiveness and securing existing employment in resource-intensive sectors. The main opportunities, as well as the labour market implications, do not necessarily lie within the enterprise itself. They may be found along the supply chain of inputs or extend to the downstream marketing, use and disposal of products. Environmental and social life-cycle assessments can be a very useful tool for identifying opportunities for improvement. Guidelines have been issued by UNEP in 2009 and applied for example to the ICT sector. [16]

Small businesses have specific challenges in going green

181. An important dimension of greening enterprises is the role of SMEs, which represent the vast majority of all enterprises, accounting for more than two-thirds of all

[15] LG Electronics: *Sustainability report 2010* (Seoul, 2011).

[16] UNEP and Society of Environmental Toxicology and Chemistry (SETAC): *Guidelines for social life cycle assessment of products* (Brussels, 2009); A. Ciroth and J. Franze: *LCA of an eco-labeled notebook: Consideration of social and environmental impacts along the entire life cycle* (Berlin, Greendelta, 2011).

permanent employment. [17] They are also the largest source of new job creation and innovation. While most SMEs are low-risk installations and the environmental footprint of the individual SME is typically small, collectively they are important polluters and consumers of resources. As such, their role will determine how successful the transformation to a green economy will be, both in terms of environmental sustainability and as regards employment and income distribution.

182. However, larger firms have better access to information, internal human resources and financial resources and technology than most SMEs. The creation and growth of SMEs is particularly sensitive to access to information and to understanding green markets, as well as to access to skills programmes, technologies and finance.

183. A study of 15 enterprises in different European countries documents how larger firms are able to tackle environmental sustainability successfully. [18] SMEs, on the other hand, face many challenges in this regard. [19] They have far greater difficulties in compensating for rising energy and raw material costs by improving processes and technology and in absorbing new environmental standards imposed by legislators and consumers. They also miss out more easily on the major business opportunities arising in green markets. This puts SMEs at an added disadvantage and carries the risk of inadvertent structural change, which would jeopardize employment creation.

184. Despite these challenges, SMEs can and should become sustainable enterprises that combine the legitimate quest for profit with the need for development that respects human dignity, environmental sustainability and decent work as envisioned by the conclusions of the 2007 International Labour Conference. As the conclusions point out, environmental sustainability is one of the 17 fundamental enabling conditions for sustainable enterprises. [20] To that end, policies that enable SMEs to successfully navigate the shift to a greener economy and to seize the opportunities will be critical. Cooperatives, business associations and partnerships along value chains can play an important role in supporting SMEs to grow and become sustainable. In addition to environmental regulation, research and development polices, as well as those on public procurement, need to be mindful of the needs and limitations of SMEs.

185. A recent study of five OECD countries found that SMEs welcome a standardized, rules-based approach to establishing environmental requirements. [21] Good practices for transforming SMEs include a sectoral approach to regulation, communication and enforcement; tailored regulatory instruments avoiding activity-based regulation for low-risk installations; the use of economic benefits as a selling point; and partnering between regulatory and enforcement bodies with trade associations and green public procurement accessible to SMEs.

[17] M. Ayyagari, A. Demirguc-Kunt and V. Maksimovic: *Small vs. young firms across the world – Contribution to employment, job creation, and growth*, World Bank Policy Research Paper No. 5631 (Washington, DC, World Bank, 2011).

[18] GHK Consulting: *The impact of climate change on European employment and skills in the short to medium-term* (London, 2009).

[19] M.S. De Gobbi: *Mainstreaming environmental issues in sustainable enterprises*, op. cit.

[20] ILO: Conclusions concerning the promotion of sustainable enterprises, op. cit.

[21] E. Mazur: *Green transformation of small businesses: Achieving and going beyond environmental requirements*, OECD Environmental Working Paper No. 47 (Paris, OECD, 2012).

Environmental policies that address SME concerns

186. A growing number of countries explicitly address SMEs in their environmental policies, including Malaysia, the Philippines, Sri Lanka, Singapore, many EU countries and the United States. Business development services can play an important role to help SMEs cope with environmental challenges. Convinced that environmental sustainability will be a key factor for their competitiveness, the Brazilian small enterprise development service SEBRAE has recently made energy and resource efficiency as well as access to green markets one of its strategic priorities. Among its support measures, SEBRAE conducts attitude and practices surveys, documents good practices, provides guidance to credit lines for environmental investment and facilitates the link to buyers in value chains which put a premium on social and environmental performance of their suppliers. [22]

187. The key role of skills development in SMEs has also been highlighted, among others, in Chapter 2 in connection with the construction and agricultural sectors. In particular in developing countries, the owners and employees in small businesses tend to have insufficient business skills. Empirical analysis has proven that entrepreneurship training such as the ILO's Know About Business (KAB) and Start Your Business (SYB) can be an effective way of addressing this. Entrepreneurship training can also help small firms to identify green business options and turn environmental challenges into new business opportunities, an approach currently piloted with promising results in China and East Africa.

Promoting greening in SMEs and informal resource-based enterprises

188. Preventive policies, which preserve employment by reducing environmental impacts and risk, can also be applied to SMEs in natural resource sectors. An interesting example is the use of unemployment insurance coverage to ensure the reproduction of fish stocks in Brazil. The income replacement enables artisanal fishermen to respect the ban on fishing during the reproductive period of the fish. A major co-benefit has been the formalization of employment for over 400,000 fishermen (see box 3.2).

Box 3.2
Social security and management of fish stocks in Brazil

Brazil provides an example of an initiative to extend social security to vulnerable workers in the informal economy. Artisanal fishers are entitled to unemployment insurance for the so-called closed period, during which fishing activity is prohibited to allow fish to reproduce. The length of the period is defined by the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA) and varies according to region.

To be eligible for unemployment compensation, workers must demonstrate proof of registration as fishers at the National Institute of Social Security (INSS) and pay contributions. They must also prove that they have no source of income other than that derived from fishing. The compensation paid is equivalent to a monthly minimum wage. In 2010, the Federal Government of Brazil paid BRL934.2 million in unemployment insurance to 437,400 fishers. The volume in 2011 was expected to reach BRL1.3 billion.

[22] See for example SEBRAE: *Produção e consumo sustentáveis – oportunidade e diferencial competitive a partir do empreendedorismo sustentável* (Brasilia, 2012) (in Portuguese).

Some aspects of the programme have been criticized. For instance, observers have noted that the existence of the insurance may attract new workers to the activity, which would increase fishing and run counter to the initial conservation intention of the programme. There may also be instances when access to the insurance is an incentive to disguise employment with larger fishing enterprises. While there may be scope for improvement in the design and implementation of the scheme, the Brazilian experience illustrates the way in which governments can use social security policies to protect natural resources while alleviating poverty among vulnerable groups.

Sources: Brazilian Presidency website: https://www.presidencia.gov.br; IBAMA website: http://www.ibama.gov.br/institucional/recursos-pesqueiros.

3.1.3. Dealing with job losses

189. Where job losses cannot be prevented, one of the keys to facilitating a just transition for workers will be early identification of affected industries, enterprises and workers, as well as the creation of placement and training services. The difficulty of the adjustment for workers is often exacerbated by: (i) the fact that the loss of the job is unexpected; (ii) their age, seniority, geographical and professional attachment to the occupation and lack of alternatives in proximity; and (iii) a lack of awareness regarding policies and programmes that are available to help them retrain or switch to new jobs.

Planning ahead for job loss due to green transformations

190. Since a green transformation can be anticipated to a certain extent, governments, business and labour can work together to identify potential adjustment pressures early, notably regarding skills deficiencies and upgrading, and develop strategies to ease the transition process. Moreover, public authorities could work closely with vulnerable sectors to inform workers, well ahead of any job separations or layoffs, of the training opportunities and other active programmes that are available to them. At the same time, efforts will be needed to ensure that the education and training systems are responsive to the development of new technologies and economic growth sectors.

191. Prospective assessments such as those carried out with the help of the OECD model, or the forecasts for losses due to energy efficiency policies in China referred to earlier, are very valuable in detecting and preparing for job losses early. Economic modelling can be informed and complemented or even substituted for by direct feedback from the social partners who are directly involved in restructuring processes.

192. A widely cited example is the tripartite round tables of social dialogue set up in Spain in 2005. They were established to tackle compliance with the commitments under the Kyoto Protocol to reduce GHG emissions while checking the impacts on competitiveness, employment and social cohesion in the most affected sectors. [23]

193. Training, labour market and social security policies and programmes can play a significant role in helping employment adjustments by providing:

- support to enterprises for retaining and/or retraining affected workers;
- matching of workers with new jobs;
- prompt identification of skills needs through surveys and other instruments;

[23] ILO: *The impact of climate change on employment: Management of transitions through social dialogue: Case study of Social Dialogue Roundtables on the effects of compliance with the Kyoto Protocol on competitiveness, employment and social cohesion in Spain* (Geneva, 2010).

- income support measures, such as unemployment benefits, to help limit the downside adjustment process for workers; and
- information to workers on the range of active and passive labour market programmes available to them to minimize disruption.

194. In situations where local and regional economies are heavily dependent on shrinking industries, efforts to diversify these economies may be needed to allow them to more readily absorb relocating workers, as illustrated by the experiences with restructuring in the forest industry in China and the fishing industry in Norway summarized below. While a green transition is not unlike other structural changes, policies and programmes should nevertheless be tailored to address specific challenges and specific industries.

Addressing low occupational mobility

195. A factor which often complicates the transition for workers from resource-intensive or natural resource-dependent sectors is their relatively low occupational mobility. This is partly due to a strong identification with their profession, for example among miners, steelworkers, fishers or loggers. It is also a consequence of a high share of workers with low skills or with skills and competences that are difficult to transfer and use in other sectors. As can be observed in table 3.2, for a range of industrialized countries the proportion of workers with relatively low skill levels is higher in industries with high emissions levels than in those with lower emissions.

Table 3.2. Employment shares and skill levels in carbon-intensive sectors (percentages)

Country	Employment share in high carbon-intensive sectors (HCIS) [1]		Share of low-skilled [2] workers in low vs high carbon-intensive sectors (LCIS)	
	HCIS	Top 15 industries	LCIS	Top 15 industries
Australia	45	12	35	26
Canada[3]	48	23	–	–
European Union[4]	41	10	18	26
France	39	9	17	24
Germany	41	9	28	34
Japan	46	12	7	21
Republic of Korea	47	15	8	35
United Kingdom	38	7	10	15
United States	45	8	8	14

[1] HCIS refers to all high carbon-intensive sectors (above the median) taken together. The top high carbon-intensive sectors include agriculture, mining and quarrying, and manufacturing transport. [2] "Low-skilled" refers to education levels; therefore strict comparisons across countries should be made with caution. The employment shares of low-skilled workers are based on the total number of hours worked in the economy. [3] Data is for 2005, except for Canada (2010) for the employment share (for the share of low-skilled it is also for 2005). [4]Data for employment share in HCIS is for EU-15, whereas for the share of low-skilled workers it is for EU-20.
Source: ILO and IILS: *Working towards sustainable development*, op. cit., p. 14.

196. There are exceptions, though, which can facilitate transitions for workers and indeed entire sectors and countries. The existing knowledge and skills base in the

offshore oil and gas sector in the United Kingdom, for example, is very relevant to the development of a domestic wind manufacturing industry. [24]

197. Skills in oil drilling could also be applied to geothermal development. Likewise, many of the skills employed in running fossil fuel power stations – including those of electrical engineers, electrical technicians, electricians and information technology specialists – can be adapted to operating renewable power plants. [25]

3.1.4. Integrated approaches for smooth and just transitions

What we have learned from previous industry restructurings

198. Experiences with restructuring in different sectors and countries highlight some of the obstacles, but also contain encouraging lessons about policy mixes which are effective.

199. Poland's experience with restructuring its coalmining industry underlines the difficulty that workers may face in a broader move away from fossil fuels, as well as the need for a well-designed and fair transition strategy with adequate social programmes, retraining efforts and economic diversification of regions dependent on the coal industry. In Poland, unprofitable mines were closed down and coal production was slashed from 147 million tonnes in 1990 to 94 million tonnes in 2006. Employment fell even more dramatically, from 388,000 to 119,000 over the same period. The miners regarded the Government's initial programmes to address the social consequences as unappealing, and funding was insufficient. Following elections, a new programme was formulated in 1998 with substantial trade union input. It strengthened social programmes and more than tripled funds in support of older miners made redundant, to about US$1.5 billion over five years. Out of the 103,000 workers who left coalmining between 1998 and 2002, 67,000 received financial assistance. Many of the miners had only vocational training specific to mining, and other sectors of the economy were also shedding labour. Thus, it took time for former miners to find work, but by 2003 as many as two-thirds of these workers were estimated to have found new jobs outside mining. [26]

200. It is worth noting that the Polish downsizing was not prompted by environmental factors but by global competition. Another consideration is the fact that moving away from the fossil fuel industry towards solar and other renewables promises substantial occupational health benefits. This is especially true with regard to coalmining. Although the work tends to pay well, it is one of the most hazardous industries for workers in terms of their long-term health and exposure to accidents. [27]

201. The relocation of workers can be promoted by industry, by governments and in partnerships between the private and the public sector, as illustrated by the examples from the sugar industry in Brazil, the forestry industry in China, fishing in Norway and the steel industry in the United Kingdom. In all cases, diversification and the creation of alternative employment are keys to success.

202. The UK Steel Enterprise, a non-profit subsidiary of industry giant Tata Steel, has helped workers to deal with the consequences of a historical process of modernization and substitution of technology for employees in the steel industry. UK Steel Enterprise

[24] CBI: *The colour of growth*, op. cit.

[25] EC and ILO: *Study of occupational and skill needs in renewable energy*, op. cit.

[26] W. Suwala: *Lessons learned from the restructuring of Poland's coalmining industry* (Geneva, IISD, 2010).

[27] S.A. Summer and P.M. Layde: "Expansion of renewable energy industries and implications for occupational health", op. cit.

was established in 1975 to support redundant steelworkers in their efforts to gain new employment. Seeking to improve the economies of regions that are most affected by changes in the steel industry, it provides tailored financial services for small business development, office rental facilities and local community development support. To date, it has helped to create nearly 70,000 new jobs and supported more than 4,500 small businesses. [28]

203. A challenge on an even larger scale was faced by the Chinese forestry industries and dependent communities when a logging ban was introduced over more than 40 per cent of the total forest area to stop flooding attributed to environmentally unsustainable practices in the forestry sector. Nearly 1 million workers lost their jobs almost overnight. A combination of income replacement, reemployment in the same sector, entrepreneurship training and assistance to create alternative employment and income opportunities targeted for different age groups of workers succeeded in a successful transition for 90 per cent of the workers affected (box 3.3).

Box 3.3
Restructuring in the forestry industry in China

Serious drought followed by a devastating flood in China in the late 1990s triggered national debates and reforms of environmental policies. Policy-makers and academics concluded that widespread and excessive cutting of forests and farming were the root causes. Measures taken by the Government in response to these environmental challenges included a ban on logging on 73 million hectares of natural forests, equivalent to 69 per cent of the total natural forest area. [1] The ambitious ban on logging inflicted tremendous short- and medium-term social economic costs; in particular, almost 1 million state forest workers lost their jobs. [2]

To integrate social concerns within the strategic environmental protection initiatives, measures were adopted to assist redundant state forest workers. According to the Ministry of Human Resources and Social Security of China (MOHRSS), design and implementation of the programme were based on consultations with tripartite committees at national and local levels, including the forest worker trade union, with special communication channels being created for workers and farmers providing a telephone hotline, dedicated websites and micro-blogs.

Older workers were offered early retirement while younger ones could opt for education and training programmes through employment service centres and were supported in finding employment elsewhere. Redundant workers who voluntarily terminated their employment contracts and resettled themselves received a lump-sum of up to three times their previous average annual wages. Until the end of 2010, 680,000 redundant younger workers had received one-off payments, and 276,000 were reemployed or retired. Reemployed or subcontracted workers have been placed in afforestation, forest protection, rural infrastructure and public construction projects. Those who accepted lump-sum payments also received assistance to establish their own businesses (especially green businesses).

Approximately 100,000 redundant workers who were unable to find new jobs received unemployment support to cover minimum living expenses and medical care. A variety of social measures also targeted local farmers affected by the logging ban.

[1] State Council of China: *Afforestation regulation*, Document No. 367 (Beijing, 2002) (in Chinese). [2] Y. Yang: "Impacts and effectiveness of logging bans in natural forests: People's Republic of China", in P.B. Durst et al. (eds): *Forests out of bounds: Impacts and effectiveness of logging bans in natural forests in Asia–Pacific* (Rome, FAO, 2001).

Source: MOHRSS: Background information of the Natural Forest Protection Programme (Beijing, 2011).

[28] Tata Steel Europe: *Supporting new businesses within UK steel regions* (undated). Available at: http://www.tatasteeleurope.com/en/responsibility/our_people/communities/helping_uk_steel_regions/.

204. In the Brazilian sugar industry a private–public partnership has been created to cope with the impact of mechanization forced by measures to reduce the impact of sugar cane harvesting on human health. Traditionally, the leaves of sugar cane are burnt prior to harvesting to facilitate manual cutting. This practice is being phased out in the most important producer region, São Paulo State. [29] Mechanization will lead to massive job losses among a workforce of mostly poorly educated migrant workers. The Brazilian Sugarcane Industry Association (UNICA) and other employers aim at retraining some 7,000 workers annually for a range of occupations, including drivers, farm machine operators, electricians, tractor mechanics, beekeepers and workers in reforestation. [30]

205. A very large transition challenge is faced by the fisheries sector, where 45 million jobs are at risk from overfishing. If addressed early and on a sufficient scale, a temporary transition programme for fishers could avert a longer term decline in fish stocks and employment in the sector which may otherwise be difficult to reverse.

206. The case of the cod industry in the Norwegian Atlantic in the 1990s (see box 3.4) is a successful example of how practices such as temporary restrictions on fishing, and income replacement and retraining for fishers, have led to a recovery of stocks and new opportunities for displaced fishers.

Box 3.4
Norway's response to overfishing

As a result of the cod crisis of 1989–90, drastic cuts were made in the total allowable cut, and all the major fisheries were effectively closed down by 2005. As a result employment fell, driving fishers to find employment elsewhere. Several remedies were offered, including debt relief. The Fishers' Guarantee Fund was established to provide temporary payments to fishers for loss of income, which dealt with the immediate effects of restructuring the fishing fleet. Resources were also provided for education and training to enable fishers to enter other areas of the labour market. Significantly, there has also been a concerted effort to expand the business sector by investing in the aquaculture industry and fish processing market as well as non-fishing activity, so that retrained fishers have new employment opportunities.

So, while the short-term effects of the suspension of cod fishing were managed through various employment policies, longer-term challenges were met by rural and regional policies emphasizing education, training and investment. Norway was thus able to manage the resource crisis successfully, while stabilizing unemployment and migration rates. In fact, total catch sizes recovered quickly in the 1990s, while overall employment in the sector continued to gradually decline – to around 15,000 from a high of 115,000 in 1946. These two trends combined to raise the amount of catch per fisher to record levels. Ultimately, a total disruption and collapse of the fisheries was avoided, and the gradual adjustment that was required of the labour market was manageable.

Source: B. Hersoug: *Always too many? The human side of fishery capacity adjustment in Norway*, presentation at OECD Expert Meeting on the Human Side of Fisheries Adjustment, 19 Oct. 2006.

207. Programmes in Norway, and to a lesser extent in Canada and other countries, have been successful in reconciling environmental and social needs. They did, however, require investments in the billions of dollars, in spite of the relatively small number of workers concerned. Providing support to workers and communities during the transition

[29] M. Sawaya Jank: "Sugarcane: Historic advances in labor relations", in *O Estado de S. Paulo*, 25 June 2009; Soybean and Corn Advisor: *Mechanized sugarcane harvest results in rural unemployment*, 10 May 2011. Available at: //www.soybeansandcorn.com/news/May10_11-Mechanized-Sugarcane-Harvest-Results-in-Rural-Unemployment.

[30] UNICA: *Brazilian labor issues briefing* (undated). Available at: http://sweeteralternative.com/environmental-benefits/brazilian-labor-issues-briefing.

period in this way will be difficult in emerging and developing countries. The fishing communities in those countries tend to be significantly larger than in developed economies and many lack the institutional capacity to deliver a comprehensive suite of passive and active support measures.

208. An international agreement may therefore be necessary to restrict fishing by fleets from industrial countries in threatened fisheries and to help compensate small-scale fishers if temporary reductions in coastal catches of developing countries are required as well. These programmes could be linked to payments for environmental services and coastal rehabilitation. They should also include measures to increase education and skill levels, diversify employment opportunities and promote SMEs in order to lift fishing communities out of poverty.

3.1.5. Coherent policy responses can promote just transitions

209. On the whole, the restructuring from the transition to a more environmentally sustainable economy may be less pronounced than the changes wrought by globalization in recent decades. The dynamics and impacts will however vary from country to country and can be significant for resource-dependent regions and communities. Coherent policy responses and the involvement of ministries of labour and the social partners can help to limit the need for relocation and ensure just transitions where job losses are inevitable. Greening of resource-intensive enterprises, sectors and value chains, along with price signals through eco-taxes that favour employment, can significantly reduce job losses. Workplace cooperation and skills upgrading can be a powerful lever for reducing environmental impacts.

210. Anticipation and mapping of likely impacts are critical for timely and targeted measures. Customized policy packages combining income replacement and income security through social protection, economic diversification, enterprise development, reskilling and labour market placement have proven effective for smooth and just transitions. Enterprise development should pay particular attention to SMEs, which require appropriate regulation, information and support to master the transition and seize environmental market opportunities. Cooperatives and the social economy can also play a major role in a just transition and social inclusion.

3.2. Climate change adaptation and the world of work

3.2.1. Nature and scope of climate impacts

211. The impact of climate change on enterprises, workers and communities is highly location-specific and varies over time. In the short run, impacts are mostly caused by more erratic weather patterns and extreme weather such as heat waves, storms, floods and droughts. These affect communities, enterprises and workers in exposed locations such as coastal areas and flood plains, including some of the world's largest cities. In developing countries, 14 per cent of the population and 21 per cent of urban dwellers live in low-elevation coastal zones that are exposed. [31] Extreme weather also affects exposed sectors, most importantly agriculture, but also tourism as well as drought-prone regions.

212. In the long run – and very much dependent on whether measures are taken to sharply reduce GHG emissions over the next two decades – rising temperatures

[31] P. Ten Brink et al.: *Nature and its role in the transition to a green economy*, TEEB series (London, Institute for European Environmental Policy, 2012).

themselves will become a major factor of change. One of the consequences is that agricultural yields will fall in many areas. In some African countries, yields from rain-fed agriculture could be reduced by up to 50 per cent by 2020, and 75 to 250 million more people could be exposed to increased water stress. [32] Another consequence is that the areas suitable for certain crops will shift. In Chile, the agricultural belt is expected to be displaced to the south, shifting the demand for labour in agriculture and forestry between regions. [33] In Uganda, coffee growing will be restricted to the highest land, depriving the country of its main export and a source of employment. [34] In the short run, conditions would become more favourable for agriculture and other activities at high latitudes but the overall economic impact is likely to be negative even in high-latitude countries. [35]

213. Rising temperatures are already leading to a melting of glaciers, including in the Arctic, where temperatures have risen twice as fast as the world average. The Greenland ice cap is losing 200 gigatons of water per year, enough to supply 1 billion people. The loss of glaciers and snow cover in the Andes and the Himalayas will put pressure on fresh water supplies and hydropower generation.

214. The melting of glaciers on land and the expansion of the oceans as they warm up has led to sea level rises of about 20 centimetres during the twentieth century. This aggravates storm surges and leads to intrusion of salt water into fresh water reservoirs. A complete melting of Greenland ice – over several centuries – would release enough water to lift sea levels by more than 7 meters. Recent evidence from satellite measurement of sea levels does suggest that actual sea level rises are twice as fast as predicted by IPCC models. By 2090 they may therefore rise by about 1 meter, rather than the 19–59 centimetre range forecast by IPCC in 2007. [36]

215. Developing countries, and within them poorer segments of the population, are more exposed to climate change because of where they live and how they earn a living. They are also more vulnerable because they have the least adaptive capacity.

216. While it stands to reason that the disruption of economic activity, the loss of infrastructure and productive assets in enterprises, the relocation of enterprises and population as well as reduced productivity will negatively affect employment and incomes, sometimes inducing or forcing migration, very little has been done to map and quantify these effects.

217. Environmental factors, in particular climate change, are already a strong driver for migration, both within and across borders. In 2002, the UNHCR estimated that 24 million people around the world became refugees because of floods, famine and other environmental factors, exceeding the number of all other refugees including armed

[32] IPCC: *Climate Change 2007: Fourth assessment report*, op. cit.

[33] ECLAC: *Economics of climate change in Latin America and the Caribbean: Summary 2010* (Santiago, 2010), p. 85, map VI.15; CEPAL: Economía del cambio climático en Chile: Síntesis (Santiago, 2009).

[34] Global Resource Information Database (GRID-Arendal): *Vital Climate Graphics Africa* (Arendal, Norway, 2002).

[35] IPCC: *Climate Change 2007: Fourth assessment report*, op. cit.

[36] S. Rahmsdorf: "A new view on sea level rise: Has the IPCC underestimated the risk of sea level rise?", in *Nature reports climate change*, 6 Apr. 2010. Available at: http://www.nature.com/climate/2010/1004/full/climate.2010.29.html.

conflicts. [37] The Stern Review notes that some estimates suggest that 150–200 million people may become permanently displaced by the middle of the century due to rising sea levels, more frequent floods and more intense droughts. [38]

218. Migration is an important strategy for maintaining minimum income levels and has increased in recent years in response to greater variation in rainfall, particularly where there is no assistance to strengthen climate resilience in situ. [39] For those with assets, in particular education and employable skills, migration is an opportunity; for those without, it effectively traps households at the margins of a decent existence.

3.2.2. Assessment of employment and income impacts of climate change

219. Three examples of national assessments highlight the need and usefulness of analysing employment and income dimensions on a case-by-case basis for both climate impacts themselves and in order to design appropriate adaptation strategies.

220. In Namibia, a computable general equilibrium model (CGE) was used to assess the economic and social impact of a variety of climate change scenarios. [40] It concludes that even in the best-case scenario, 25 per cent of the population will have to find new livelihoods. The poorest households (subsistence farmers) are the most affected and will probably move to cities. As a consequence of the massive displacement of rural population, incomes for unskilled labour in the cities could fall by 12 to 24 per cent, further exacerbating the situation of the poor.

221. The study of the employment impact of Cyclone Sidr [41] conducted with support from the ILO and FAO shows that methodologies to assess climate-related disasters need sufficient resolution in terms of the sectors and types of enterprises affected in order to design effective policy measures (see box 3.5).

Box 3.5
The impact of Cyclone Sidr on enterprises in Bangladesh

When Cyclone Sidr hit Bangladesh in 2007 it had a direct impact on 567,000 people, corresponding to 14 per cent of all households in the 12 affected districts. Although 75 per cent were farm households, only 35 per cent had agriculture as their main source of income. Livelihoods and prospects for short-term recovery were therefore mainly affected by damage to income-generating assets in non-farm small businesses rather than harvest loss.

[37] K. Warner et al.: Human security, climate change, and environmentally induced migration, Institute for Environment and Human Security (United Nations University, 2008). Available at: http://www.ehs.unu.edu/file/get/4033.

[38] N. Stern: *The economics of climate change*, op. cit.

[39] K. Warner, T. Afifi, K. Henry, T. Rawe, C. Smith, A. de Sherbinin (2012). Where the Rain Falls: Climate Change, Food and Livelihood Security, and Migration, United Nations University. http://unu.edu/publications/policy-briefs/where-the-rain-falls-climate-change-food-and-livelihood-security-and-migration.html.

[40] H. Reid et al.: *The economic impact of climate change in Namibia: How climate change will affect the contribution of Namibia's natural resources to its economy*, Environmental Economics Programme Discussion Paper 07-02 (London, International Institute for Environment and Development (IIED), 2007).

[41] ILO: *Cyclone Sidr: Preliminary assessment of the impact on decent employment and proposed recovery strategy*, op. cit.

Damage to assets included the loss of fishing boats and gear, of infrastructure, factory equipment and tools of self-employed workers. Private businesses included rice mills, sawmills, ice factories, potteries, blacksmiths, barber shops, tricycle vans, sewing machines and tools held in private homes. The damage affected about 30,500 establishments and 75,000 jobs. In addition, about 27,000 self-employed workers without a fixed establishment lost their income-generating assets. The total value of lost assets was estimated at US$3.8 million, mostly in the manufacturing sector. Private businesses had to interrupt or reduce activity for more than two months because of the destruction of assets and the lack of electricity. The total loss of revenue in industrial and commercial establishments due to reduced activity has been estimated at another US$47 million.

Enabling non-farm SMEs was the fastest way to restart economic activity, but required substantial access to new credit to replace lost assets. Interest rates surged in response, leading the Government to impose a ceiling. This in turn resulted in a credit crunch. As the FAO/ILO assessment revealed, high prior debt levels and uncertain outlook made the SMEs high-risk borrowers. Credit guarantees of lower interest government loans were therefore needed. Understanding the sector, employment and distributional income effects enabled policy to accelerate recovery of income, notably in micro- and small enterprises and industries.

Source: Government of Bangladesh: *Cyclone Sidr in Bangladesh: Damage, loss, and needs assessment for disaster recovery and reconstruction* (Dhaka, Economic Relations Division, 2008).

222. Adaptation measures can also have impacts on labour markets – sometimes inadvertent ones, as another example from Bangladesh shows. [42] Dryland rice, the staple crop in north-eastern Bangladesh, is becoming unviable because of lower and erratic rainfall. Substituting mango – deep-rooted trees – for rice is technically feasible and economically viable with a good market for mango. The labour market impact, however, would be a sharp contraction of labour demand in agriculture in districts where landless workers who earn their living as daily labourers in rice farming represent 41 per cent of the total workforce. Deprivation and outmigration would be likely consequences of the new cropping pattern.

223. Assessments of the employment and social impact of climate change itself and of adaptation to it should therefore be conducted systematically. Data should be collected about the labour market, households and enterprises. Enterprise data should comprise location, the sector of activity, assets and number of employees. Employment data are needed by sector, by gender, formal or informal employment and levels of skill. Household income and expenditure should be collected by income quintile, differentiating between urban and rural households, between male- and female-headed and where appropriate by ethnic group, for example indigenous/non-indigenous households. In addition to the level, the main source of household income, assets and savings, as well as the affiliation of households with organizations, are important parameters for the design of adaptation strategies.

3.2.3. National initiatives on climate change adaptation

224. Significant climate change is already occurring and causing major damage to economies and labour markets. Even with drastic reductions of emissions today, global warming will continue for centuries because of the inertia of the climate system. Adaptation to climate change will therefore be essential to protect enterprises, workplaces and communities from negative impacts.

[42] FAO: *Community based adaptation in action: A case study from Bangladesh* (Rome, 2008).

225. A range of estimates of the cost of adaptation has been made based on different assumptions and scenarios. An early estimate by the UNFCCC in 2007 put global adaptation costs at US$49–171 billion per year by 2030, with US$27–66 billion needed in developing countries. A 2010 study by the World Bank arrived at US$75–100 billion per year in current US dollars for 2010–50 for developing countries alone. This is the same order of magnitude as development assistance by advanced economies to developing countries. [43] Other estimates are considerably higher. [44]

226. Among the main policy responses by countries are National Adaptation Programmes of Action (NAPAs). As of November 2012, all except one of the 48 least developed countries had prepared NAPAs. Many more emerging and advanced economies such as China and India, as well as Germany and the United Kingdom, have national adaptation programmes. Very few, however, explicitly address the employment dimensions of adaptation such as:

- rehabilitation of natural infrastructure and management of ecosystems such as water catchments, forests and coastal mangrove belts to reduce soil erosion, flooding or water scarcity;
- engineering options such as increased sea defences or storm-proof houses;
- risk management and reduction strategies such as early warning systems;
- access to social security benefits to buffer against shocks;
- development of financial instruments such as insurance schemes; and
- capacity building of local institutions and communities including the use of weather and climate data, adaptation of farming practices, irrigation or water harvesting.

227. Adaptation options are many, ranging from "software" measures such as training, capacity and institution building and social assistance, to "hardware" measures such as infrastructure or reforestation. Well-designed national initiatives combine both types of measures. Public works programmes (PWP) or employment-intensive investment programmes (EIIP), which have been used widely in the past in development programmes not necessarily related to climate change, can serve as a hub for a multi-faceted integrated approach in adapting to climate change. When properly targeted and designed, they can help to reduce the vulnerability of the poor strata of the population by the provision of employment opportunities through a local resource-based approach. Through the right types of works and use of appropriate technologies, they can increase resilience to climate change and ensure a low-carbon or carbon-neutral approach to building more climate-resilient communities. These types of programmes can have a multiplier effect for employment, income security, climate-resilient asset creation and access to fundamental services such as energy and water.

228. The restoration and protection of the natural resource base not only reduces climate risks but can improve agricultural productivity and income. Flood prevention measures such as diversion of floodwater and improved water management contribute to climate-proofing local infrastructure.

[43] World Bank: *The cost to developing countries of adapting to climate change: New methods and estimates*, Global Report of the Economics of Adaptation to Climate Change Study, consultation draft (Washington, DC, 2010).

[44] M. Parry et al.: *Assessing the costs of adaptation to climate change: A review of the UNFCCC and other recent estimates* (London, IIED and Grantham Institute for Climate Change, 2009).

229. Large-scale public employment programmes such as the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) in India (see box 2.2 in Chapter 2), the Expanded Public Works Programme (EPWP) in South Africa and the Productive Safety Net Programme (PSNP) in Ethiopia (see box 3.6) all make the link between employment, social protection and the restoration and protection of natural resources. Although they may not all have been conceived as such at the design stage, these programmes illustrate the fundamental role public employment programmes have as part of social protection floors and how they can assist exposed populations to cope with the impacts of climate change and to adapt successfully.

Box 3.6
Ethiopia's Productive Safety Net Programme

Millions of people in rural Ethiopia are exposed to a potentially lethal interaction of drought and poverty. During the drought in 2003, 14 million people – one in every five Ethiopians – depended on food aid. Ethiopia's Productive Safety Net Programme (PSNP) is a bold attempt to tackle the food security threats posed by an uncertain climate. Food insecurity is an integral element of poverty in Ethiopia. Traditionally, the response has been ad hoc food aid. The PSNP replaces this humanitarian model with an employment-based social transfer programme. Targeting people facing predictable food insecurity as a result of poverty rather than temporary shocks, it offers guaranteed employment for five days a month in return for transfers of food or cash equivalent to US$4 per month for each household member. Coverage has been extended from 5 million people in 2005 to 8 million by 2010. Unlike the food aid model, the PSNP is a multi-year arrangement financed by government and donors, shifting the mode of support away from sporadic emergency aid towards more predictable resource transfers and continuous investment.

Sources: D.O. Gilligan, J. Hoddinott and A.S. Taffesse: "The impact of Ethiopia's Productive Safety Net Programme and its linkages", in *Journal of Development Studies*, Vol. 45 (2009), No. 10, pp. 1684–1706; R. Sabates-Wheeler and S. Devereux: "Cash transfers and high food prices: Explaining outcomes on Ethiopia's Productive Safety Net Programme", in *Food Policy*, Vol. 35 (2010), No. 4, pp. 274–285.

230. Microinsurance and social finance can be valuable instruments to address climate along with other economic and social risks. Innovative finance schemes to strengthen the financial resilience of households affected by climate change have been developed, among others, in Ghana and in the Asia–Pacific region.

231. In the Philippines, microinsurance and finance as part of an integrated approach to climate risk attenuation has been tested by the ILO in a joint UN project on building climate resilient farming communities through innovative risk transfer mechanisms. In the context of the so-called Climate Change Adaptation Project (CCAP), a local financing and risk insurance model was designed for rice and maize farmers vulnerable to climate change in north-eastern Mindanao, southern Philippines. The CCAP model facilitated access to credit in support of crop production and alternative livelihoods as well as to savings facilities and to formal and informal insurance (crop, life, health) including the innovative Weather Index-based Insurance (WIBI) package. The project also facilitated access to productive services including training in farming technology (Farmer Fields School) and agricultural inputs. The technical training was complemented by entrepreneurship training, the promotion of financial literacy and access to market information and business development services. As a result, these communities were able to continue with production in the face of climatic risks, diversify their sources of income, strengthen their asset base and make more effective decisions on farming based on risk levels. At the end of the pilot in 2011, around a thousand families had participated in CCAP and had achieved an increase in net income.

The project is now being scaled up with government resources and support from UNDP. [45]

232. While it is widely recognized that the approaches conducive to successful adaptation to climate change are similar to those for sustainable development more broadly, existing policies and strategies such as the NAPAs still pay little attention to the employment and income dimension. There continues to be a prevalence of technocratic and loosely coordinated measures. Integrated approaches built around social protection and employment promotion such as those highlighted above are proving to be effective. They can achieve both scale, as part of national schemes, and be customized through local economic development approaches to account for the fact that the challenges and opportunities for adaptation to climate change are highly location-specific. A stronger participation of ILO constituents in the formulation of NAPAs and related programmes would provide valuable social and labour market information for the planning process, associate those directly concerned by the implementation in the decision-making and thereby enhance ownership and voice by businesses and workers, as well as synergies between public and private investments.

3.3. Adverse income distribution effects originating from energy poverty

233. The third category of challenges for labour markets and social inclusion from the transition to sustainable economies is of a different nature from the previous two; it concerns the impact that environmental policies to reduce GHG emissions and growing resource scarcity can have on income distribution and expenditure patterns of different social groups. Rising prices for energy – whether driven by scarcity as well as the pricing of GHG emissions, by levies to finance investments into renewable energy or by green energy subsidy reform – will impact poorer households disproportionately. This is likely to exacerbate existing income inequalities within countries. This section examines the evidence on the relation between household income and energy expenditure, and explores policy options for averting unintended regressive effects of policies.

3.3.1. Energy expenditure and income distribution

234. Environmental policies that raise prices for consumers can exacerbate energy and fuel poverty in both developed and developing countries. Energy-poor households are unable to meet their basic needs for energy even though they spend more than 10 per cent of their total income for this. These households represent the extreme of a broader pattern: in general, poor households spend a higher proportion of their income on energy, despite the fact that they consume less and have far lower emission levels. These findings are confirmed by a number of recent studies for all continents. In much of Africa, Asia, Latin America and parts of Europe, the proportion of income spent on energy is three times – and can be as much as 20 times – that of richer households. [46]

235. Low-income households also tend to have lower income elasticity in terms of energy spending than those with higher incomes. [47] This is further aggravated by the close link between energy prices and those of other essential goods and services, such as

[45] See http://www.ilo.org/asia/whatwedo/projects/WCMS_189793/lang--en/index.htm.

[46] For more detail on the findings by country see ILO and IILS: *Working towards sustainable development*, Ch. 1.

[47] T. Jamasb and H. Meier: *Energy spending and vulnerable households*, EPRG Working Paper 1101, Cambridge Working Paper in Economics 1109, Faculty of Economics (University of Cambridge, 2010).

food and transport on which the poor spend an even larger percentage of their income than on energy directly (see Chapter 1). The majority of poor households therefore have little budgetary flexibility, and an increase in prices or a change in energy policies can have a direct impact on them, forcing them to choose between energy payments and essential goods. [48]

236. It is therefore necessary to keep these distributional impacts in mind when considering environmental transition policies such as the abolition of energy subsidies or energy and carbon taxes. In addition to improving the access of the poorest to quality energy services, as discussed in Chapter 2, measures are needed to reduce the disproportionate burden on already poor households and the broader regressive income distribution effect.

3.3.2. Compensation for the impact of higher energy prices

237. Carbon-trading schemes and feed-in tariffs levied on electricity consumers tend to have stronger regressive effects than broader carbon taxes. Emissions trading concentrates on large point sources of emissions, notably power stations. Large industrial users are allocated emissions allowances and often exempted from financing feed-in tariffs, thereby shifting the burden to households and smaller enterprises.

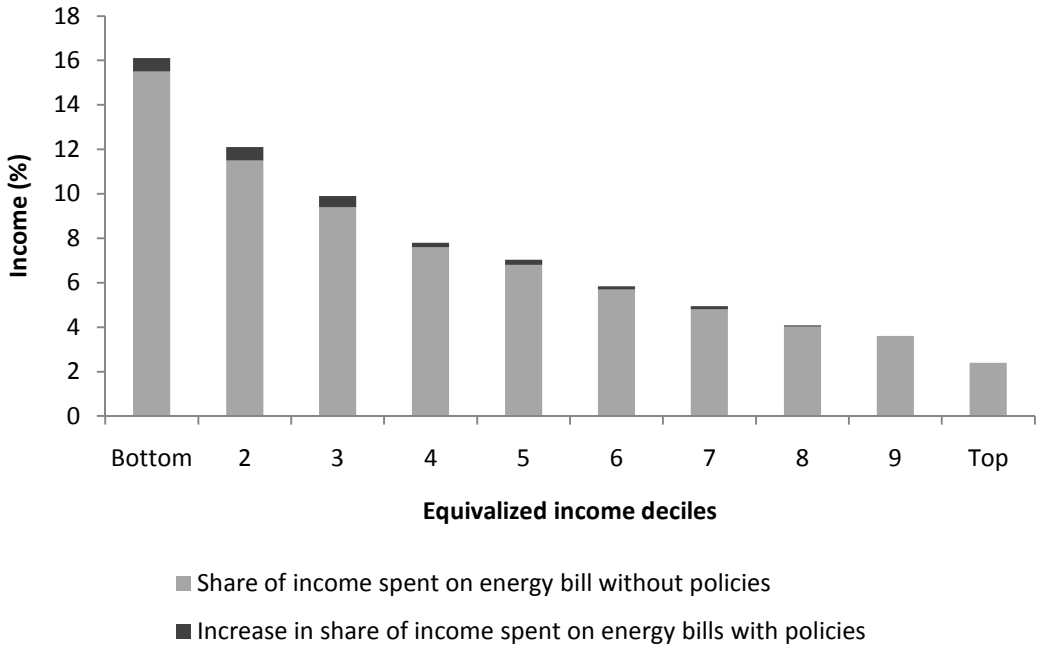
238. Compensation for this effect through fiscal measures is not straightforward, because domestic use is highly variable between different groups and localities. While cash transfer programmes, for example, could in principle make up for such increases, such transfers are unlikely to fully compensate for the rise in energy prices. In the United Kingdom even the most progressive use of revenues from carbon taxes to protect the poor would leave up to a third of low-income households losing out. This underlines the need to carefully design policies to address the effects of higher energy prices through a coherent set of policy measures, which can include transfer programmes embedded in national social protection floors and wider social security systems.

239. Gough et al. [49] evoke possible alternatives considered for the United Kingdom. Figure 3.4 illustrates the pre-existing exposure of households to energy prices and the expected impact of carbon pricing policies to reduce GHG emission levels – highest for the lowest income bracket.

[48] Sustain Labour Foundation: *Developing renewables – Renewing development: Towards clean, safe and fair energy* (Madrid, 2008).

[49] Gough et al.: *The distribution of total greenhouse gas emissions by households in the UK, and some implications for social policy*, Centre for Analysis of Social Exclusion (London, London School of Economics, 2011).

Figure 3.4. Energy expenditure with and without carbon pricing by house income group, United Kingdom, 2011



Source: Gough et al.: *The distribution of total greenhouse gas emissions by household in the UK*, op. cit.

240. To mitigate this effect, low-income price indexes could be used to calibrate transfer payments. Differential energy pricing, at low cost for a basic consumption level and with steeply rising tariffs for additional use, would have a positive distributional effect but signify a radical departure from current pricing. The furthest-reaching proposal is a personal carbon budget, which would be complex to implement.

241. In the absence of readily applicable compensatory mechanisms, a radical expansion of eco-social investment in housing and transport infrastructure is widely seen as an essential complement. Such investments have, inter alia, been advocated by UNEP [50] and others as a Green New Deal, i.e. an effective way to tackle the financial and economic crisis while advancing sustainable development goals.

242. Many countries are promoting energy efficiency in social housing and are expanding affordable public transport. The example of the social housing programme in Brazil integrating solar water heaters (see box 3.7) illustrates the benefits. Electricity bills of beneficiary households decline 40 per cent, the national electricity grid saves expensive peak power supply and labour markets add at least 18,000 jobs. While solar heaters are a very effective and lasting way of addressing the root cause of the problem of energy poverty, infrastructure development will take time before relieving the burden on poor households.

[50] UNEP: *Global green new deal: An update for the G20 Pittsburgh Summit* (Nairobi, 2009).

Box 3.7
Brazil: Programa Minha Casa Minha Vida – PMCMV (My Home, My Life)

Initiated in response to a massive housing deficit, this social housing programme was launched in March 2009 with an initial budget of BRL34 billion (US$18 billion) and planned to build 1 million homes for low-income families by the end of 2011. The second stage of the programme, which is integrated into the Government's Growth Acceleration Programme *(Programa de Aceleração do Crescimento)*, was announced in March 2010. With a budget of BRL278 billion (US$153 billion) for 2011–14, it made a commitment to build a further 2 million homes. Families earning up to three times the minimum wage in cities with over 100,000 inhabitants will receive subsidies that set the monthly repayment rate to around BRL10 per month. Families earning three to six times the minimum wage are guaranteed that their monthly mortgage payments will not surpass 20 per cent of their income.

Houses built under the programme have to meet a number of environmental requirements, including rainwater collection and the use of certified timber. Solar water heaters were made compulsory for houses in the southern half of Brazil in late 2010. The industry association ABRAVA estimated that some 1.1 million m^2 of solar collector area would be added in 2011, surpassing the country's total installed area in 2008 of just 700,000 m^2. In 2009 the ILO (which advised the Brazilian Government to include solar collectors in the PMCMV programme) expected that some 500,000 houses would eventually be built with solar heating, and that homeowners could expect a 40 per cent reduction in electricity bills. The ILO also projected that nearly 18,000 additional jobs could be created in the solar installation industry. In 2010, the government-owned mortgage bank CAIXA financed approximately 43,300 housing units with solar water heating. CAIXA requires that solar installers working under PMCMV be accredited under the Qualisol quality label.

Sources: ECLAC and ILO: *The employment situation in Latin America and the Caribbean*, op. cit.; H. Loudiyi: *Brazil announces phase two of the Growth Acceleration Program*, Growth and Crisis Blog (Washington, DC, World Bank, 2010), available at: http://blogs.worldbank.org/growth/node/8715; C.F. Café: *Brazil: How the "My Home My Life" programme can help the solar water heater sector* (Global Solar Thermal Energy Council, 2009); C.F. Café: *Brazil: My Home My Life programme requires Qualisol certified installers* (Global Solar Thermal Energy Council, 2010); C.F. Café: *Brazil: Low-income multi-family house with individual solar water heaters and gas back-up*, op. cit.; F. Cardoso: *Brazil: New requirements for solar installations on social housing* (Global Solar Thermal Energy Council, 2011). See http://www.solarthermalworld.org.

243. Another way of addressing the higher burden on the poor of energy expenditures, or simply to enable them to access modern energy, is the formation of energy cooperatives. Cooperatives provide community ownership and control, while the priority for service provision keeps prices low. With the principle of sustainability for the community at their root, they also provide voice to members and engage in dialogue on energy policy which facilitates community ownership, production and distribution of energy (see box 3.8).

Box 3.8
Cooperatives as providers of affordable clean energy

In some countries, cooperatives have traditionally played a major role in energy supply. In the United States, for example, they account for 11 per cent of total electricity delivered and serve an estimated 42 million people in 47 states. In Argentina, the Sociedad Cooperativa Popular Limitada de Comodoro Rivadavia (SCPL) was founded in 1933 to provide energy at lower cost than the monopoly utility, when a group of entrepreneurs and socially active citizens bought the concession to distribute electricity. SCPL later added power generation and built the grid which led to the development of the region. The cooperative has extended its activities to cover telephone services, the supply of drinking water, sanitation services and Internet access. Today, SCPL has over 600 employees and owns the largest wind park in Argentina. Clean energy generation represents 17 per cent of its total energy production.

More recent examples are Greenpeace Energy (Germany), the largest energy cooperative in the country with 22,000 members and more than 100,000 clients (including 7,000 commercial customers). The cooperative was founded to provide 100 per cent renewable energy at affordable prices by means of wind farms/wind turbines, and photovoltaic (PV) plants as well as hydropower. With €84 million in sales, the cooperative has created 80 direct jobs.

Inspired by the experience with rural electrification in the United States, the Rural Electrification Programme (REP) in Bangladesh was created in the late 1970s to make electricity available outside urban areas. In 2008, the REP included approximately 70 rural energy cooperatives which generate and distribute electricity, employing about 16,000 people. The results of this electrification programme have been impressive: 219,006 kilometres of distribution lines have been installed that now connect about 47,650 villages to the electricity grid, giving about 30 million people in rural areas access to electricity.

244. In summary, higher energy and resource prices, caused by scarcity or policies to encourage energy efficiency and reductions of GHG emissions, will often have strong regressive impacts on income distribution, but this effect can be assessed and attenuated by compensating poorer households through transfers or adapted tariff structures. Transfers can be linked to existing social protection programmes and should be complemented by enhanced access to energy-efficient housing and transport for low-income groups.

Chapter 4

Effective policies and the scope for a supportive role by the ILO

245. Chapters 2 and 3 identified three areas of opportunities and three areas of challenges. There are significant opportunities to create more jobs, particularly in green growth sectors, with net employment gains for the economy as a whole; opportunities to upgrade large numbers of existing jobs, making them more productive as well as more environmentally sustainable with massive benefits for poverty reduction; and opportunities to promote social inclusion through the access to clean, modern energy.

246. The challenges result from the structural change associated with a transition to more sustainable production and consumption patterns; from the already significant and growing damage to enterprises, jobs and livelihoods caused by climate change; and from the imperative to mitigate potential worsening of income distribution due to energy price increases.

247. The examples of successful policy approaches have shown that coherent policies which integrate the three dimensions of sustainable development and which make use of the inseparable and complementary nature of productive employment, social protection, labour rights and social dialogue are the most effective to ensure a smooth and just transition which seizes the opportunities and minimizes the social and economic costs associated with the challenges. More and more countries are embarking on a shift to environmentally sustainable economies and want to seize the potential to create decent work in the process.

248. This chapter presents a synthesis of major national and international initiatives that offer opportunities for contributions by the ILO, and provides a short overview of the current state of ILO practical support to decent work promotion in the transformation to greener economies, as a starting point for future work. The chapter then summarizes the policy lessons emerging from the previous chapters and outlines a conceptual framework for the contribution of the world of work to environmental sustainability as a basis for discussion.

4.1. Initiatives to promote environmental sustainability and decent work

4.1.1. National initiatives

249. Growing numbers of national governments are pursuing environmental sustainability, often with green economy and green growth initiatives, and increasingly with the support of employers' organizations and trade unions. Table 4.1 provides an overview of selected initiatives by countries at all levels of development from around the world. Many are recent, with a considerable number giving explicit consideration to green jobs policies or explicitly addressing jobs, skills, enterprise development, social protection and inclusion or just transitions.

Table 4.1. National initiatives for environmental sustainability, green economy or green growth

Country	Examples of green economy or green growth initiatives
Barbados	❑ The National Strategic Plan 2006–25 includes "Building a Green Economy – Strengthening the Physical Infrastructure and Preserving the Environment" and "Building Social Capital" as two of six strategic goals. The Plan contains strategies to create new businesses and expand existing enterprises on a sustainable basis, supported by a modern synergistic manpower planning framework for decent work and the creation of quality jobs.
Brazil	❑ The national poverty eradication strategy (2011) reflects green opportunities, including social housing, green protection grants (*Bolsa Verde*), and the formalization of 250,000 recycling workers linked to the National Solid Waste Policy established by law in 2010.
Cambodia	❑ The national Green Growth Roadmap (2010) aims in the short term (2–5 years) to help stimulate the economy, save and create jobs, protect vulnerable groups and improve environmental sustainability. It recognizes investment into human capital as a key precondition for sustained economic growth, including training for green and decent jobs to enhance the greening of the economy and improve the stock of human capital in Cambodia.
China	❑ The 12th Five Year Plan (2011–15) set as key themes the rebalancing of the economy, reducing social inequality and protecting the environment. There are plans to invest US$468 billion in greening key economic sectors, in particular waste recycling and reutilization, clean technologies, and renewable energy. An estimated 35,000 enterprises and institutions in environment protection and its related industries employ 3 million workers. Employment and skills policies for green jobs are in preparation.
European Union	❑ Europe 2020 (2010–20), a European strategy for smart, sustainable, and inclusive growth, sets key targets covering employment, education, research and innovation, social inclusion and poverty reduction, and climate/energy. Employment targets include the following: 75 per cent of the population aged 20–64 should be employed while meeting the EU's objective of 20 per cent of renewable sources; meeting the 20 per cent target on energy efficiency by 2020 would create over 1 million new jobs.
Ethiopia	❑ Climate Resilient Green Economy Initiative (2011–2025): Seeking to achieve middle-income status by 2025 in a climate-resilient green economy, the CRGE Initiative promotes socio-economic targets such as rural development; health; the creation of employment in high value added production; the local production of efficient stoves, afforestation/reforestation as well as forest management, and livestock, in particular poultry; and rural employment.
France	❑ Under the *Grenelle de l'Environnement* (Environment Round Table) (2009–20) more than US$600 billion are being committed to support green measures and over 300,000 direct jobs have so far been created.
Germany	❑ The objectives of the energy policy (*Energiewende*) 2011 are: to phase out nuclear energy by 2020 and increase energy efficiency; and to increase renewable energy sources in gross electricity consumption from 17 per cent in 2010 to at least 35 per cent by 2020. More than 300,000 workers are employed in renewable energy and another 300,000 in energy-efficient building construction.
India	❑ The National Action Plan on Climate Change (NAPCC) outlines existing and future policies and programmes for climate mitigation and adaptation. The plan identifies eight core "national missions" including solar energy, agriculture, water and habitat, running through 2017. ❑ The Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) supports several of the missions through a vast public works programme mostly oriented to environmental protection and conservation, benefiting over 55 million households in 2010–11.
Indonesia	❑ Through its National Action Plan Addressing Climate Change (2007) based on a triple-track strategy which is pro-poor, pro-job and pro-growth, Indonesia has voluntarily committed to reducing its greenhouse gas emissions by 26 per cent, and up to 41 per cent by 2020 with international support. A Climate Change Sectoral Roadmap including for green jobs and skills has been developed to mainstream climate change in the Indonesian national mid-term development plan (2010–14), while a National Action Plan on Mitigation and Adaptation to Climate Change on Public Works consists of policies, strategies and programmes to lower impacts of climate change.

Country	Examples of green economy or green growth initiatives
Malaysia	❑ The 10th Malaysia Plan (2011–15) sets out a programme of economic reforms which are expected to facilitate the growth of new industrial sectors, particularly in green technologies. It includes enterprise promotion. An assessment of employment potential is under way.
Mauritius	❑ The *Maurice Ile Durable* (MID) (2008–28) long-term vision for sustainable development encapsulates five major themes: energy, education, environment, equity and employment. Government institutions and employers' organizations have included green jobs, skills and enterprises in their strategies.
Mexico	❑ Mexico established "promoting sustainable development, green growth and the fight against climate change" as one of the priorities of its presidency of the G20 in 2012. A Special Climate Change Programme (2009–12) set a target of cutting national GHG emissions by 50 per cent by 2050 compared to 2000, supported by programmes to replace almost 2 million refrigerators, air conditioning units and inefficient light bulbs. Mexico's Environmental Leadership for Competitiveness – a programme to improve the competitiveness of value chains and of SMEs through environmental management benefited 651 businesses up to 2010, generating MXN 923 million (over US$70 million) of savings per year and creating 5,758 permanent jobs. A comprehensive green economy and green jobs assessment, and the identification of indicators to support green growth policies are under way.
Morocco	❑ The Solar Plan (2009–20) aims to reduce Morocco's energy imports by installing 2,000 MW from solar power by 2020 while supporting economic growth and creating employment; and to achieve industrial integration of concentrated solar power technologies.
Philippines	❑ The National Climate Change Action Plan (2011–28) includes a specific output on increased productive employment and livelihood opportunities in climate-smart industries and services. Activities programmed aim to develop and improve matching of labour force skills to climate-smart industry demand; develop a system of monitoring and reporting of green job creation and employment; and review and develop innovative financing mechanisms for sustainable livelihoods in rural and climate change-vulnerable areas.
Republic of Korea	❑ The plans Road to Our Future: Green Growth, National Strategy and Five Year Plan for Green Growth (2009–13) are expected to generate some 810,000 green jobs by 2013 and foster competitiveness of the Korean economy in technologies that reduce energy dependence, enhance climate resilience and promote a low-carbon growth path.
South Africa	❑ The Green Economy Accord (2011), adopted as one of the accords under South Africa's New Growth Path, was signed by representatives of the South African Government, business representatives, organized labour and the community constituency at the Parliament of South Africa in November 2011. The Accord sets the goal of creating at least 300,000 jobs by 2020 in the green economy, and activities that green the economy including in manufacturing, energy efficiency, recycling, transport and energy generation.
Sri Lanka	❑ The National Human Resource and Employment Policy (NHREP) adopted in October 2012 spans critical sectors of the economy, including those that have potential to create green jobs. Technical and financial support will be offered to entrepreneurs, including SMEs, to explore green business opportunities.
United Arab Emirates	❑ A long-term national initiative, "A Green Economy for Sustainable Development" (2012–21), aims to position the country as a centre for the export and re-export of green products and technologies through programmes and policies in the areas of energy, agriculture, investment, sustainable transport and construction.
United Kingdom	❑ The Low Carbon Transition Plan: National Strategy for Climate and Energy (2009–20) aims to make a necessary transition to a low-carbon economy through the creation of new business and employment opportunities in renewable energy and building, among others, and to achieve a 34 per cent cut in emissions on 1990 levels by 2020.
United States	❑ The American Recovery and Reinvestment Act (2009) has allocated up to US$100 billion to green investments, with a Green Jobs Act that provides for training for workers and entrepreneurs in green sectors such as energy efficiency, renewable energies and sustainable construction.

4.1.2. International initiatives

250. In the context of Rio +20, UN agencies and other international organizations have launched a range of initiatives to support growing worldwide interest in seizing the opportunities of a green economy. These initiatives aim at closing knowledge gaps by generating evidence, formulating concepts, methodologies and indicators, and identifying best practices. Several provide advisory services and capacity building and engage stakeholders in policy dialogues. Efforts are also being made to step up finance for a greener economy. Only a few of these initiatives consider employment and social dimensions, however. The most relevant are summarized below.

Sharing knowledge

- UNEP has followed up its landmark 2011 Green Economy Report by posting online a series of success stories from around the world to encourage replication and scaling up. The experiences documented range from broad-based policies and practices to specific projects. [1]
- UN-DESA has developed a Green Economy Policy Map and Database. This searchable, online knowledge resource incorporates more than 300 examples of green economy policies, practices and initiatives and will become part of a new Sustainable Development Knowledge Platform. [2]
- The Green Growth Knowledge Platform (GGKP) [3] inaugurated in January 2012 brings together a global network of researchers and development experts to provide practitioners and policy-makers with better tools to implement sustainable development. The founding members of the GGKP are the OECD, World Bank, the Republic of Korea-based Global Green Growth Institute, and UNEP. The ILO has been invited to contribute specialized knowledge on employment, green jobs and social inclusion.
- The OECD has created a Forum on Green Skills, bringing together stakeholders in skills development for a low-carbon economy. [4]
- The G20 strategy on inclusive green growth adopted in May 2012 provides comprehensive guidance to member States, including on decent work, social protection and green jobs. An ILO–OECD issues paper on the implications for the labour market served as input. To assist implementation of the guidance, the G20 Development Working Group published a comprehensive toolkit jointly with the wider UN system, OECD and the African Development Bank, including references to ILO employment assessment methodologies and the building of social protection floors. [5]

[1] UNEP: *Green economy: Developing countries success stories*, op. cit. Available at: http://www.unep.org/greeneconomy/SuccessStories/tabid/29863/Default.aspx.

[2] UN: Sustainable Development Knowledge Platform. Available at: http://sustainabledevelopment.un.org/index.html.

[3] See http://www.greengrowthknowledge.org/Pages/GGKPHome.aspx.

[4] See http://www.oecd.org/employment/greeningjobsandskills.htm.

[5] AfDB, OECD, UN and World Bank: *A toolkit of policy options to support inclusive green growth*, Submission to the G20 Development Working Group (2012).

Advisory services

- A Joint Programme on "Supporting a Green Economy Transition in Developing Countries and LDCs: Building towards Rio +20 and Beyond" by UN-DESA, UNDP and UNEP promotes green economy as a key element of "One UN" and UN Country Team programming. It supports about 15 countries to link sustainable development and poverty eradication. [6]
- UNEP's expanding Green Economy Initiative is currently providing policy advice, technical assistance and capacity building to 26 countries. Scoping studies and policy dialogues aim at determining key elements of a green economy strategy and roadmap. The ILO Green Jobs Programme has been complementing this policy design with assessments of the potential for green jobs where possible, including in China, Kenya, Mexico and South Africa.
- The Poverty Environment Initiative (PEI) by UNDP in collaboration with UNEP is assisting 22 countries to integrate pro-poor environmental sustainability issues into national development strategies, plans and budget processes. Under the PEI portfolio, there has been work on protecting worker health in waste management. [7]
- UNDP also supports a number of countries in formulating Green Low Emission Climate Resilient Development Strategies (LECRDS). Among the goals is the creation of new employment opportunities and green jobs. [8]
- The Climate Change, Employment and Local Development project of OECD aims to help national and local authorities promote good quality greener jobs in low-carbon activities. This includes efforts to measure the potential for green growth at regional/local level and explore ways to foster job creation and inclusive economic development. [9]
- The United Nations Secretary-General formulated an Action Agenda in April 2012 in support of Sustainable Energy for All, an initiative with three complementary objectives for 2030 – achieving universal access to modern energy services; doubling the rate of improvement in energy efficiency; and doubling the share of renewable energy in the global energy mix. [10] Major new investments are to be mobilized, including through public–private partnerships.
- A 2012 report by the International Renewable Energy Agency (IRENA) finds that reaching the objective of sustainable energy for all could create almost 4 million direct jobs by 2030 in the off-grid electricity sector alone, and additional jobs relating to heating, cooling and cooking energy. [11]
- The Director-General of UNIDO has launched a Green Industry initiative on resource-efficient low-carbon growth in developing countries. [12] UNIDO works

[6] See UN Sustainable Development Knowledge Platform: *Attachment A – Audit of current initiatives and key actors involved in Post-Rio +20 green economy work*. Available at: http://sustainabledevelopment.un.org/.

[7] See www.unpei.org.

[8] UNDP: *Green, low-emission and climate-resilient development strategies*. See http://www.undp.org/content/undp/en/home/ourwork/environmentandenergy/focus_areas/climate_strategies.html.

[9] See http://www.oecd.org/employment/greeningjobsandskills.htm.

[10] UN: Sustainable Energy for All initiative website, at http://www.sustainableenergyforall.org. The Action Agenda is available at http://sustainableenergyforall.org/images/content/SEFA-ActionAgenda.pdf.

[11] IRENA: *Renewable energy: Jobs and access* (Abu Dhabi, 2012).

[12] UNIDO: *Green industry in focus*, UNIDO Green Industry Platform. Available at: http://www.unido.org/index.php?id=1001254.

with governments to support industrial institutions that in turn provide assistance to local enterprises and entrepreneurs, covering a broad range of issues including energy, resource-efficient and cleaner production, management of chemicals, ozone-depleting substances and water. In collaboration with UNEP, UNIDO has set up a Green Industry Platform, a framework to bring together governmental, business and civil society leaders to secure concrete commitments and mobilize action in support of the Green Industry agenda. [13]

- The Partnership for Action on Green Economy (PAGE), launched by UNEP, the ILO, UNIDO and UNITAR with the support of the Republic of Korea and a number of other donors, offers a comprehensive set of services to countries interested in promoting environmental sustainability with job creation and social inclusion. As of February 2013 PAGE will offer customized advisory services for individual countries to help design, implement and finance policies and programmes, and promote high-level policy dialogues as well as knowledge generation and sharing.

Finance

251. As adequate financing is critical for transforming the economy and the creation of green jobs, multilateral development banks are changing priorities and stepping up green economy finance.

- The World Bank's renewable energy portfolio has more than quadrupled from 2007 to 2012, rising to US$3.6 billion (or 44 per cent of the Bank's total energy investments, up from 22 per cent). [14]
- In the transportation sector, the World Bank and the regional development banks announced at the Rio +20 Conference that they would make available US$175 billion over ten years for alternative, low-carbon transport. [15]
- The African Development Bank is formulating a Green Growth Strategy focusing on providing sustainable infrastructure, efficient/sustainable use of natural assets, and building resilience and adaptive capacity. The strategy is expected to guide the AfDB's operational engagement with its regional member countries and provide targeted assistance to countries committed to developing through green growth. Cape Verde, Kenya, Mozambique, Senegal and Sierra Leone have been identified for piloting national green growth support. [16]
- The Green Climate Fund set up under the United Nations Framework Convention for Climate Change [17] is to provide support to developing countries to limit or reduce their greenhouse gas emissions and to adapt to the impacts of climate change. The Fund is intended to play a key role in channelling new, additional, adequate and predictable financial resources to developing countries and should catalyse both public and private climate finance at the international and national

[13] UNIDO: Green Industry Platform website, at http://www.greenindustryplatform.org.

[14] World Bank: *World Bank Group Energy Portfolio by Sector, FY2007-FY2011* (Washington, DC, undated). Available at: http://go.worldbank.org/ERF9QNT660.

[15] World Resource Institute: *Development banks announce "game changer" for sustainable transport at Rio +20* (Washington, DC, 2012). Available at: http://www.wri.org/press/2012/06/statement-development-banks-announce-game-changer-sustainable-transport-rio20.

[16] AfDB: *Facilitating green growth in Africa: Perspectives from the African Development Bank*, Discussion paper presented at the Rio +20 Conference, 14 June 2012 (Tunis, 2012).

[17] See http://gcfund.net/about-the-fund/mandate-and-governance.html.

levels. For the time being, the Fund is far from the envisaged level of US$100 billion per year.

- The UNDP/Global Environment Facility (GEF) Small Grants Programme provides funding for local-level investments into sustainable livelihoods. More than 15,000 community-level grants have been made around the world, some of which are directly targeting green jobs development. [18]

4.2. ILO support for environmentally sustainable development

252. Over recent years the ILO has significantly expanded its long-standing work to link environmentally sustainable development with decent work. Following the discussions at the International Labour Conference in 2007, the Green Jobs Initiative was launched in 2007 with UNEP, IOE and ITUC. In response to strong demand from constituents, the Green Jobs Programme was established in 2008.

4.2.1. Strategic orientation

253. The initial priorities for the Programme established by the Governing Body [19] were:

- research and a strong knowledge base;
- awareness raising and capacity building for constituents on the link between the environment, climate change and the labour market;
- the creation of green jobs;
- the greening of all jobs and workplaces; and
- a socially just transition to a low-carbon and sustainable economy.

254. These priorities were last updated in November 2012 [20] in the light of the outcomes of the Rio +20 Conference, calling for a focus on:

(i) *capacity building for social dialogue:* strengthening training and outreach programmes to establish national frameworks and agree on measures that ensure a transition aiming at greater social inclusion and the creation of quality employment opportunities at sector and national level;

(ii) *employment assessments:* expanding ongoing technical assistance for the analysis of the employment impacts and implications for skills development of greening economies and enterprises at national and sector level;

(iii) *social protection floors:* identifying and promoting positive linkages between national social protection floors, economic development, poverty reduction and environmental protection; and

(iv) *research and knowledge management:* continuing to provide constituents with knowledge and information, tested tools and practical approaches on decent work creation in the transition to a green economy.

[18] See http://sgp.undp.org/.

[19] ILO: GB.300/WP/SDG/1, op. cit.

[20] ILO: GB.316/POL/3, para. 20, as amended by the Governing Body.

255. The key contribution of the Office would focus on supporting economic and labour market restructuring in response to resource scarcity, to the adverse impacts of climate change and to environmental and climate policies.

4.2.2. Mode of implementation

256. Throughout, the constituents emphasized the need for an integrated approach linking the four dimensions of decent work in keeping with the 2008 ILO Declaration on Social Justice for a Fair Globalization.

257. In line with this orientation, the Green Jobs Programme adopted a cross-cutting approach under which:

(i) implementation takes place through an Office-wide networked programme with joint delivery and learning by field offices, projects, the International Training Centre (Turin) and ILO headquarters;

(ii) products and deliverables integrate the four dimensions of decent work; and

(iii) human and financial resources are pooled in teams composed of staff from relevant technical units in all sectors and supported by funding from all sources.

258. In the 2010–11 biennium, the Green Jobs Programme was formally included in the programme and budget and outcome-based workplans as one of three areas targeted for knowledge and product development in emerging areas. All ILO regions have been including work items related to the Programme for the last two biennia, with a focus on outcomes for employment, skills upgrading, sustainable enterprise development and economic sectors. External partnerships have also been critical for success: these include UNEP, IOE and ITUC under the Green Jobs Initiative, other UN agencies such as UNIDO and UNITAR, and a number of bilateral agencies as well as the World Bank, OECD, UNEP and the Green Growth Institute around the Green Growth Knowledge Platform. The ILO is an active partner in the UN "delivering as one on climate change" and the Partnership for Action for a Green Economy (PAGE).

4.2.3. Products and deliverables

259. In order to effectively address the key links between decent work and the environment at national and international level, the programme strategy prioritized five clusters for support to constituents:

(i) global knowledge products;

(ii) diagnostic and decision-making tools to assess employment and income impacts for national policy and programme design;

(iii) capacity-building programmes for constituents;

(iv) practical approaches to promote green jobs in the greening of enterprises and the development of new businesses in sectors such as energy efficiency and renewable energy, construction, waste management and recycling;

(v) promoting just transitions towards a sustainable low-carbon economy for enterprises and workers affected by restructuring due to environmental factors or having to adapt to climate change.

260. **Specific products** have been generated to respond to demand and endeavour to reflect relevant ILO values and standards. These include:

- Global flagship reports on green jobs (2008), [21] skills for green jobs (2011) [22] and working towards sustainable development (2012) [23] highlighting that green jobs need to be decent work in accordance with ILO standards.
- Documentation on the significant contribution made by social dialogue to shaping and implementing well-informed and broadly supported policies, from the enterprise to the international level. [24] The Bureau for Workers' Activities (ACTRAV) has explored this relation to a just transition [25] and to international labour standards, [26] with a focus on tripartite consultation, the right to organize and collective bargaining.
- Customized capacity-building programmes for constituents developed and delivered in cooperation with other UN agencies, the IOE and ITUC emphasizing tripartite consultation and social dialogue (see boxes 4.1 and 4.2).
- A practitioners' guide [27] for quantitative ex-ante assessment of employment and income impacts of environmental policies and climate change, to inform responsive policies on employment promotion, equal opportunities for women, youth and disadvantaged groups, working conditions, social protection.
- Tested approaches and training products for green entrepreneurship and business development (Green Business Options, Green Value Chains, My.Coop) and greening of enterprises (productivity improvement and clean production in Green Biz Asia, SCORE and SIMAPRO), translating into practice-relevant ILO instruments on youth employment, skills, equal opportunity, sustainable enterprises, working conditions, OSH and labour–management relations.
- Guidelines for labour in green construction and the built environment with a focus on working conditions, OSH and skills. [28]
- Policy briefs on gender and environmental sustainability, addressing gender equality in climate change [29] and gender and green jobs. These briefs aim at a better integration of gender equality and women's empowerment in adaptation to climate change and in the promotion of green jobs.
- Research and policy briefs on safe and inclusive waste management and recycling, emphasizing the importance of access to adequate skills, OSH, equal opportunity and the abolition of child labour.

[21] UNEP, ILO, IOE and ITUC: *Green jobs*, op. cit.

[22] ILO: *Skills for green jobs: A global view* (Geneva, 2011); European Centre for the Development of Vocational Training (CEDEFOP): *Skills for green jobs*, European Synthesis Report (Thessaloniki, 2010); other products from the EC and ILO joint management agreement "Knowledge sharing on early identification of skill needs", available at: http://www.ilo.org/skills/projects/WCMS_140837/lang--en/index.htm.

[23] ILO: *Working towards sustainable development*, op. cit.

[24] ILO: *Social dialogue on environmental policy around the globe: A selection of national and regional participatory experiences* (Geneva, 2012).

[25] ILO: *Climate change and labour: The need for a "just transition"* (Geneva, 2010).

[26] ILO: *Information note: Social dialogue: Promoting sound governance, inclusive growth and sustainable development* (Geneva, 2012).

[27] ILO: *Assessing green jobs potential in developing countries: A practitioner's guide* (Geneva, 2011).

[28] ILO: *Built environment and labour: Formulating projects and studies concerning labour issues in greening the sectors of the built environment* (Geneva, 2012).

[29] ILO: *Green jobs: Improving the climate for gender equality tool*, brochure (Geneva, 2009).

- Guidance on skills and enterprise development in renewable energy.
- Integrated approach to climate change adaptation favouring employment and incomes by linking public employment programmes, social insurance, enterprise development and local economic development. This brings to bear the ILO's value added on employment promotion, skills development, recommendations for SMEs and cooperatives, social protection (floors) and consultation.

Box 4.1
Promoting green enterprises: Building the capacity of employers' organizations

A training manual is under development for employers' organizations in order to build their capacity to participate in national debates about greening the economy and to set up information and support services for member enterprises wishing to green their business practice and supply chains. The four modules of the manual are designed to improve the understanding and ability of employers' organizations to act in response to the implications of climate change and the opportunities in the green economy.

Having worked with the ILO to explore the issue as part of an RBSA-funded project, the Mauritius Employers' Federation created a Green Enterprise Support Service (GESS) in October 2012, guided by a committee of leading entrepreneurs. The ILO Bureau for Employers' Activities (ACT/EMP) and the Turin Centre have worked closely together on the manual and have scheduled training-of-trainers workshops for interested organizations.

Box 4.2
Sustainable development and decent work: A training manual for workers

The ILO Bureau for Workers' Activities (ACTRAV) together with SUSTAINLABOUR and the Turin Centre has created and implemented a distance learning training programme for trade unions in Latin America. [1] The course content and experience has subsequently been adapted for Africa, validated and finalized through a highly interactive workshop in Kenya in 2011. Interregional training courses continue to be provided in Turin, supported by an Internet-based platform. Overall, more than 100 trade union staff has benefited, 45 per cent of them women.

The training materials available have been used by trade unions in many other capacity-building events. A recent example is the workshop on green and decent jobs for South African workers in November 2012, organized jointly by COSATU and SUSTAINLABOUR supported by the European Union Commission and the European Trade Union Confederation. It covered topics such as opportunities for green job creation in South Africa, successful experiences already developed in the country, policy needs to ensure that the transition to a more sustainable development model benefits everyone, skills for green jobs, and the experience of trade unions and governments in other countries in relation to the creation of green and decent jobs.

[1] ITC and ILO: *Desarrollo sustentable y trabajo decente: Manual formative para trabajadores de Las Americas* (Turin, 2010).

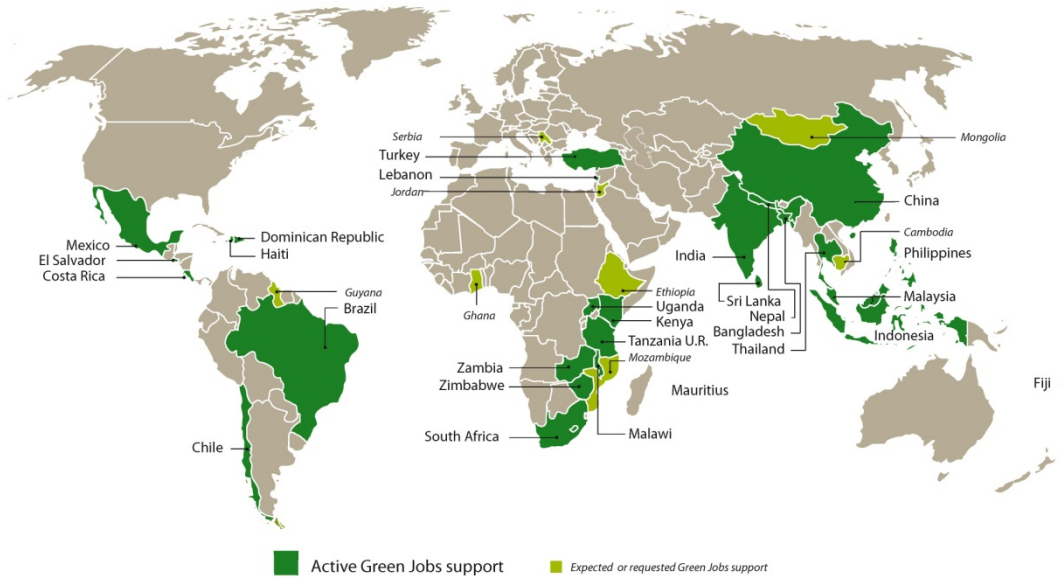
4.2.4. Support to national constituents

261. From the inception of the Green Jobs Programme there has been strong demand from constituents for support for capacity building, advisory services, and demonstration and pilot projects to assist national policy formulation and implementation. Starting with Brazil and China in 2008, member States began to include the theme in their Decent Work Country Programmes. With strong support from the ILO Regional Office for Asia

and the Pacific, policy dialogues and pilot projects were initiated in Bangladesh, India and the Philippines.

262. Since 2008, a total of 27 countries have been assisted directly with capacity building and advisory services on green jobs, including 16 through technical cooperation projects (see figure 4.1). In addition, technical support has been provided to policy dialogues in a number of industrialized countries, including Canada, the United States, the European Union and several of its Member States.

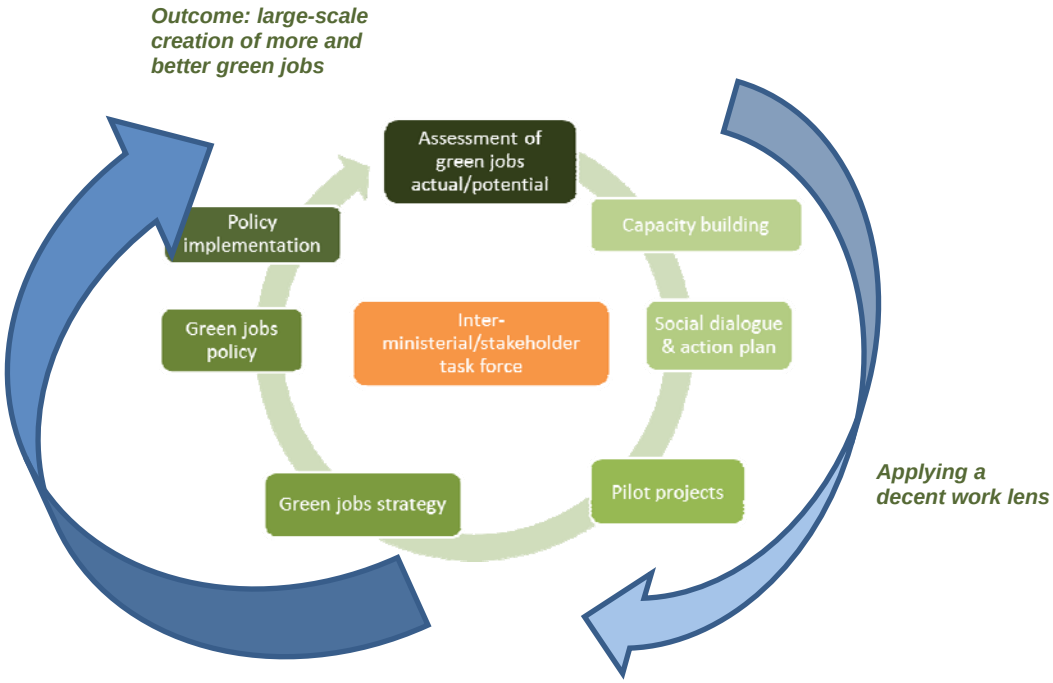
Figure 4.1. Overview of Green Jobs Programme countries



263. Extra-budgetary resources from a growing number of donors such as Australia, Finland, Belgium, Germany, Japan, Norway and Spain have made it possible to extend collaboration to new countries. Yet the increasing interest in green jobs and the demand for technical support outstrips current ILO capacity.

264. The approach adopted for country-level assistance aims at impacts of scale and sustainability. This implies emphasis on strengthening national constituents and partners, as well as anchoring at the policy level, as shown in figure 4.2. In practice, the services are customized to meet specific needs and circumstances. The scope, extent and duration of ILO support have varied substantially, from short-term or limited advice on issues such as inclusive waste management, to multi-year projects and contributions to national development policy.

Figure 4.2. The Green Jobs Programme cycle



265. Typically, advisory services start with information and awareness raising drawing on ILO global knowledge products, followed by capacity building for constituents and relevant stakeholders. Where demand and potential is confirmed, labour market impact assessments are carried out to inform policy dialogues. These often lead to pilot projects, often in economic sectors of particular relevance to the country, and may culminate in the adoption and implementation of policies for green jobs (see figure 4.1). Lessons from this application ultimately feed back into further policy reform, and where possible expand into a broader approach to green jobs through other policy initiatives.

Initial results

266. While the Programme is relatively new, it has already contributed to a series of outcomes in international policy agreements and at country level. Notable international outcomes include the broad interest in green jobs, related components in the response to the economic crisis, and key references in the international climate agreement and in the Rio +20 outcome document.

267. Highlights of selected results at country level with ILO contributions include:

- **Bangladesh:** The Government institutionalized and scaled up skills development for renewable energy with ILO support to increase the outreach of the ambitious solar home system programme implemented by Grameen Shakti (see box 2.5).
- **Brazil:** ILO participation in policy dialogues and advisory services were instrumental in including renewable energy in social housing and skills development for the new jobs created (see box 3.7), the mandatory inclusion of decent work provisions in contracts for forest concessions and the target for formalization of waste-pickers. Green jobs outcomes have also been included in the Decent Work Country Programme of Brazil and the Decent Work Agendas of the states of Bahia and Mato Grosso.

- **China and Kenya:** Both countries are successfully testing training developed by the ILO on green business options for young entrepreneurs, and formulating policies and programmes for scaling up.
- **European Union:** ILO participation in numerous consultations with the EU Parliament, Council and Commission, as well as the preparation of two major studies for the EU by the IILS and the ILO Skills and Employability Department, contributed to the inclusion of green jobs in the EU employment package. [30]
- **Indonesia:** The Ministry of Tourism and Creative Economy revitalized 15 tourism destinations with the help of an ILO project on green jobs for youth, providing new opportunities for local communities. Based on the experience and extensive consultation, the Ministry adopted a strategic plan for sustainable tourism and green jobs.
- **The Philippines:** The country successfully tested an integrated approach to adaptation to climate change and local economic development building on the contribution of an ILO project. The approach is being scaled up with government funding.
- **South Africa:** ILO participation in a national summit on the green economy, and follow-up assistance for the employment assessment and the Expanded Public Works Programmes, contributed to the inclusion of green jobs targets in the national development strategy and large-scale implementation.
- **Sri Lanka:** The country has initiated a programme to formalize and train waste management workers with ILO assistance (see box 2.3) and included green jobs in its employment policy.

4.2.5. Lessons learned and challenges

268. The examples of Bangladesh, Brazil, China, India, Indonesia, the Philippines, South Africa, the European Union and many of its Member States, among others, show that important strides can be made towards making sustainable development and decent work central planks in national development strategies. ILO support and capacity building have assisted constituents to engage meaningfully in national consultative processes, and to propose specific strategies to address employment issues, promote sustainable enterprises and advance social protection.

269. An increasing number of countries are reorienting their development strategies, aiming for sustainable growth with social inclusion. In the analysis of the employment and income impacts of greater environmental sustainability, and in dialogues, countries have identified opportunities to advance national development goals by creating new green jobs and businesses and to green and upgrade existing jobs and enterprises.

270. The engagement of ILO constituents has been instrumental in generating coherent policies and mobilizing political support at the highest level, which is often critical. A growing number of examples – social housing in Brazil, the Mahatma Gandhi National Rural Employment Guarantee Scheme in India, green business options for SMEs and youth employment in China and Kenya, investments in skills for green jobs in the United States – demonstrate that this is possible and how.

271. Demand for ILO support has grown steadily. The promotion of green jobs is part of a growing number of country priority outcomes, linked to employment policies, skills

[30] ILO and IILS: *Towards a greener economy: The social dimensions* (Geneva, ILO, 2011).

upgrading, employment-intensive investment, sustainable enterprises, sector strategies, and the eradication of child and forced labour. The network approach of the Green Jobs Programme, linking technical capacities and resources from virtually all strategic outcomes and regions, has proven successful for scaling up quickly and for providing integrated services to constituents in which relevant elements of decent work are mutually supportive.

272. The Director-General's Report to the 2012 International Labour Conference noted that:

> The ILO's Green Jobs Programme achieved policy impact and coherence by systematically linking itself with the economic and social pillars of sustainable development, going beyond the mere promotion of environmentally friendly jobs. In Brazil, China, India and Indonesia green jobs have become a vehicle for promoting decent work in local development strategies, rural employment programmes and strategies in the construction, forestry, waste management and renewable energy sectors. [31]

4.3. Coherent policies for more and better jobs in a greener economy

273. A decisive turn away from the business as usual policy scenario is urgently called for. A different set of coherent policies is needed if it is a fairer, greener and more sustainable future that we want. Globally, the policy challenge is enormous. Most international policy institutions, among them the OECD, World Bank and UNEP, have made urgent calls for a change of direction. [32] This has been accentuated further by the outcome of the United National Conference on Sustainable Development 2012 (Rio +20).

274. A greener economy requires sustainable production and consumption patterns; these will trigger modifications to practices in most enterprises and workplaces as well as structural change across the economy. The shift needs to create not only the incentives for enterprises to invest but also the capability for them to adopt new modes of production. A greener economy can be mutually reinforcing with good labour market and social development outcomes, but this is not automatic. It will hinge on the right policies and on institutions capable of implementing them.

275. The evidence suggests that gains and losses in terms of jobs, inclusion and equality are not happening by default, but neither can they be programmed with one-size-fits-all policy recipes. The shaping of the right mix of policies is very much country-specific. Countries and regions with large shares of resource-intensive and high-emitting industries face different challenges from those with a lighter legacy of unsustainable production patterns. The latter may have labour markets dominated by sectors exposed to climate change such as agriculture or tourism, affecting employment and incomes on a large scale.

4.3.1. Key policy areas

276. The main policies which drive the transformation to environmental sustainability are:

[31] ILO: *ILO Programme implementation 2010–11*, Report of the Director-General, Report 1(A), International Labour Conference, 101st Session, Geneva, 2012.

[32] OECD: *Towards green growth*, op. cit.; World Bank: *Inclusive green growth*, op. cit., World Bank: *Turn down the heat: Why a 4 degree centigrade warmer world must be avoided* (Washington, DC, 2012); UNEP: *Towards a green economy,* op. cit.

- macroeconomic policies, aimed at redirecting consumption and investment through price signals and incentives for enterprises, consumers and investors, including taxation, price guarantees, subsidies, finance and public investment;
- sectoral policies for key economic sectors or important groups of enterprises, in particular SMEs. This includes most environmental regulation as well as mandates (such as the share of renewable energy in power supply, average energy consumption thresholds for car fleets, or biodiversity set-asides in agriculture and forestry). Most public investment into environmental sustainability is also aimed at key sectors such as transport, land and water management; and
- social and labour policies, which ideally include a combination of social protection, employment, skills development and active labour market policies.

Macro policies

277. Macro policies are used to send price signals which reduce resource consumption and pollution, thereby providing incentives for investment and facilitating private sector-led green jobs. They alleviate binding constraints identified for enterprises, thus creating an enabling environment. Constraints often include lack of finance, inadequate infrastructure, inadequate and inappropriate skills, or prices which do not reflect scarcity and environmental damage. Since many of the investments have relatively long pay-back periods, a stable policy signal is essential.

278. Price signals are typically produced through taxation (a carbon tax or a "cap and trade" scheme whereby emissions limits are established and permits issued which can be sold). Incentives can also be created through guaranteed prices. Over 70 countries are applying "feed-in tariffs" which guarantee a price for electricity fed into the national grid from renewable sources. This temporary subsidy for cleaner power production is financed by electricity consumers. It has led to rapid deployment of renewable energy and dramatic progress in technology, increasing its competitiveness.

279. However, subsidies more often artificially reduce resource prices, stimulating resource consumption and waste. According to the World Bank, environmentally harmful subsidies amount to US$1.2 trillion per year (more than 1 per cent of world GDP), with $0.5 trillion on fossil fuels, $0.3 trillion on water and $0.4 trillion on agriculture and fisheries. [33] These subsidies constitute a strong disincentive for green investments and also tend to be socially regressive. The largest subsidies are received by the major consumers, which tend to be well-to-do households and enterprises.

280. Price signals are best transmitted through firm targets and strategies with timelines. The European Union, for example, has adopted the "20–20–20 targets" to reduce emissions, increase the share of renewables and improve energy efficiency by 2020. [34] Brazil and Indonesia have both adopted unilateral emissions reductions targets below BAU. China has introduced goals for improvements in energy efficiency and the share of renewable energy in its five-year plan. The United Kingdom has adopted a climate change law to give such targets legal status. South Africa has included targets in its national development strategy. In the Republic of Korea, green growth has become the central tenet of the national development plan. [35]

[33] World Bank: *Inclusive green growth*, op. cit.

[34] EC: *Europe 2020: A strategy for smart, sustainable and inclusive growth* (Brussels, 2010).

[35] For a country listing see http://www.oecd.org/greengrowth/countries.htm#all.

281. Other key challenges for fiscal policy and public expenditure management are sustainable financing of public investment in green infrastructure, and the inculcation of appropriate skills to meet the human resource needs of an eco-friendly economy. Without such a resource mobilization strategy, sectoral policies to promote green jobs are likely to become ineffective. This is where the current fiscal austerity programmes in the European Union and other parts of the world can curtail green growth.

282. Green jobs have in fact been successfully "mainstreamed" through counter-cyclical policies. For example, during the global recession of 2008–09, over 70 countries accounting for well over 80 per cent of global GDP enacted fiscal stimulus packages. Public investment in green infrastructure became a common element in such packages. [36]

283. Investment in public infrastructure can be a combination of fiscal (public) expenditure, social protection, employment and investment. Such strategies can be an important instrument with which to create a much-needed boost in employment and employability in rural as well as urban areas. Infrastructure is likely to be a key component of green economy and climate change adaptation strategies in most countries; many of the strategies and plans developed so far place significant emphasis on investment in infrastructure.

284. Monetary policies can also play a supportive role through the provision of affordable finance, credit guarantees and stable, competitive exchange rates.

285. As a package, such macro policies can have a strong "crowding in" effect on private investment, as demonstrated by investment in renewable energy globally and in energy-efficient buildings in Germany. Globally, investment in renewable power and fuels in 2012 increased by 17 per cent to a record US$257 billion, almost half the total investment of US$539 billion in the energy sector. For renewables this is a sixfold increase on the 2004 figure and 94 per cent higher than the total in 2007, the year before the world financial crisis. In Germany, €30 billion of public investment in energy-efficient buildings triggered total investment of over €100 billion.

Sectoral policies

286. Policies for key economic sectors as well as for industrial and enterprise development have proven important for a transition to greener economies, either as stand-alone policies or, more effectively, as a complement to macroeconomic and regulatory policies. As emphasized in the previous chapters and analysed in detail in the recent reports by UNEP [37] and by the ILO, [38] many environmental problems are sectoral and the search for solutions and adoption of policies start there.

287. Many countries concentrate their efforts on the sectors that are most relevant in the national context. Examples include the Environmental Round Table in France, which focuses on energy-efficient buildings, transport and renewable energy; and China's new five-year economic development plan (adopted in May 2012), which has identified seven priority industries for growth and high-technology products. Alternative forms of energy, energy conservation and environmental protection, biotechnology, high-end equipment manufacturing, and clean-energy vehicles are expected to account for 15 per cent of China's GDP by 2020, up from 2 per cent today. South Africa's New Growth Path

[36] ILO and World Bank: *Joint synthesis report: Inventory of policy responses to the financial and economic crisis* (Geneva/Washington, DC, 2012).

[37] UNEP: *Towards a green economy*, op. cit.

[38] ILO and IILS: *Working towards sustainable development*, op. cit.

concentrates green investment on energy-efficient buildings, renewables and rehabilitation of natural resources.

288. Numerous countries have used industrial policy to support the shift to a greener economy. Examples include renewable energy in Brazil (initially ethanol, now biodiesel), China (all renewables), Denmark (wind) and Spain (wind and concentrated solar). Japan is prioritizing hybrid and electrical vehicles. The Republic of Korea is focusing, inter alia, on green information technology.

Labour and social policies

289. The transition to a greener economy entails both job creation and the transformation of many jobs and occupations, as well as displacement as workers change jobs, firms or economic sectors. In this context, labour market institutions and policies are critical for setting out the framework conditions for labour markets to adjust to the transformation required. One of the key areas of a policy package for the transition, therefore, is to enhance the capacity of the labour market to adapt to structural change, regardless of the source of this change. Employment, social protection, training and skills development, labour market policies, governance and cooperation between the social partners all matter for the speed and form of adjustment.

Social protection

290. Social protection measures will be critical in the transition to a green economy. Strengthening social protection can:

- provide the opportunity for poor people, including farmers, to adopt sustainable practices and improve productivity;
- afford income security and enable skills acquisition and mobility for workers who have to relocate to new jobs;
- remunerate environmental services rendered by poor groups and communities which engage in conservation activities and environmental protection; and
- combine targeted access to employment opportunities to major investments in productive infrastructure, rehabilitation of natural resources and adaptation to climate change.

291. People who are focused on daily survival and challenged by ill health, without having access to social health protection benefits, are unlikely to give priority to conserving the quality of their environment and to engage in forest, soil and water conservation activities. A certain level of social health protection and income security is necessary to empower them to engage in such activities.

292. Some countries have explicitly incorporated environmental components into their social protection floor policies. The Brazilian *Bolsa Verde* programme (see box 2.6) includes a green grant designed to provide incentives to poor families living in natural reserve areas to engage in environmental conservation. Colombia and Mexico have implemented similar programmes. The Indian Mahatma Gandhi National Rural Employment Guarantee Scheme (see box 2.2) links a right to public wage employment with green infrastructure building and rural natural resource management to enhance the livelihood security of marginalized households in rural areas. Ethiopia's Productive Safety Net Programme (PSNP) (see box 3.6) provides seasonal work in public employment programmes in exchange for cash or food in order to alleviate household vulnerability to food insecurity during the lean season.

293. These examples show that national social security systems, including social protection floors as laid out in ILO Recommendation No. 202, can be major contributions to enhancing people's resilience, strengthening their adaptive capacities and enabling them to seize new economic opportunities. The joint statement submitted by the AfDB, OECD, UN agencies (including the ILO), and the World Bank to the G20 Development Working Group argues: "Social protection instruments are a way to make green growth more inclusive and socially acceptable …" [39] Social protection floors need to be defined in each specific country context, typically building on existing (though often inadequate) social protection schemes.

Vocational training and skills development

294. Training and skills development policies will require considerable attention. Skills are fundamental to adjusting worker competencies to evolving demand for jobseekers, changing competencies in occupations and workers affected by relocation. The ILO global study on skills for green jobs [40] has shown that shortages of qualified workers are already hampering the shift to a greener economy in most countries and sectors, because demand has been underestimated or skills systems are not linked to the macro and sectoral policies for greening. This is critical, because without skilled workers and competent enterprises the shift to a greener economy will be neither technically feasible nor economically viable.

295. The extent of the transition in skills and occupations depends on several factors, including country-specific industrial structure and stage of development. Nevertheless, some important general lessons have emerged: [41]

- Place emphasis on skills and education policies to facilitate job transition and improve employability: A greener economy will see the emergence of some new occupations, but it will mostly require new competencies in existing jobs and shifts in demand for occupations. This means that greater emphasis needs to be placed on skills upgrading through workplace training, as well as on preparing new generations of workers. There is ample evidence from around the world that it is both possible and necessary to anticipate future skills needs and make adjustments in education and training systems. Australia, Europe and the United States are leading in mapping new skills requirements, including those for safe and healthy work practices.
- Link training systems more directly to evolving demand: In order to respond quickly and appropriately to the emerging demand in green growth sectors, training initiatives should target the environmental goods and services sector (EGSS), where an expansion will create new demands for a variety of skill profiles. Tripartite skills councils, as in France and the Republic of Korea, are a good way of making training systems more responsive. Other examples include the Green Skills Agreement in Australia, the UK Alliance of Sector Skills Councils (SSCs), the mobilization plan for green jobs in France and the Fund for Energy Savings bringing together utilities, trade unions and enterprises in Mexico.
- Ensure equal access: Experience shows that those who have the required skills are also the ones who find jobs. Skills can therefore be an important stepping stone for

[39] AfDB et al.: *A toolkit of policy options*, op. cit.

[40] ILO: *Skills for green jobs: A global view*, op. cit.

[41] ILO: *Greening the global economy: The skills challenge*, Skills for Employment policy brief (Geneva, 2011).

giving young women and men and other disadvantaged groups access to the job and income-generation opportunities created in a green economy.

- Encourage acquisition of generic and STEM skills: Generic skills are increasingly important, particularly in science, technology, engineering and mathematics (STEM skills) which will be needed for new research and development to achieve breakthroughs for greening economies. They will also enhance labour force mobility generally.
- Promote "portable skills": Through qualifications based on competency profiles for green jobs which are recognized sector-wide. A good example is the tripartite creation of certification of green plumbers in Australia. [42]
- Address the significant reskilling needs for greening as well as relocation: This is particularly important for workers in resource-intensive sectors such as mining, power generation, manufacturing and agriculture.
- Integrate skills into policies for climate change adaptation: The skills required for successful adaptation to climate change will depend on the sectors concerned and the adaptation strategies chosen. Skills development has so far rarely been recognized as an adaptive response in national adaptation plans of action. If they were, they could for example be delivered as part of public employment programmes providing retraining and skills upgrading for workers to become employable in transformed, more environmentally friendly jobs.

Sustainable enterprise development

296. The social, economic and environmental dimensions of sustainable development come together inseparably in enterprises and workplaces. Enterprises not only employ the majority of the global workforce and are a main driver of employment creation and wealth generation; they are also vital for environmental sustainability. Enterprises will have to be able to produce a wider range of green goods and services and to adopt clean production methods.

297. Successful policies to facilitate this shift include:

- an enabling environment for sustainable enterprises generally, but specifically regulatory and fiscal measures which promote demand for green products and services and drive green investments;
- special consideration to help SMEs comply with environmental regulation and to seize green business opportunities; and a sectoral approach to regulation, communication and enforcement, with tailored regulatory instruments and partnering between regulatory and enforcement bodies with trade associations;
- uptake of green business opportunities, achieved by business development services including green entrepreneurship training, access to information, technology, credit and markets, among others, through green public procurement accessible to SMEs;
- greening of all existing enterprises, with a strong role for skills upgrading and management–worker cooperation at sectoral and enterprise levels. This can build in many instances on institutions and practices already existing for occupational safety and health;

[42] ILO: *Skills for green jobs: A global view*, op. cit.

- value chain development by enterprises themselves or in partnership with government institutions, which can be effective in identifying opportunities for reducing environmental impact and expanding green business opportunities;
- businesses becoming resilient to climate change to avoid the disruption of economic activity and the loss of jobs and income. National policies and plans for adaptation should work closely with business associations to climate-proof infrastructure and promote disaster-preparedness information, skills development and insurance, in particular for SMEs; and
- a pivotal role for cooperatives in enhancing climate resilience but also in seizing green business opportunities and developing value chains.

Occupational safety and health

298. As the green economy develops it is essential that the safety and health of workers are integrated into policies for the transition to green jobs. The current focus on a low-carbon economy should integrate environmental aspects with OSH and public health, while at the same time taking into consideration the well-being of surrounding communities.

299. Integrating the OSH dimension implies evaluating the hazards and risks to workers in all green jobs, processes and products through the implementation of risk assessment and management measures. A true green job must integrate safety and health into design, procurement, operations, maintenance sourcing, use, reuse and recycling policies and decision-making as part of national OSH policies.

300. Government policy, labour inspection, social dialogue and collective bargaining on OSH issues, as well as corporate governance, can play key roles in prevention, reporting and enforcement to ensure that green jobs are safe and traditional jobs become safer. ILO standards on safety and health promote universal principles which are pertinent to any type of economic system or workplace, but some are also directly relevant to the protection of the environment. This is particularly true for the Chemicals Convention, 1990 (No. 170), and the Prevention of Major Industrial Accidents Convention, 1993 (No. 174).

Labour market policies

301. The existing suite of active and passive labour market policies can play a significant role in helping realize the opportunities for more and better jobs as well as social inclusion. Active labour market policies (ALMP) encompass a broad set of policies with different aims: supporting labour demand by maintaining jobs or directly creating new jobs, and maintaining links to the labour market, in particular through job-search assistance and access to training.

302. In many instances of adjustment this may simply require augmenting the existing suite of active labour market programmes such as job-search assistance, job counselling, training and improved labour market information. This will reinforce the adaptive capacity of the labour market, and not just in the context of a green economy. In developing countries, however, as discussed above, programmes of this nature are still limited, and efforts to develop strong labour market institutions are thus needed.

303. Some labour market policies, such as job-search assistance, do not need deep reform but can also play a role if they are tooled to assist the transition. Job-search assistance is a relatively effective and low-cost tool to reduce unemployment and the risk of skills degradation. Awareness of the opportunities in a greener economy and skills requirements for green jobs among workers and employers, as well as employment

services, can be raised through institutions such as France's National Observatory for Green Employment and Occupations, but typically also requires capacity building in employment services.

304. In developing countries, public employment programmes and employment guarantees play an important role in sustaining labour demand. These programmes can be "greened" by entering directly into environmental services or by producing greener infrastructure. Another role for such programmes is to transfer the skills needed for workers to be employable in transformed, more environmentally friendly jobs.

305. In some instances, bolstering the existing range of programmes may be insufficient and a degree of tailoring will be required – particularly relevant given the fact that challenges are often sector-specific. Examples include the Belgian public employment service, which has developed a "sustainable building" competency centre in East Flanders. In addition to practical skills training such as learning how to install eco-efficient heating, the centre matches workers and engineers with green building skills to demand in the construction sector. Similarly, in Morocco the public employment service ANAPEC is managing the recruitment process for major green construction works. [43]

4.3.2. Policy coherence: Objectives and examples

306. Four policy objectives are key to achieving win–win outcomes:

(1) shifting the burden away from labour to resource use and pollution;

(2) encouraging investment in a greener economy;

(3) providing targeted support to enterprises, notably SMEs; and

(4) ensuring just transitions for workers negatively affected by restructuring, for communities exposed to climate change and for population groups disadvantaged by green policies.

307. The most successful examples are characterized by the purposeful matching of economic, environmental and social policies.

308. Among macroeconomic policies, eco-taxes have emerged as an instrument of choice because they integrate both dimensions in a single tool. Eco-taxes can generate a double dividend of improved environmental sustainability and net gains in employment (compared to BAU) when revenue generated to increase the price of resource consumption is used to stimulate employment by investing in human resources and reducing the price of labour. [44] Eco-taxes are a powerful policy lever, but will work best if complemented by other policies such as skills and enterprise development.

309. Harmonized approaches across different policy fields in key economic sectors include:

- **Agriculture:** resource conservation and low-carbon agriculture, enabling small-scale producers to adopt more productive and sustainable production methods through technical and entrepreneurial skills, supportive social protection, targeted investment in infrastructure, organization and finance (see examples from Ethiopia (box 3.6), India (box 2.2), and the Philippines (Chapter 3, page 20);

[43] See http://www.wapes.org/infos/info/patrick-@/index.jspz?id=2874.

[44] For a detailed discussion of empirical and modelling evidence, see ILO and IILS: *Working towards sustainable development*, op. cit., Ch. 10.

- **Forestry:** arresting deforestation, rehabilitating degraded forests and extending sustainable forest management through support for sustainable forest enterprises with high skill levels and good working conditions, value-chain development and payment for environmental services to local communities which can be linked to social protection floors (see examples from Brazil and South Africa, Chapter 2, page 18);
- **Fisheries:** reducing overfishing and allowing depleted stocks to recover and promote sustainable levels of catch by providing income replacement during unemployment; access to employable skills outside fishing and promotion of alternative income opportunities (see examples from Brazil (box 3.2) and Norway (box 3.4));
- **Energy:** improved energy efficiency through regulation, price signals and access to finance, supported by skills upgrading and labour management cooperation; deployment of renewable energy with access for those currently without modern energy through targeted SME development, cooperatives and social housing (see examples from Brazil (box 3.7) and Bangladesh (box 3.8));
- **Resource-intensive industries:** stimulating greening of these industries to substantially reduce pollution, energy and resource consumption through regulation and incentives, coupled with information, access to finance and management–worker cooperation at sector and enterprise levels (see examples from Japan, Republic of Korea (Chapter 3, page 7) and 3M (box 3.1));
- **Waste management and recycling:** reducing hazards from waste and expanding recovery of valuable material by increasing recycling and upgrading informal waste management through organization of informal recycling workers, service contracts, technical and business skills development (see examples from Brazil and Sri Lanka (box 2.3));
- **Buildings:** tapping the largest potential for energy efficiency gains by adopting high building standards for new construction, and stimulating renovation of existing building infrastructure by regulation, information, public investment and access to affordable finance for clients and skills upgrading, certification of competences and improvement in working conditions in the building sector (for examples, see boxes 8.4 on Germany and 8.5 on Australia); [45]
- **Transport:** shifting to energy-efficient vehicles and modes of transport, in particular public transport through fiscal policies, regulation and incentives for consumers in combination with technology development, skills upgrading and public investment in infrastructure (see examples from China, Japan and Republic of Korea in Chapter 2).

310. Examples of countries which have successfully adopted an integrated sector focus include:.

- **China**, which has supported environmental and labour market goals with a successful green stimulus package during the economic crisis, creating 5.3 million jobs in the green economy between 2009 and 2012. Targets for energy efficiency and renewables in national development plans are matched by targets for green job creation. The latter are supported through development of vocational and entrepreneurship skills as well as assistance to green business start-ups;

[45] ibid., Ch. 8.

- **Austria's** *Klima-aktiv* (active for the climate) policy launched in 2004, which has been very successful in giving SMEs access to opportunities in a greener economy, particularly in green construction and renewable energy. Environment policies are coordinated with those for the labour market, in particular workforce training, quality standards for new products and services, information and communication campaigns, and advice and support to businesses and networking.

311. To complement national and sector-focused policies, local economic development strategies can be pursued in realizing a growth path with low environmental impact and high employment and income benefits. Measures can be adopted and integrated to respond to local needs, constraints and opportunities in the green economy through inclusive and participatory planning and implementation. Local employment and value added can be multiplied when adopting appropriate technology and relying on local resources to improve the natural resource base and to climate-proof private and public infrastructure, especially when using local SME contractors.

4.3.3. Achieving policy coherence: Assessments, institutions and social dialogue

312. Coordinated implementation across policy areas is particularly important. Unlike recent major structural transformations brought about by globalization or by the ICT revolution, the transformation to a more sustainable economy is likely to be largely policy-led, with policy exacerbating rather than buffering market signals.

Assessing social impacts for more effective strategies

313. One of the key ingredients for successful policy-making has been ex-ante assessments of the expected impact of specific greening policy measures. This enables decision-makers to clarify the link between environmental issues and policies on the one hand, and effects on social groups and social objectives on the other – including employment creation and the generation and distribution of income. Ideally, such analysis would be used to prioritize policy options. These changes can be anticipated better than for adjustments arising from other causes, so that the transition can be managed more smoothly and possibly more fairly.

314. As we have seen in this report and other earlier reviews, [46] however, the environmental challenges, as well as the options for addressing them, differ widely between countries and between economic sectors. Assessments can do justice to this diversity by taking account of specific national, sectoral or local conditions.

315. A range of methods is available and has been applied to understand the interlinkages between the environmental, economic and social dimensions of the transformation to sustainable production and consumption patterns. No single method can provide all the answers; each has its strengths and weaknesses in terms of data needs, level of detail captured, ability to take account of interlinkages within the economy, and time horizon. There are often trade-offs between these parameters, e.g. a method for economy-wide analysis over a longer time horizon typically has high data requirements and limited resolution.

316. These constraints and trade-offs notwithstanding, several assessment methods have been helpful for informing policy (see examples in table 2.1). Useful methods include sector studies, input/out (I/O) analysis, static or dynamic social accounting matrices

[46] UNEP: *Towards a green economy*, op. cit.; UNEP: *Green jobs*, op. cit.; ILO and IILS: *Working towards sustainable development*, op. cit.

(SAM/DySAM), and computable general equilibrium models (CGE) as well as a variety of complex dynamic models which use systems analysis and sometimes combine physical and economic variables.

317. Some countries have conducted assessments of environment-related employment for many years and monitor it periodically. In Germany, assessments started in 1994 and analyses of employment effects of environmental policies have been conducted for over a decade. [47] In recent years, a growing number of countries have begun to collect such data.

Institutions for policy coherence

318. Social dialogue aims to promote consensus building among the major stakeholders. Effective dialogue can help resolve crucial socio-economic issues and improve economic performance. Given that the transition towards a greener economy will entail profound changes in production processes and technologies as well as reallocations of jobs, close cooperation between government and the social partners will be central to the success of this transformation. The need for participation in governance was already recognized in Agenda 21 and has been emphasized even more in the Rio +20 outcome document.

319. Numerous examples in this report [48] as well as in a dedicated ILO study [49] show how social dialogue plays a critical role, from international, national and sectoral to the local and enterprise levels, to:

- inform policy;
- promote policy coherence;
- launch initiatives for greening the economy and enterprises;
- form partnerships for the implementation of policies;
- promote job quality and decent work in green sectors and occupation; and
- sensitize, advise and assist the members of employers organizations and trade unions.

320. Social dialogue informs policy-making by contributing essential information to assessments. The perspectives of the social partners ensure that social outcomes are taken into account and that social and labour market policies can complement environmental and economic measures. Existing forums such as the Councils for Social and Economic Development in many countries, or the new ones such as the Grenelle de l'Environnement in France or the tripartite round tables for the implementation of the Kyoto Protocol in Spain, have been instrumental in agreements on large integrated policy packages. An outstanding example of an initiative driven by the social partners is the German programme for energy efficiency in buildings (see Chapter 2, page 12). Examples for sectoral and enterprise level initiatives from Japan, Republic of Korea, the United States and others were reviewed in Chapters 2 and 3. In South Africa the "green economy accord" has been concluded to formalize the partnership between relevant line ministries and the social partners for the implementation of this component of the national development plan.

[47] See Ministry of Environment website, at: http://www.bmu.de/english/aktuell/4152.php.

[48] See also: *Recurrent discussion on the strategic objective of social dialogue*, Report VI, International Labour Conference, 102nd Session, Geneva, 2013.

[49] ILO: *Social dialogue for a green economy* (Geneva, forthcoming).

321. Employers' organizations and trade unions have sensitized and provided advice to their membership in many countries. In Latin America, for example, over 2,500 trade union members have completed a distance learning course on sustainable development. They have also innovated in collective bargaining. Collective agreements in Belgium include an incentive to buy sustainably produced products.

4.4. Towards a policy framework for sustainable development, decent and green jobs

322. The review of experiences throughout this report, and in particular the rapidly growing number of national and international initiatives discussed, show that the search for a fairer, more inclusive and environmentally sustainable development model has clearly gained momentum in many countries. It is spurred by the realization that environmental sustainability is not optional, but a necessity, including for labour markets, sustainable enterprises and poverty reduction.

323. Achieving environmental sustainability requires profound and far-reaching changes in production and consumption patterns. It is already having major impacts in workplaces and enterprises, in labour markets and communities. The environment is clearly a social and labour issue. Decent work can only play its role as a driving force for sustainable development if this linkage to the environment is acknowledged and factored into policies and practices.

324. The Rio +20 Conference underlined the importance of overcoming thinking, policy-making and actions based on a concept of sustainable development with three separate pillars. The challenge for the future is to recognize and act on the linkages between the economic, social and environmental dimensions. This report has shown that environmental sustainability cannot be achieved without the active engagement of the actors in the world of work. By contrast, where the links are recognized, the social and environmental dimensions can become mutually supportive, and even challenges such as the need to adapt to climate change can be turned into opportunities.

325. Macroeconomic and environmental policies, coupled with investments into a skilled workforce and opportunities in enterprises, can create a powerful dynamic for sustainable development. Social housing policies stimulating local SMEs in a greening construction sector, or promoting renewable energy with skills training and entrepreneurship promotion for women and youth, promote social inclusion and create jobs while avoiding an unsustainable environmental footprint. Linking labour inspection and the prevention of major industrial accidents to environmental regulations in forestry and mining and to the development of local and global value chains enhances the development contribution of extractive sectors while containing their environmental impact.

326. The overarching challenge for ILO constituents is to leverage the process of structural change towards sustainable production and consumption patterns for the large-scale creation of quality employment opportunities, the extension of adequate social protection, the advancement of social inclusion and the realization of fundamental principles and rights – for current and future generations alike.

327. On the one hand, this requires environmental and economic policies which are mindful of their impacts on the world of work; on the other hand, social, employment, skills and labour market policies need to incorporate environmental sustainability as one of their goals to contribute to, rather than undermine, the prospects for sustainable enterprises and decent work. Creating institutions and governance mechanisms for

environmentally sustainable development at all levels, including ministries of labour and social development, employers' organizations and trade unions, will be essential to achieve the necessary integration and coherence.

328. Table 4.2 suggests a preliminary framework for identifying the contributions that decent work and the world of work need to make to environmental sustainability from economic, social and environmental perspectives. It begins to identify relevant policy measures and guidance already contained in international labour standards (ILS) and major ILO policy statements. While it is clear that much relevant guidance exists, it has never been articulated in ways that national and international policy-makers, the private sector or indeed the ILO constituents themselves can act on.

Table 4.2. The contribution of the world of work to environmentally sustainable development

Contribution	Economic	Social	Environmental
	Create opportunities for productive employment in environmentally sustainable sectors and enterprises	**Provide access to quality jobs and income opportunities** for unemployed, underemployed and working poor	Adopt green products and practices in enterprises and at workplaces (bring about environmental sustainability of key sectors and economies as a whole)
	Reduce the economic cost of transition due to the labour market	Promote a just transition with a fair sharing of cost and opportunity	Enhance resilience of enterprises and workplaces to climate change
Relevant measures and policies (ILS providing guidance on substance)	Employment creation (Convention No. 122) Labour force development (Convention No. 142) Enterprise development (Recommendations Nos 189 and 193, MNE Declaration)	Quality job opportunities (ILS on working conditions, social protection, representation) Equitable access (ILS on non-discrimination, skills, social security) Just transition for those who lose jobs or livelihoods (ILS on dismissal, social protection, reinsertion, migration)	Adopt green products, services, processes and practices (resource and energy efficient; minimum pollution) Social protection, skills development, economic diversification
ILS providing guidance on governance	Consultation and participation (Conventions Nos 144 and 169)	Participation in enterprises (Conventions Nos 87 and 98) and communities (Nos 144 and 169)	Participation in enterprises (Conventions Nos 87 and 98) Workplace cooperation (Convention No. 136)

329. The Rio +20 outcome document, the Cancun Agreements on climate change and a growing number of national policy statements call for decent work and a just transition to low-carbon economies to be a central goal as well as driver for sustainable development. The deliberations at the International Labour Conference in 2013 provide a unique opportunity to formulate guidance on how to translate this political will into practice.

Chapter 5

General discussion – Sustainable development, decent work and green jobs

Suggested points for discussion

330. How will the main current environmental problems (such as climate change, water scarcity, biodiversity loss and deforestation) affect the world of work?

331. What are the main opportunities to advance decent work for all as part of the overall shift towards environmental sustainability? How can the potential for growth of jobs and sustainable enterprises from this shift be realized and how can it be ensured that green jobs are also decent jobs?

332. The impacts of environmental problems, but also the actions taken for protecting the environment, will present diverse challenges for employment, working conditions, social equity and labour rights. These include the impact of new regulations on resource-intensive sectors or polluting ones, the impact on supply chains arising from an increase in the costs of energy and natural resources, or the distributional impacts of carbon pricing or other environmental measures. What challenges could be experienced by the world of work following the implementation of policies aimed at protecting the environment?

333. What can be learned from previous transitions (such as those associated with the introduction of labour-saving technology and mechanization, information and communications technology or trade adjustments) and their impact on the world of work and what is new with the transition to sustainable development?

334. What policies and institutions are required in order to manage the challenges for enterprises and workers, from a transition to an environmentally sustainable economy and minimize negative effects, while promoting green and decent jobs and the greening of all enterprises? What policies and instruments can be applied to facilitate a just transition for the world of work?

335. What should be the ILO's priorities – using all its means of action – in order to assist constituents to capitalize on the opportunities and in fostering a just transition towards a world of work that respects and contributes to environmental sustainability? What should be the role of member States, and employers' and workers' organizations?