



Global Challenges for Sustainable Development: Strategies for Green Jobs

*ILO Background Note
G8 Labour and Employment Ministers Conference
Niigata, Japan, 11 to 13 May 2008*

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A: Introduction

1. This background note discusses the implications for employment and decent work policies of shifting to more sustainable development paths. It focuses in particular on climate change and the search for ways to combine growth, the reduction of poverty and equitable development with a much reduced emission of green house gases. The overarching framework for this discussion is the concept of sustainable development agreed at the Johannesburg Summit in 2002 which assumed “a collective responsibility to advance and strengthen the interdependent and mutually reinforcing pillars of sustainable development - economic development, social development and environmental protection - at the local, national, regional and global levels.”¹
2. The time horizon for the transition to a sustainable development trajectory for the global economy is medium to long term although there is an urgent need to

¹ Paragraph 5 of the Johannesburg Declaration on Sustainable Development which it should also be recalled included a paragraph on employment as follows: “28. We also agree to provide assistance to increase income-generating employment opportunities, taking into account the [Declaration on Fundamental Principles and Rights at Work](#) of the International Labour Organization.”

halt the upward trend in green house gas emissions. Following agreement in Bali in December 2007 on a road map for international action on climate change, negotiations have started with a view to an agreed outcome at the Conference of the Parties in Copenhagen in December 2009. The Executive Secretary of the UN Framework Convention on Climate Change recently described the challenge for these negotiations in the following terms:

“according to the IPCC’s scientific findings, the solutions that we come up with in the context of advancing the Bali Road Map need to significantly increase the extent of adaptation to reduce vulnerability; stop the increase of global emissions within the next 10 - 15 years; dramatically cut back emissions by mid-century at the latest, and do so in a way that is economically viable world-wide.”²

3. Many countries have developed national programmes for sustainable development including addressing the challenges of climate change. There is growing awareness that employment and labour policies can contribute to a smooth transition to more sustainable growth by identifying opportunities for green jobs, greening existing jobs and easing the phasing out of unsustainable jobs. Strategies for green jobs are set to become an increasingly important part of employment and labour ministers responsibilities as well as the activities of employers’ organizations and trade unions.
4. Green jobs strategies need to be placed in the context of the challenge of shaping a social dimension to globalization discussed at the 2007 Dresden Conference of G8 Labour and Employment Ministers and at the Heiligendamm Summit. G8 Heads of state and government expressed their conviction that “a globalisation that is complemented with social progress will bring sustainable benefits to both industrial and developing countries. We recognize our responsibility for an active contribution towards this objective. Therefore, we support the International Labour Organization’s (ILO) Decent Work Agenda with its four pillars of equal importance: the effective implementation of labour standards, especially the ILO core labour standards, the creation of more productive employment, further development of inclusive social protection systems and the support of social dialogue between the different stakeholders.”³
5. Just as there is increasing concern that the current path of globalization is yielding too few decent jobs, so is there concern that we cannot continue with growth at the expense of environmental quality. We are therefore in a period of transitions searching for the policies and the leadership that can take us into a sustainable development path where social and environmental dimensions of globalization are an integral part of economic policy-making. Transitions in employment structures and in workplaces are central to this process.⁴

² Statement by Yvo de Boer at the opening of the Bangkok Climate Change Talks 2008 31 March 2008 http://unfccc.int/files/press/news_room/statements/application/txt/080331_statement_bkk.pdf

³ Summit Declaration on Growth and Responsibility in the World Economy, 7 June 2007, (paragraph 22).

⁴ See Address by Juan Somavia Director-General of the International Labour Office to the 10th Special Session of the Governing Council/Global Ministerial Environment Forum United Nations Environment Programme (UNEP), Monaco, 20 February 2008 <http://www.ilo.org/public/english/bureau/dgo/speeches/somavia/2008/unep.pdf>

6. Employment patterns and labour markets are in constant change driven by many factors including technology, trade, finance, demographics and as well as the environment. Maintaining a policy framework that facilitates and encourages change is one of the main responsibilities of employment and labour ministers. Climate change and other environmental issues add a new dimension to that process of change which needs to be better understood so that policies can be well-tuned to meet the new challenges.
7. This background note sets out what we know so far about the impact on employment of climate change and policy responses. It concludes by suggesting issues on which Ministers may wish to exchange ideas and information and ways in which G8 leadership could reinforce the initiative of the ILO to develop and implement a global green jobs strategy in collaboration with partner international agencies and its national tripartite constituency.

B: Environmental Challenges to Sustainable Development

Climate Change

8. Global temperatures have risen by 0.74°C over the last century, the largest and fastest warming in the history of the Earth detected by scientists. The trend is accelerating and has affected all continents and most oceans. Temperatures could rise by 3°C over pre-industrial levels by the end of the century.⁵ Global warming follows emissions with a long time lag. The world will experience further climate change even if emissions stopped today, albeit to a much lesser extent than otherwise. Adaptation to climate change in an effort to reduce its negative impacts is therefore inevitable.
9. Most impacts in the short to medium term will come from increased variability of weather and more frequent and extreme events like storms, droughts, floods and heat waves. Although developing countries have historically contributed least to emissions causing climate change, they stand to suffer most because many are vulnerable and least able to adapt to extreme environmental events. Particularly at risk are the heavily-populated areas such as developing country mega-deltas and small island states. The economic sectors most dependent on the weather, such as agriculture and tourism, are likely to be most affected along with settlements and industry located in coastal and river flood plains as well as other areas prone to storms.
10. In the medium to long term, projected climate change from current trends will lead to serious disruption of economic and social activity in many sectors on all continents. However, the technical and economic potential exists to reduce emissions to levels of climate change considered tolerable. Mitigation, i.e. measures to reduce emissions or remove GHG from the atmosphere are both necessary and cheaper than inaction.⁶
11. Scientists suggest that in order to avoid dangerous, possibly irreversible and self-reinforcing climate change, atmospheric concentrations of GHG should not exceed the equivalent of 450 parts per million (ppm) CO₂. This would result in a warming of 2°C on average. Stabilization scenarios show that a 450 ppm maximum requires global emissions to peak over the next 10-20 years. At

⁵ 4th Assessment Report, Intergovernmental Panel On Climate Change Working Group 1, 2007

⁶ Stern Review Report on the Economics of Climate Change

http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm

the same time the trend scenario of the International Energy Agency projects a 60 per cent increase in global demand for energy until 2030, needing a total investment of US\$20 trillion of which about half in developing countries.⁷ While historically, industrialized countries have been responsible for the bulk of emissions, developing, in particular the rapidly industrializing countries are becoming major emitters in aggregate despite comparatively low emissions per capita. Action by the industrialized countries alone will therefore not be sufficient and poses starkly the issue of how to balance achievement of international commitments to poverty reduction and the containment of climate change.

12. Making economic growth and development compatible with stabilizing the climate calls for 'low carbon economies' worldwide. A reduction of emissions by half compared to trend would take cuts of the order of 60-80 per cent in industrialized countries and still need 30 per cent lower levels in developing countries. Decoupling economic growth from emissions supposes major advances in energy efficiency of products and services, in power generation, in buildings and transport, a significant increase in the use of renewable energy as well as lower emissions from land-use. New technologies will be needed, including carbon capture and storage, together with additional development assistance to the Least Developed Countries in particular.
13. Equity in responding to the climate change challenge is likely to be a key determinant of success. Ministers of the Group of 24 developing countries expressed support for urgent collective action to mitigate and adapt to climate change in their statement to the IMF and World Bank Spring meetings. "They stressed however, that in line with the principle of common but differentiated responsibilities, these cooperative actions need to be equitable taking into account the low historical contribution and still much lower per capita energy use by developing countries, the much more adverse impact on them from climate change, and their unmet development needs."⁸ For industrialized countries equity in the handling of employment transitions is key to the political sustainability of effective global action to reduce green house gases.

Natural resources

14. Commodity prices have soared over the last 4-5 years and nearly doubled for energy and industrial inputs. Food prices have risen sharply after an almost continuous decline over three decades. Commodity prices have a long history of boom and bust cycles, but as the April 2008 IMF World Economic Outlook notes, the current commodity boom is long, big and broad-based by historical standards.
15. While some downward adjustments and fluctuation over time are likely, there is reason to believe that commodity prices and thus inputs for industrial production and services will remain high in the future. For a number of commodities, the best quality and lowest cost resources are already near to being fully exploited. World petroleum production for example may have already peaked. Raw material scarcity and prices are likely to trigger

⁷ World Energy Outlook 2007 International Energy Agency, <http://www.worldenergyoutlook.org/2007.asp>

⁸ Intergovernmental Group Of Twenty-Four On International Monetary Affairs And Development Communiqué April 11, 2008 <http://www.g24.org/04-08ENG.pdf>

adjustments in production patterns and processes. Recycling and reuse can be expected to become increasingly competitive relative to primary raw materials.

16. Demand for food has grown significantly, not least through the change of consumption patterns towards more protein-rich diets as incomes rise in fast growing and large developing countries such as China and India. Food security is a major international concern and some countries have taken measures to try to prevent shortages.
17. A full examination of the implications of current natural resource constraints is beyond the scope of this note, however, they may be a harbinger of increased pressure on global natural resources and thus the need to shift to an economic model that values resource productivity much more highly. As with climate change, the implications for production and consumption, and thus employment, patterns are significant.
18. For developing countries, especially the least developed, a vital issue of economic, social and environmental sustainability is the promotion of rural employment for poverty reduction, which will be discussed at the 2008 International Labour Conference.⁹ Rising commodity prices, especially for food, gives added urgency to the reinvigoration of policies that would enable rural working women and men to improve their living standards while containing the cost of living for the urban poor. Climate change is a threat to rural livelihoods in many countries, but well-designed adaptation measures through building social and economic resilience could contribute greatly to increased rural decent work opportunities. International donor assistance should be increased to fund this urgent dimension of poverty reduction strategies.
19. Middle-income developing countries also face significant transitions to move towards a development path that continues to fuel higher living standards but in a more carbon-efficient way. Foreign direct investment and the technology transfers it can bring will be important. It will however be equally necessary to generate local innovation to meet the specific production possibilities of developing countries, not least through strengthened human resource development policies. This issue is also on the agenda of the 2008 International Labour Conference.¹⁰

C: Employment Impacts of Climate Change and Policies of Adaptation and Mitigation

20. Climate change itself, adaptation to it and efforts to arrest it by reducing emissions have far-reaching implications for economic and social development, for production and consumption patterns and therefore for employment, incomes and poverty reduction. These implications harbour both

⁹ Report IV: Promotion of rural employment for poverty reduction, International Labour Conference, 97th Session, 2008 ILO Geneva.

http://www.ilo.org/wcmsp5/groups/public/---ed_norm/---relconf/documents/meetingdocument/wcms_091721.pdf

¹⁰ Report V: Skills for improved productivity, employment growth and development, International Labour Conference, 97th Session, 2008, ILO, Geneva.

http://www.ilo.org/wcmsp5/groups/public/---ed_norm/---relconf/documents/meetingdocument/wcms_092054.pdf

major risks and opportunities for decent work in all countries but particularly for the most vulnerable in the least developed and small island States.

21. One of the most visible risks concerns food and economic security, particularly in regions and sectors based on agriculture. The Stern Review has drawn attention to the fact that 22 per cent of the global population are dependant on agriculture¹¹ and that the sector also has the highest concentration of the world's poor (75 per cent of the poorest people in the world, the 1 billion people who live on less than US\$1 a day). Not least because of its impact on agricultural livelihoods, climate change poses a threat to the achievement of the Millennium Development Goals (MDGs). A further MDG-related impact is on health which will also affect the workforce, particularly in developing countries. Another weather dependent sector is tourism where employment has been growing fast. In all three, agriculture, tourism and health, women are likely to be affected more than men.
22. More frequent and severe natural disasters are likely to trigger or accelerate migration flows and could increase existing political tensions and instability. The response to such crises could help to make local societies more resilient if it aimed at adapting livelihoods rather than short-term disaster relief to return to the original situation. Access to basic social protection systems also cushion the impact of disasters and help prevent temporary loss of earnings becoming chronic poverty.
23. Major investments in adaptation could offer significant employment and income opportunities in areas such as extending coastal defences, reinforcing buildings and infrastructure, water management and harvesting. Adaptation will require the transfer of new technologies on a large scale and involve the relocation of exposed settlements and industry. Adaptation in agriculture could have positive or negative impacts on employment and income depending on the labour inputs of new crops and farming practices and their compatibility with smallholder farming. The availability of finance on affordable terms to low income farmers, small enterprises and poor communities is an essential element in adaptation investment.
24. A literature review for the ILO of the limited number of quantitative assessments of the impact of mitigation measures on labour markets, mostly in industrialized countries, finds that a transition to a low carbon economy should lead to a net increase in employment.¹² This typically small net gain is, however, the result of major labour market transitions with substantial losses of some jobs more than compensated by increases in others.¹³

¹¹ The ILO estimates that 36% of world employment was in agriculture in 2006. KILM 2008.

¹² ILO: "The impacts of climate change on employment and incomes – A review of the literature" by the Centre for Sustainable Production and Consumption, commissioned by the ILO (forthcoming).

¹³ "Climate change and employment", with the support of the DG Environment, ETUC study, Syndex, Istas, Wuppertal Institute, SDA (2007), at <http://www.etuc.org/a/3676> ; "Renewable energy sector in the EU: Its employment and export potential", a final report to DG Environment, Ecotec study, Research & Consulting Ltd, United Kingdom, 2002, at <http://www.tuuleenergia.ee/uploads/File/employment%20and%20export.pdf> ; S. Laitner, S. Bernow and J. DeCicco, 1998: "Employment and other macroeconomic benefits of an innovation-led climate strategy for the United States", *Energy Policy*, 26(5), pp. 425–432; D.M. Kamman, K. Kapadia and M. Fripp, 2004: "Putting renewables to work: How many jobs can the clean energy industry generate?", Renewable and Appropriate Energy Laboratory (RAEL) report, University of California, Berkeley.

25. Most of these transitions are likely to take place within economic sectors such as agriculture, power generation, energy-intensive industries or transport. All aspects of adaptation and of mitigation require new technical and often also entrepreneurial skills. Increases in energy efficiency and in renewables will be a big part of the equation. While the IPCC report has emphasized the significant potential to create new employment of adaptation and mitigation measures, generally employment has only featured marginally in the climate debate as a “co-benefit” of mitigation measures. This view overlooks the fact that the benefits for employment and development are vital for making many mitigation measures technically feasible, economically viable, socially acceptable and politically sustainable.
26. The climate change challenge is global but meeting it requires sustained transformations in enterprises at local level over a medium term perspective. The reflex to “reduce, reuse and recycle” can enter the culture of investment, production and employment but requires leadership by labour and employment ministers, business and trade unions. The potential of tripartism in this regard was demonstrated by the adoption of a comprehensive policy statement on the Promotion of Sustainable Enterprises at the 2007 International Labour Conference.¹⁴ An increasing number of companies include sustainable development goals in their corporate objectives and reporting. There are also several sectoral initiatives aimed at promoting responsible business practice on both the environment and also labour and social issues.
27. Links between climate change and development are in still in their infancy, but the potential can be seen, for example, in the United Nations Industrial Development Organization’s projects linking power generation to youth employment programmes in Mexico and Cuba or by the promotion of solar energy by the Self-Employed Women’s Association in India. The ILO has been invited to contribute to UN system programmes in China and Brazil focusing on energy efficiency and bio-energy, respectively. In China, this will include design and testing of ways to improve energy efficiency in small enterprises along the lines of the successful ILO programme “Work improvement in small enterprises”. The programme in Brazil will help assess employment and income potential, organization of producers and design of extension programmes that promote productivity and decent work in the value added chain for biofuels. The potential for synergies and for the need to make the response to climate change part of wider efforts for sustainable development is recognized. However, not least because of the limited role or even absence of the ILO constituents in most of the policy debates, there are still rather few examples where the substantial potential has been tapped.
28. We need to expand the climate change debate to include the investment, production and employment implications of adaptation and mitigation measures. The transformation to a greener economy will take place in enterprises all over the world where the perspectives of the ILO’s constituents – employers’ and workers’ organizations and ministries of labour and

¹⁴ Conclusions concerning the promotion of sustainable enterprises, International Labour Conference, June 2007
<http://www.ilo.org/dyn/empent/docs/F836599903/ILC96-VI-2007-06-0147-2-En.pdf>

employment – can determine the success with which progress is achieved on global goals.

D: Decent Work in a Greener Economy

29. “Green jobs” does not lend itself to a tight definition but certainly includes the direct employment which reduces environmental impact ultimately to levels that are sustainable. This includes jobs that help to reduce the consumption of energy and raw materials, decarbonizes the economy, protect and restore ecosystems and biodiversity and minimize the production of waste and pollution. Green jobs can lead to lower environmental impacts directly e.g. in the transport sector as railway or subway operators providing energy efficient mass transportation or indirectly e.g. as technicians in industry or logistics managers in services reducing energy consumption in manufacturing and delivery of services.
30. The range of profiles of green jobs stretches from highly skilled research and development or management functions through technical and skilled levels to the relatively low skilled. The largest numbers of already existing and future green jobs is concentrated in sectors directly linked to the use of energy and the recovery of raw materials:
 - Improvements in energy efficiency, particularly in the building sector (renovation), but also industry and transport
 - Renewable energy
 - Mobility: mass transportation
 - Recycling and reuse
 - Sustainable use of natural resources: agriculture, forestry and fisheries
 - Environmental services
31. A somewhat wider concept of “green jobs” might embrace any new job in a sector which has a lower than average environmental footprint, contributes to improving overall performance, albeit perhaps only marginally. This more relative notion poses a problem to those who set out to count and monitor the numbers of green jobs. For example workers assembling hybrid cars or cars with less than say 120 g/km of CO₂ emissions are performing “greener” jobs than other car workers because these types of cars contribute significantly less to greenhouse gas emissions. However, if transport volumes continue to rise as projected, a larger number of cars, even if they are cleaner, will still not be sustainable.
32. The different shades of green complicate accounting, but the real significance of the concept of “green jobs” is not so much in the precise volume of direct green jobs that are being created but in the focus it puts on how the drive for sustainable development transforms employment patterns and the labour market. A new job maybe greener but ultimately not green enough. Nevertheless it is part of a process that is continuous and positive.
33. A further consideration is the quality of green jobs. Many green jobs in recycling, construction or in the biofuels sector for example are currently informal. Recycling especially in developing countries is often precarious employment, involves serious occupational as well as public safety and health hazards and generates less than living wages and incomes. Feedstock production for biofuels also can involve excessive work loads, exposure to

hazardous chemicals and even the violation of fundamental rights such as the use of child and slave labour. This highlights the developmental character of any path to sustainability. It is not possible to address the purely environmental dimension without also focusing on the national and international social and economic policies needed to expand opportunities for decent work.

34. International labour standards provide practical guidance for green jobs that are also decent, particularly instruments on safety and health, chemicals and on working conditions. The transformation of economies and workplaces can become a major driver for the broader application of labour standards through a combination of awareness raising, regulation and inspection as well as corporate social responsibility.
35. Green growth and clean production are part of an overall drive towards production and consumption patterns which are compatible with sustainable development through transitions that take as a point of departure the developmental needs of each country. It is one of the key challenges in the transformation to clean development to ensure that the green jobs associated with it are decent work and contribute to socially sustainable development.

E: Opportunities and Challenges for Employment

Energy efficiency

36. Energy efficiency gains have historically been one of the biggest contributors to reductions in emissions. They will require the transfer and deployment of new technology. Much of the capital stock of buildings and equipment is long-lived and has slow renewal rates. The significant and often low cost contributions from improvements in existing processes and facilities can only be achieved by the active involvement of managers and workers.
37. Energy efficiency gains are often the result of investment in better technology, but there is a large and often untapped potential for improving working methods and procedures. Joint initiatives by employers and workers for 'greening of workplace' can lead to significant improvements in energy efficiency and resource use with little or no capital investment and at low overall cost. There are numerous examples of such schemes reducing consumption by 15 per cent or more. Gains in energy efficiency can be achieved in all sectors, but the potential is particularly large in industry, transport and most of all in construction.
38. Buildings consume the largest share of total energy. They typically account for 30-40 per cent of demand and a similar share of GHG emissions. According to the IPCC buildings also have the highest potential of all sectors to reduce emissions. The energy efficiency of buildings can often be improved by 50 per cent and more. In many countries zero or negative energy houses will become the building standard in the near future increasing the cost of new construction by as little as 5-10 per cent. However the useful life of a building can be 60-100 years. The building stock in most countries is therefore relatively old. Renovation of these older buildings is labour intensive and requires customized work typically provided by local enterprises and skilled workers.
39. More than half of the energy savings potential in buildings is in developing countries and almost a third of the emissions reductions carry negative net cost

over a relatively short period of time, i.e. they pay for themselves through the savings on the energy bill. Germany has been recently further expanded fourfold a renovation programme which had already been in place for a number of years. Under this programme – probably the largest worldwide – every €1 billion invested in the building stock safeguards or creates around 25,000 jobs.¹⁵ The social partners in the construction sectors played an active role in the design and implementation of the programme. A recent US study finds that “retrofitting” buildings calls for skilled workers who are amongst the most “in-demand” workers according to the Department of Labor. When linked to training and apprenticeship programmes, “retrofitting” can provide an important pathway for groups of workers at risk of poverty since the jobs are relatively well-paid.¹⁶

40. In addition to the employment potential, energy efficiency measures can contribute to poverty alleviation. Poor households tend to spend disproportionate shares of their incomes on energy for electricity, heating and transport. Efficiency gains often translate into improvements in real incomes for the poor.

Renewable energy

41. Renewable energy in wind, solar thermal and photovoltaic, small hydro, geothermal and bioenergy represents the most readily counted source of green jobs. There are at least 2.2 million jobs in equipment manufacturing, installation and operation of renewable energy already with half of them in the developing world. Investment have been rising at 20 per cent per year and the employment in this sector could exceed 20 million jobs by 2030.¹⁷ All forms of renewable energy have significantly higher employment elasticities than fossil or nuclear alternatives per unit investment, per unit installed capacity as well as per unit output. They also tend to concentrate employment less in the manufacturing and equipment installation phase and provide more continuous employment during operation and maintenance.
42. Bioenergy such as alcohol produced from starch or sugar and biodiesel derived from oil crops to be used as fuel for cars or wood and other biomass for power generation have the highest employment elasticities of all. Studies for India for example suggest that every hectare of energy plantation can generate as much as 1 full-time job. These would be green jobs in most cases. In the tropics, and based on efficient feedstock crops and processing, bioenergy can have a rather favourable energy balance and substantially lower emissions compared to fossil fuels. On the other hand, bioenergy tends to compete for agricultural land with food production and is often associated with low incomes and very poor job quality. In the midst of the emerging food price crisis, this issue has acquired added visibility and is the subject of urgent discussions nationally and internationally.

¹⁵ BMU (2007) What is the German government doing to boost energy efficiency? German Environment Ministry (BMU) http://www.bmu.de/english/energy_efficiency/buildings/doc/38270.php

¹⁶ Greener Pathways: Jobs and Workforce development in the Clean Energy Economy, available from the Centre on Wisconsin at: <http://www.cows.org/greenerpathways/>

¹⁷ Worldwatch Institute (forthcoming) ‘Preliminary report: Green jobs – Towards Sustainable Work in a Low-carbon World’, December 2007 at www.unep.org/civil_society/Publications/index.asp/

43. Small-scale renewable energy including biomass could be used for decentralized power generation for the 1.6 billion or more people who currently don't have access to any modern form of energy. Project experiences demonstrate improvements to the quality of life of the poor, employment and income opportunities in power generation itself and, importantly new economic opportunities for small enterprise development once people have access to electricity or other forms of power.

Recycling and the circular economy

44. Recycling and the circular economy are essential to gradually eliminate waste and close the material cycle of production and consumption. Recycling already accounts for a large proportion of identifiable green jobs and rising commodity prices is making it more and more competitive. Materials in particular metals like aluminium but also glass and paper, which are energy intensive to produce, can be profitably recycled, significantly reducing energy inputs and emissions. In European countries recycling rates for such materials are 50-80 per cent. This contributes to protecting natural environments and has turned out to be a cheaper source of raw material than primary resources in many cases.
45. Total employment in recycling in China for example is estimated to be 10 million. A relatively recent but fast growing segment is the recycling of information technology products in China as part of a global production chain. In this case, as in ship-breaking in Bangladesh, very poor working conditions and serious hazards for health and the environment are widespread. Turning recycling into a contributor to sustainable local development and into a source of decent jobs remains a challenge as well as a major opportunity.
46. More advanced approaches towards a circular economy form of recycling like remanufacturing and cradle-to-cradle production are still in their infancy. Several Japanese companies have been among the pioneers of this concept. Hardly any research appears to have been done on the implications of remanufacturing and cradle-to-cradle for employment, although a European case study suggests that it could be twice as labour intensive and requires higher skills than conventional manufacturing.

Sustainable management of renewable natural resources

47. Sustainable management of renewable natural resources is a key area from an environmental as well as from a food security and employment perspective. Agriculture and forestry are among the sectors most affected by climate change but have also been contributing substantially to greenhouse gas emissions. Conversion of forests for agriculture or other land uses has been responsible for 20-25 per cent of CO₂ emissions. Emissions resulting from deforestation rather than industry or transportation are particularly strong in Indonesia and Brazil.
48. After decades of relative neglect dwindling food stocks are leading to renewed attention to agriculture and rural development. Major efforts are needed to develop agricultural and forestry production systems which provide decent incomes and livelihoods and at the same time reduce emissions, consume less water and maintain soil fertility and biodiversity. Such sustainable production systems are not likely to reverse the steady decline in agricultural employment

although working conditions may be improved. It will therefore be necessary to take a wider view of sustainable rural employment. A recent study by the Centre for Science and Environment in New Delhi of the new National Rural Employment Guarantee Act suggests that a focus on local level programmes for water conservation and afforestation would have an enhanced impact on poverty reduction and sustainable livelihoods.¹⁸

F: Labour Market Dynamics

49. Millions of green jobs exist already. Moreover, in areas like renewable energy the numbers are growing fast. While research on green jobs has mainly focussed on industrialized countries, it would appear that the same technological drivers and mechanisms are behind transformations in developing countries, which should lead to broadly similar outcomes in terms of job creation. While identifiable green jobs are real and look set to be a growing source of employment into the future, an exclusive focus on the number of direct green jobs is misplaced. Their significance for the economy and for the labour market can only be assessed by taking a broader look at the transformation of the economy in which green jobs play a key role.
50. Anticipating the effect of green jobs on labour markets needs to recognize the forward linkages of greening economic activity; take account of the interactions of new job creation, substitution, destruction and transformation; consider the often large effects via indirect employment and the restructuring of economies towards more labour and less resource intensive production, and recognize the potential of green jobs for development and poverty reduction
51. The number of green jobs reported and expected to be created over the next years is substantial but modest relative to the total size of national and global labour markets. 100 million green jobs would represent just over 3 per cent of the global labour force of over 3 billion. That would still be significant if all green jobs were new and additional employment, but typically they are at least partially a substitute for existing jobs. This is the case for example when jobs in renewable energy replace those depending on fossil fuels. The direct substitution effects of green jobs are often favourable on balance as they tend to have higher employment elasticities but this may not be of much consolation to displaced “carbon economy” workers.
52. In addition green growth and clean production will transform many if not most jobs in the economy towards more energy and resource efficiency and less environmental impact. Rather than replace existing jobs with totally different green jobs, it is the content of jobs, the way work is performed and the skills of workers that will change.
53. Green technologies and green jobs have impacts through forward linkages to other sections of the economy and employment that are neither particularly brown nor green. Jobs in renewable energy for example substantially lower the environmental footprint of the sectors it supplies. The information technology sector for example is a still modest but rapidly growing contributor to greenhouse gas emissions. Powering the internet, computers in offices and

¹⁸ NREGA Opportunities and Challenges, Natural resource Management and Livelihood Unit, Centre for Science and the Environment, New Delhi, 2008

mobile phones by renewable energy would turn this large economic sector into a low impact activity and make IT employment more sustainable. Electrical cars powered with photovoltaic batteries for example would dramatically reduce the climate impact of transport. Green jobs in energy efficiency, reused and recycled materials and products have similar effects. Such structural employment effects could move economies into a pattern that is less resource but more employment intensive, generating a significant increase in employment compared to that in conventional production systems.

G: Policy Responses

54. Anticipating the economic transformation that a shift to more sustainable patterns of production and consumption and the net effects on labour market dynamics is complex. However, as might be judged from the preliminary evidence gathered so far such an effort does help to focus attention on key issues for policy and further analysis. The full range of employment adjustment policies will be needed to facilitate and stimulate change. How they are applied will require a better understanding of the scale, speed and focus of change.
55. Three of the ILO's main tools are labour market analysis, social protection and social dialogue. Good analysis of possible labour market impacts is vital to good policy design, social protection policies provide a cushion for those who may find themselves on the down side of transitions and as the Director-General said to environment ministers at the UNEP Council in Monaco in February, "We need social dialogue among those most affected by these transitions—workers, employers and governments—to work towards fair policies that are efficient and balanced in their costs and benefits because that is the way to make them sustainable."¹⁹
56. One issue that emerges strongly is that the impacts on small and medium-sized enterprises which are major employers are not well understood. There may be a risk that structural change in the economy set in motion by green growth policies and energy and raw material prices will sideline smaller enterprises as only larger, better-informed and more sophisticated businesses will be in a position to grasp opportunities. In addition to ODA for adaptation and mitigation, arrangements for financial transfers such as the Clean Development Mechanism under the Kyoto protocol should be modified so as to put them within reach of initiatives by small enterprises, by local government and those directly benefiting the poor.
57. Similarly, skills development will play an essential role in making green growth possible. There are already shortages of professionals and skilled workers in many countries resulting in energy efficiency standards not being met, in a slowing down of improvements in energy efficiency and the deployment of renewable energy and other high performance technologies.
58. More frequent and severe natural disasters call for anticipatory investments to make local societies more resilient including through basic social protection systems. Major investments in adaptation could offer significant employment and income opportunities in areas such as extending coastal defences, reinforcing buildings and infrastructure, water management and harvesting

¹⁹ *ibid*

and the relocation of exposed settlements and industry. Adaptation in agriculture could have positive or negative impacts on employment and income depending on the labour inputs of new crops and farming practices and their compatibility with small holder farming.

59. Key political decisions about climate change will be made over the next 20 months as a new international climate regime for the period after 2012 is drawn up. International trade unions, business leaders and employers' organizations have endeavoured to connect the economic and social dimensions of development to these international discussions. Employment, enterprise development, social dialogue, social protection and poverty reduction are, however, rarely referenced in these negotiations. There is also large untapped potential for social dialogue and alliances at national, sectoral, company and workplace levels to help arrive at better informed and more integrated policy responses. An example of a tripartite mechanism to facilitate such transitions is the national sectoral roundtables for the implementation of the Kyoto commitments in Spain.

H: ILO's Green Jobs Initiative

60. During 2007 the ILO has stepped up its work on green jobs. The Director General's report to the International Labour Conference highlighted the importance of ILO constituents working together to anticipate the employment changes that a more environmentally sustainable development will engender.²⁰ In November, the Governing Body's Working Party on the Social Dimension of Globalization held a panel discussion on decent work for sustainable development – the challenge of climate change with Mr Achim Steiner, Executive Director of the United Nations Environmental Programme (UNEP) and UN Assistant Secretary-General, Mr Michel Jarraud, Secretary-General of the World Meteorological Organization (WMO), Mr Supachai Panitchpakdi, Secretary-General of the United Nations Conference on Trade and Development (UNCTAD), Mr Matthew Farrow, Head of Environment at the Confederation of British Industry (CBI), and Mr Joaquin Nieto, Secretary for Occupational Safety, Health and Environment from the *Comisiones Obreras* trade union of Spain.²¹
61. The ILO together with UNEP, the International Trade Union Confederation (ITUC) and others have set in motion a "Green Jobs Initiative". It is a contribution to the development and implementation of a UN system-wide strategy on climate change. The objective is to promote and identify the many technological innovations, investment opportunities, enterprise and quality job creation potential of a sustainable development path. At the same time it will look at the adaptation and social protection needs of enterprises and workers affected by the production and consumption shifts involved.
62. Work under the ILO green jobs initiative with UNEP, the ITUC and other partners includes:

²⁰ Decent work for sustainable development ILC 96-2007/Report I (A)
<http://www.ilo.org/public/english/standards/reim/ilc/ilc96/pdf/rep-i-a.pdf>

²¹ See report of meeting at:
http://www.ilo.org/wcmsp5/groups/public/---ed_norm/---relconf/documents/meetingdocument/wcms_087612.pdf and paper at: http://www.ilo.org/wcmsp5/groups/public/---ed_norm/---relconf/documents/meetingdocument/wcms_084890.pdf

- A Green Jobs report prepared by the Worldwatch Institute to be published in June 2008.
- Mapping labour market impacts: an analysis of methodological options. A first application is planned as part of a larger UN project in China.
- An initial background study on energy efficiency in buildings in developing countries and emerging economies.
- Energy efficiency and SMEs -- research and integration of results into on-going programmes on enterprise development.
- Skills development: a preliminary review has been carried out for the report on skills to be discussed at the International Labour Conference in June 2008. A major dedicated report on this key subject will be prepared for 2009.
- Adaptation to climate change - impacts in rural areas: together with FAO, ILO plans to develop a methodology to factor employment into national plans and programmes for adaptation to climate change. One of the countries where the methodology is to be tested is Bangladesh.
- Bioenergy and smallholder farming: the ILO has been developing tools to assess the employment and income impacts of biofuels in Brazil. It has also been requested to assist the Government of the State of Bahia with the design of a sustainable biodiesel programme to improve livelihoods of smallholder farmers. The programme includes the definition of criteria and indicators on economic, social and environmental sustainability to monitor policy impacts and to certify products for marketing and trade.
- Documentation of good practices: a study on the role of the social partners in the implementation of the Kyoto protocol in Spain has been completed. Other case studies related to the role of social dialogue and to green jobs for development are under way.
- Together with the ILO International Training Centre in Turin a first training module on green jobs will be developed by the end of 2008. It will be primarily aimed at building the capacity of ministries of labour, employers' organizations and trade unions to bring green jobs strategies into Decent Work Country Programmes.
- 'Green Jobs for Asia and the Pacific' is a programme which the ILO is rolling out as the its contribution to the regional priority on 'green growth' spearheaded by UN/ESCAP. A regional research conference on green jobs held in Niigata 21-23 April 2008 brought together about 40 experts drawn from national and local governments, employers' and workers' organizations, labour research institutes, academia, environmental and social NGOs. The Conference helped to define an agenda for policy relevant research by ILO and partners in the region and identified approaches for promoting green jobs which can be built into ILO Decent Work Country Programmes in the region. The experts also formulated a number of messages for the G8 meetings in 2008. (see annex to this paper)

I: G8 Leadership for a Global Green Jobs Strategy

63. Addressing the challenges posed by climate change is on the top of the international agenda but is one of the most complicated issues of multilateral cooperation. Global warming is directly related to the way we work and ultimately can only be halted by changing the way we work. The policies to achieve such a major transformation will thus require close collaboration across a number of policy fields. Employment and labour ministers will need to be part of such national and international efforts to generate and facilitate change at workplaces – factories, offices, farms, mines and transport installations. Together with employers and workers and their organizations, global goals can be translated into tangible progress on all three of the pillars of sustainable development.
64. Over the year since G8 Ministers met in Dresden and the Heads of State and Government in Heiligendamm, the interrelationship between economic, social and environmental sustainability in the context of a globalized market economy has become increasingly evident. With employment prospects for the year ahead more gloomy, the sharper focus on policies for recovery creates an opportunity to shape a new global framework for economic, social and environmental sustainability. Full and productive employment and decent work for all is at the core of such a framework.
65. G8 leadership on green jobs is a major contribution to arresting and eventually reversing the growth of green house gas emissions. Furthermore through their engagement in multilateral processes G8 governments and their partners can strengthen the cooperation vital to action over the long term. Employment and labour ministers have a particular contribution to make in supporting the engagement of their developing country counterparts in the formulation and implementation of national green jobs strategies within Decent Work Country Programmes. Ensuring that progress is developed and maintained on adapting employment patterns to environmentally sustainable development paths at a time of global slowdown and economic uncertainty is a further dimension to current policy-making.²² In this context, the importance of getting increases in development assistance back on track to meet the G8 Gleneagles commitments of 2005 is vital to progressing on green jobs in developing countries.
66. Some of the key issues emerging for green jobs strategies are:
- identification of the likely increases and decreases in employment opportunities consequent on policy changes to stimulate more sustainable growth patterns;
 - the promotion of dialogue at national, sectoral, company and workplace level on greening of employment;
 - review of skills policies to prepare for green job opportunities;
 - integration of green jobs approaches with policies to make labour markets more inclusive;

²² See ILO Director-General's statement to the International Monetary and Finance Committee and the Development Committee April 2008:
<http://www.ilo.org/public/english/bureau/dgo/speeches/somavia/2008/ifi.pdf>

- support for programmes for smaller enterprises to promote energy conservation, more resource efficient and cleaner production, recycling etc.
- measures to promote green jobs in possible counter-cyclical policies;
- dialogue with national ministerial colleagues, particularly ministers of environment, on policy initiatives with a view to anticipating and grasping employment opportunities;
- dialogue with developing country counterparts and development ministry colleagues on for example basic social protection systems and collaboration on employment intensive investment in climate change adaptation programmes (climate proofing of infrastructure, rehabilitation of watersheds, of mangroves and construction of flood barriers, water conservation, etc.)
- cooperation with developing country counterparts and colleagues in ministries of development and environment in charting pathways to clean development and avoidance of greenhouse gas emissions which also deliver on creating more and better jobs and on reducing poverty. Great strides could be made with decentralized access to energy, rehabilitation of slum areas and social housing to save energy, avoided deforestation and sustainable agriculture as well as through improved energy efficiency in small and rural enterprises.

ILO Research Conference
 ‘Green Jobs for Asia and the Pacific ‘
 Niigata, Japan, 21-23 April 2008

Emerging Policy Messages for the G8 Meetings in 2008

The ILO regional Research Conference on ‘Green Jobs for Asia and the Pacific’ held in Niigata from 21-23 April 2008 brought together about 40 experts drawn from national and local governments, employers’ and workers’ organizations, labour research institutes, academia, environmental and social NGOs.²³

Among its conclusions are six key policy messages for consideration by the meetings of the G8 hosted by the government of Japan in 2008 set out in the following.

1. The inter-relations between the environmental, economic and social dimensions of climate change and other policies need to be put on the political map

Green growth in the Asia-Pacific region and the global and national responses to climate change will lead to major transformations of production and consumption patterns. These will have profound impacts on labour markets, livelihoods and social development. This challenge is on the same scale as those posed by globalization or by ageing, yet very little attention is being paid to the social dimension in environmental policy making.

2. Green growth and tackling climate change can become a major opportunity for employment and development

The greening of production and of jobs will make enterprises and employment sustainable. More and better employment and income opportunities can be generated in the process by actively promoting green jobs. Numerous examples from the Asia-Pacific region and elsewhere show that green jobs have significant potential for economic development and to reduce poverty. They can make important contribution in realizing both MDG 1 (poverty reduction) and MDG 7 (protecting the environment) and to making these mutually supportive rather than conflicting goals.

3. Green growth and arresting climate change depend on greener enterprises and green jobs

Greener enterprises and green jobs are an indispensable part of the solution of environmental problems, including climate change. This fact tends to be overlooked in environmental policy debates. Without the commitment and initiative of employers and workers environmental goals will not be achieved. Experiences from the region and from other parts of the world demonstrate that environmental performance standards and eco-efficiency targets cannot be met without the necessary skills and without enterprises and workers prepared to adopt new technologies. Skills shortages are a bottleneck for a transition to cleaner production in many parts of the world. Conversely, economic sectors and individual enterprises can make a major contribution to reducing

²³ For Conference documents and information see :

<http://www.ilo.org/public/english/region/asro/bangkok/events/greenjobs/index.htm>

emissions of greenhouse gases and reducing the environmental footprint generally through labour-management initiatives to green workplaces, often at very low cost. The resources invested by countries to address social and labour market problems are in many cases larger than the estimated cost of mitigating climate change. Mobilizing the potential synergies between climate change and social development policies could lead to major overall savings, in particular in public expenditure.

4. Labour markets and their institutions need to be prepared for the change

Unlike other changes to which labour markets had to adapt after the event, the challenge of climate change can be anticipated. The effects of climate change on national economies, individual sectors and regions are relatively well understood. Policies to mitigate climate change and to reduce emissions are being designed over the next 18 months and can factor in the threats and opportunities they pose for labour markets. To this end, it is crucial and urgent to anticipate labour market implications of climate change itself as well as of policies for adaptation and mitigation. Particular attention needs to be paid to skills needs and to sectoral shifts. The latter may require measures to facilitate ‘just transitions’ for enterprises, workers and communities.

5. Attention to equity and the need for pathways to clean development

Equity will be a key issue for a future international agreement on climate change. This concerns both the sense of a fair sharing of burden and of access to opportunity with countries and between countries. Green jobs have major potential to foster development and to contribute to a broad-based improvement of living standards and to poverty reduction. The G8 countries and in particular the ministers of labour can assist countries in realizing this potential. They can assist their counterparts in developing countries and emerging economies and foster South-South cooperation to design and put into practice pathways towards clean development with more and better jobs.

6. Promote coherent policies, engage and empower actors

The inter-dependence between environmental, economic and social policies is strong, but the synergies which can be reaped are not automatic. Coherent policies are critical and will take commitment at the highest political level. The ministers of labour are well placed to articulate the relationships and to take the social dimension to the environmental policy debates, in particular the climate talks, where relative prices are being set, industrial policies are set and key decisions are made about technology transfer, financial flows and investments. The Ministers of Labour can also play a key role together with their counterparts in environment to establish the mechanisms of social dialogue and for action which enable the main stakeholders to contribute to more informed decision making and to more effective implementation: employers and workers, local governments and communities.
