International Journal of Labour Research
2010
Vol. 2
Issue 2

Climate change and labour: The need for a "just transition"

INTERNATIONAL LABOUR OFFICE, GENEVA

Copyright © International Labour Organization 2010
First published 2010

Publications of the International Labour Office enjoy copyright under Protocol 2 of the Universal Copyright Convention. Nevertheless, short excerpts from them may be reproduced without authorization, on condition that the source is indicated. For rights of reproduction or translation, application should be made to ILO Publications (Rights and Permissions), International Labour Office, CH-1211 Geneva 22, Switzerland, or by email: pubdroit@ilo.org. The International Labour Office welcomes such applications.

Libraries, institutions and other users registered with reproduction rights organizations may make copies in accordance with the licences issued to them for this purpose. Visit www.ifrro.org to find the reproduction rights organization in your country.

International Journal of Labour Research
Geneva, International Labour Office, 2010

ISSN 2076-9806

just transition / climate change / internal migration / international migration / poverty / Mexico / sustainable development / green jobs / technological change / the environment / role of ILO / ILO standards / climatic influence / environmental impact assessment / developed countries / developing countries / environmental degradation / environmental protection / trade union role / trade union federation / metalworking industry / renewable resources / offshore installation / petroleum industry / UK / employment creation / renewable resources / Netherlands / workers rights / agricultural worker / microstate / Asia / Pacific / railway transport / industrial production / location of industry / industrial policy / trade union attitude / Canada / USA

13.06.3

ILO Cataloguing in Publication Data

The designations employed in ILO publications, which are in conformity with United Nations practice, and the presentation of material therein do not imply the expression of any opinion whatsoever on the part of the International Labour Office concerning the legal status of any country, area or territory or of its authorities, or concerning the delimitation of its frontiers.

The responsibility for opinions expressed in signed articles, studies and other contributions rests solely with their authors, and publication does not constitute an endorsement by the International Labour Office of the opinions expressed in them.

Reference to names of firms and commercial products and processes does not imply their endorsement by the International Labour Office, and any failure to mention a particular firm, commercial product or process is not a sign of disapproval.

ILO publications and electronic products can be obtained through major booksellers or ILO local offices in many countries, or direct from ILO Publications, International Labour Office, CH-1211 Geneva 22, Switzerland. Catalogues or lists of new publications are available free of charge from the above address, or by email: pubvente@ilo.org

Visit our website: www.ilo.org/publns

Photocomposed in Switzerland WEI
Printed in Switzerland GEN

International
Journal
of Labour
Research

2010
Vol. 2
Issue 2

Contents

International
Journal
of Labour
Research

2010
Vol. 2
Issue 2

International
Journal
of Labour
Research
2010
Vol. 2
Issue 2

Preface

Dan Cunniah
Director,
Bureau for Workers' Activities
International Labour Office

Climate change is now widely acknowledged as one of the great – if not the greatest – challenges facing humanity in the coming decades. Through its impact on average temperature, precipitations and sea levels, it will endanger the livelihood of hundreds of millions and impose increasing costs on our societies if nothing is done. Indeed, the economic costs of inaction have been estimated at something between 5 and 20 per cent of global GDP by 2050, a colossal burden. And to add insult to injury, it is the people from the poorest nations of the world, those who have in effect contributed the least to the problem that are likely to suffer its worst impacts. Clearly, inaction is not an option.

However, the failure in Copenhagen of the last Conference of the Parties to the UNFCCC to generate a significant commitment on the part of governments, despite a broad consensus on the threat at hand, illustrates the inherent political difficulty in addressing a threat whose effects are not quite immediate (or at least are still rather diffuse compared to other problems) and which affects people unequally. Indeed, the very policies that have the potential to stem the problem (i.e. keep the rise in temperature below 2°C) involve an ambitious transition away from a carbon-intensive economy and will themselves impose costs on our societies.

It is becoming increasingly clear that the only way to get the sort of commitments needed to effectively deal with the challenge is to create a global consensus that involves all stakeholders. Such a consensus will only arise if there is a seemingly "just" sharing of the burden in this battle to keep the planet hospitable to human beings.

This is particularly true when it comes to employment. It goes without saying that climate change and policies to mitigate it will in time have an enormous impact on industries, jobs and workers. Yet, despite the rhetoric about the elusive "social dimension" of sustainable development, one has to admit that until very recently climate change negotiations showed only

limited concern about the fate of workers, and that far greater efforts were directed at measuring the environmental rather than the social impacts of climate change.

This issue of the *International Journal of Labour Research* is meant as a modest contribution to start to fill that gap. In the aftermath of the last Conference of the Parties in Copenhagen, the Bureau of Workers' Activities joined the International Trade Union Confederation to hold a workshop on Climate Change and Employment in Brussels in March 2010. The objectives were manifold: to document the impact of climate change and mitigation policies on employment, to identify policies likely to facilitate the transition to a low-carbon economy, and to examine how trade unions organize around the issue of climate change. The papers presented at that event serve as the basis for this issue of the Journal.

Contributions to this issue highlight the fact that climate change already has an impact, particularly in the South and in the agricultural sector, exacerbating the problems of poverty and migration. They point to the need for the international community to free up resources to help provide viable alternatives, notably through adaptation programs. Unfortunately, the evidence thus far on the adaptation programmes promoted under the aegis of the United Nations seems to suggest that workers' concerns have been absent from the drafting of the programmes, notably in the case of small island States where people are amongst the most vulnerable to the consequences of climate change.

But what also emerges from this issue is that trade unions have become quite active around the issue of climate change in recent years. They have been visible as proponents of ambitious reduction targets for greenhouse gases, often forging alliances with the environmental movement; they have pushed for a number of initiatives, notably around the issues of renewable energy, the retrofitting of housing or the greening of public transportation. In addition, they have taken the lead in performing the research to assess the job impact and employment potential of moving towards a green economy.

Worldwide, trade unions have developed a point of view on the issue that is encapsulated by the concept of "Just Transition", the notion that the transition process to a greener economy has to be inclusive of all stakeholders, and that the unavoidable employment and social costs of the transition have to be shared by all. Because one thing is sure: if the transition to a greener economy generates employment, it will also entail job losses for some. Who will lose out? What support will be provided to workers and communities that are on the losing end? What skills will be needed in the new sectors? How do we ensure that the new jobs are decent jobs? These very questions lead to a couple of inescapable conclusions: social dialogue will have to be at the heart of the process and governments, beyond regulating the emission of greenhouse gases, will have a key role in promoting the sort of industrial and social policies that will lead to the creation of productive and decent employment.

It can be said that the notion of Just Transition is in line with the long-standing philosophy that has inspired the creation and the history of the International Labour Organization: the idea that social concerns have to be part and parcel of economic decision-making, that the costs of economic transition should be socialized as much as possible, and that the economic management of the economy is best achieved when there is genuine social dialogue between social partners. The last contribution to this issue documents how ILO standards can support the development of a Just Transition approach; it also opens an interesting window for a greater role for the ILO in defining the policies needed to deal with climate change.

We thus hope this issue will prove useful to trade unions and further stimulate discussions about how they can play a constructive role in the policy-making around the question of climate change.

International
Journal
of Labour
Research

2010
Vol. 2
Issue 2

Building a Just Transition

The linkages between climate change and employment

Anabella Rosemberg
International Trade Union Confederation

Introduction

Climate change has been at the centre of several scientific debates in the last decades, but only in recent years has it made its place in the "mainstream" politics and in public opinion.

This is the outcome of a few interrelated factors which range from the increase in the number of extreme weather events around the world to better media coverage of climate negotiations, the latter also influenced by a higher participation of world leaders in climate-related discussions.

The union movement has not been immune from this increased public awareness. In the last years, trade unionists have created an international group on climate change (with over 100 national centres represented) and increased four-fold the number of its delegates to the UN climate discussions. The number of debates and activities on climate change has also increased substantially. The employment aspects of climate change as well as the need to secure a space for the international union movement in an eminently global debate about solidarity, development and equity have been fundamental drivers.

High expectations around the climate negotiations in Copenhagen in 2009 and the disappointment that emerged following their weak outcomes reinforced the public feeling that United Nations multilateralism might not be able to solve complex issues. However, the consequences of the economic crisis, which set the scene for the negotiations, should not be ignored. In 2009, when governments met in Copenhagen to discuss a new climate agreement, many economies around the world were badly hit by the global economic crisis and employment prospects were not encouraging (Global Unions, 2010).

The discussions in Copenhagen irremediably linked climate change to the traditional economic and political agendas of governments, and in this revealed the limited importance that the latter had been given in the UNFCCC negotiations.

The realization that the "realpolitik" aspects of climate change had to be dealt with along with scientific aspects might be one of the most interesting outcomes of the Copenhagen discussions. For several actors, including the labour movement, it was clear by then that unless a "job-friendly rationale" was developed around climate change, there was a risk for this issue to be seen only under a "gloom and doom" perspective, which was not going to be sufficient for getting governments to act.

This paper will explore some aspects of the employment/climate change nexus. It will also consider some of the possible public policy options that have been identified by several actors as sound climate policies which protect the broader social needs of communities. Finally, this paper will seek to highlight research gaps that need to be addressed.

Natural allies? Environmental and social crises, originally linked but separately addressed

When, in 1992, governments met in Rio and agreed on the fundamental link between ensuring social justice, protecting the environment and promoting economic security, hopes emerged on the capacity of our societies to transform themselves towards sustainability. However, 20 years later, the limits of our economic system have been reached, inequalities have never been higher and the planet's natural resources are already showing signs of exhaustion.

In terms of social crisis, it may well be said that our societies have reached a tipping point. Reliable indicators show that in the last 15 years income inequality has grown (ILO, 2008), workers are gaining a decreasing share of global GDP to sustain their livelihoods (Torres, 2009; ILO, 2008) and long-term strategies concerning social progress and sustainability have been undermined by corporations' fixation on the short-term benefits to shareholders. Long-term trends in income distribution are also exacerbated by the instability of prices of food or fuel, which has put the livelihoods of millions in peril.

In terms of the environment, there are no doubts on the increase of environmental thresholds: the proliferation of extreme weather events as a consequence of climate change, the incapacity of our societies to stop the loss in biodiversity, the long-term effects on our health of the proliferation of chemical substances... Those are but a few examples of the multiple environmental challenges our societies are facing. Unsustainable consumption and production patterns make humanity's environmental footprint 31 per cent larger than the planet's capacity to produce these resources (WWF, 2008). A recent figure highlights this in a stark manner: "In 2010, the worldwide human population is projected to use 150 per cent of the resources the Earth can generate in a year" (Global Footprint Network, 2010).

Moreover, these excesses are not even sufficient to guarantee access to resources to all: nearly 900 million people lack access to drinking water (WHO, 2010), 3 billion people do not have access to reliable sources of energy for heating and cooking (UNDP and WHO, 2009), 1 billion people suffer from hunger (United Nations, 2010) and almost half of the world's population – over 3 billion people – live on less than US$2.50 a day (Shah, 2010).

The argument that the expansion of the economic system as we know it will make it possible for those people to secure their rights is simply not realistic. If the world's inhabitants generated greenhouse gases at the same rate as some developed countries, we would need nine planets (UNDP, 2007).

This highlights the need to relate the environmental and social crises to the economic system that generated them. An in-depth analysis of the current global crises (food, energy, climate, finance, economy) (ITUC, 2009a;

Shah, 2008) reveals a common thread in their root causes: an unregulated, consumption-oriented and socially unjust economic model.

Climate change is a demonstration of the unequal way in which benefits and costs are shared under our current model of production and consumption: its negative consequences will be mostly felt by those who least caused it (Parry et al., 2007). If temperatures increase above 2°C from pre-industrial levels, 75 to 250 million people across Africa could face water shortages by 2020; crop yields could decrease by 30 per cent in Central and South Asia; and agriculture fed by rainfall could drop by 50 per cent in some African countries by 2020 (UNDP, 2009).

Climate change shows the profound links between the environmental challenge and the social and economic order. Its solution challenges the clustered way in which we have been dealing with environmental or social issues in the past.

In this regard, climate debates have given some attention to the negative impacts of inaction on poverty eradication and other development goals. Another issue that has gained some coverage is the employment opportunities and challenges coming from a greener economy (as explored below). However, those links are unidirectional. Climate policies are the driver and social dimensions are part of the consequences, they are at the receiving end of the policy.

The positive feedback coming from the implementation of coherent climate and social policies is still an underdeveloped issue. For example, a citizen who receives adequate health-care provision is a citizen who is more resilient to climate change. Equally, workers assured of being accompanied in their job search if they are currently in a sector facing challenges, could also be more proactive in their support for the development of a new and greener economic plan. This shows that social protection schemes contribute to climate change adaptation and mitigation.

An employment-blind negotiation

Since the signature of the UNFCCC in 1992, and the negotiation of the Kyoto Protocol, international climate negotiations dealt only marginally with social and economic issues. It was acknowledged that emission reductions implied changes in several economic sectors. However, the small emission reduction target agreed upon in Kyoto did not generate major changes in any of them. This said, the non-ratification of the Kyoto Protocol by the United States was based on concerns about the Protocol's impacts on the American economy. Those supposed impacts were not countered at that time by any other research. These arguments could be taken by others now that stronger emission-reduction efforts will be needed. In order to avoid a similar scenario, a better understanding of the economic and social aspects of climate policies seems a priority.

In the last two years, the economic aspects of climate change have become more visible. Identifying the costs of climate policies was instrumental for providing an economic approach to climate policies. Based on pioneering research, Stern stated that the costs of fighting climate change (costs estimated to 1 per cent of annual GDP by 2050[1]) were far below the costs of inaction (estimated at 5–20 per cent of the global GDP, with poor countries suffering in excess of 10 per cent of their GDP). Mitigation and investments in a low-carbon society are thus more economically rational, and investments in a low-carbon society should be considered as responding to economic rationality (Stern, 2007).

However, macroeconomic and long-term considerations linking climate change with national policy priorities have not been sufficient yet to motivate governments to take action for the welfare of all in a decade or more. If the negotiations on climate change were to succeed, it would be through the integration of immediate domestic concerns (jobs, growth, and poverty) in climate decisions, as a means to secure support.

One aspect that was blatantly ignored was employment.

In preparation for the UNFCCC conference in Bali, Indonesia (3–14 December 2007), a strong statement was released by the trade union movement, where the link between employment and climate change was clearly stated:

> The effects on the economy – including on employment – will be catastrophic if ambitious measures are not taken to reduce GHG emissions. While employment protection has often been used by certain developed country governments as a reason for not engaging in GHG emissions reductions, emerging evidence indicates that climate change mitigation has positive net employment effects. [...] Trade unions are aware that certain sectors will suffer from efforts aimed at mitigating climate change. Sectors linked to fossil fuel energy and other energy intensive sectors will be profoundly transformed by emissions reduction policies (ITUC, 2007).

Global unemployment has risen by 34 million since the crisis began, with millions more workers unable to find regular employment but absent from unemployment statistics (Global Unions, 2010). In this context, domestic policy priorities, such as employment creation, remain a priority for governments, even as the climate crisis knocks at their doors.

While employment concerns might not be the only reason why governments do not engage in climate policies, if climate policies became "job-literate" and able to address the economic, social and employment consequences of climate change, this would certainly facilitate consensus-building for an ambitious mandate on emission reductions.

1. These annual costs correspond to a stabilization at 500–550 ppm CO_2 equivalent.

What do we know about the relationship between climate change and employment?

This section will examine some of the evidence found on the linkages between climate change and employment. It deals with the employment impacts of climate change mitigation (policies to reduce greenhouse gas emissions) and adaptation policies (policies to anticipate the consequences of climate change) and examines their effects on different sectors from an environmental, economic and political perspective.[2]

Unfortunately, to date, research in those three areas is scarce. It is easy, if not trite, to say that when the economy is affected, employment is as well. However, it is harder to analyse how these impacts will be distributed, as impacts on the economy might not bring about immediate and visible changes in employment as a whole. Instead, some sectors will be adversely affected by these changes while others will benefit from them.

The impacts of climate change on employment

Impacts in the short to medium term will not be the consequences of temperature increases as the latter will be moderate and might even have positive impacts, by increasing agricultural yields in some regions for instance (under an optimistic scenario in which there is less than 2°C increase in global average temperatures). The negative impacts on employment will be the result of extreme weather events such as droughts, cyclones and/or floods. They will also arise from slower processes such as sea level rise.

The greater incidence of extreme weather events will affect urban employment because damage to transport, industrial infrastructures and settlements affects the ability of workers to commute and/or to find alternatives when workplaces have to close. An illustration of this is the near destruction of New Orleans by Hurricane Katrina, which resulted in the loss of about 40,000 jobs. Another anticipated impact is the displacement of workplaces to areas less exposed to environmental risks (further away from the sea or in zones less prone to cyclones). In a globalized economy, it is hard to predict whether these displacements will take place within the same country or be transboundary.[3]

2. The section is based on UNEP and Sustainlabour (2008). Anabella Rosemberg and Laura Martin were the lead authors of this chapter.

3. Foreign investments are highly influenced by "Country Risk" notations. A certain number of risk agencies, such as the COFACE, already incorporate indicators on the level of infrastructure which might be affected in a disaster-prone country. In its services for members, the Investor Network on Climate Risks includes advice regarding the ways in which businesses – their facilities, suppliers, customers, raw materials, etc. – are susceptible to the physical impacts of climate change including sea level rise, changing weather patterns and increased intensity and frequency of severe weather events such as droughts, floods and storms.

Rural employment will also be affected by climate change. Due to a greater incidence of heavy precipitation and the damage to crops this entails, it is anticipated that employment in the agricultural sector will be adversely affected, especially seasonal jobs that depend on harvesting and crop-processing. This is illustrated by Ruiz (in this issue), who links the decrease in employment opportunities due to climate change to migrations. It is hard to draw a simple cause-and-effect relationship between migration and climate change. People migrate for numerous reasons. However, a recent study has revealed that climate change is one of the key reasons behind male migration from Chiapas towards the northern states of Mexico and the United States (Verheecke, 2010). In the 2010 floods in Pakistan, in addition to the heavy death toll, almost 17 million acres of farmland have been flooded and billions of dollars' worth of crops and livestock destroyed. This destruction is particularly significant in a country where two-thirds of the 180 million inhabitants are in agriculture-related work (Karamat, 2010).

Climate change is also expected to reduce workers' productivity by increasing mortality and morbidity because of the resurgence and proliferation of certain diseases and to worsen the working conditions of workers who carry out their activity outdoors, such as construction workers, for example, because of rising temperatures. Increases in respiratory and/or water- and food-related diseases and the risk of malnutrition will also negatively affect employment. The latter will also condition the future incorporation of young workers into the workforce due to irreparable childhood health damage (WHO, 2009). Increased migration and mortality will further aggravate problems such as worker turnover and the loss of qualified workers. The latter issue is of special concern as technical knowledge is essential in order to adapt to changing working conditions.

A detailed description of the potential effects of climate change on employment can be found in Annex I.

In order to shed some light on the link between climate change effects and employment, some regional cases are worth examining. In Europe, agriculture, tourism, insurance, forestry, fisheries, infrastructure and energy were identified as highly vulnerable to the direct effects of climate change due to their dependence on regular climate conditions (ETUC, 2006). Table 1 includes some of the potential direct effects of climate change in Europe.

In Africa, climate change will affect agricultural production through increased water stress, reduced farming areas and decreased yield potential. Jobs in the rural areas will be affected, not only through the direct reduction in agricultural production but also through indirect effects in rural economies such as the knock-on effect on the processing sector, private transport services to the cities and non-agriculture-related commerce which depends on the revenues of agriculture (i.e. small shops in rural communities). For example, an increase of only 2°C would make some areas of Uganda unsuitable

for coffee production. In Uganda, the coffee sector is the most important exporter and one of the biggest employers (ILO, 2007).

In Asia, up to 60 per cent of the income of rural households depends on agriculture, with the rest coming from wage jobs in the same sector. Thus, rises in the frequency of floods or decreases in freshwater availability are likely to affect the two main sources of income of these households. The development of the Asian region will be subject to an increased water stress. Predictions reveal that by 2050 up to 1 billion people will be affected (UNEP, 2007).

In Latin America, the increase in extreme weather events in cyclone-prone zones might bring about changes in tourism patterns in the Caribbean region. For example, the Guatemalan travel and tourism economy accounted for 7.2 per cent of the country's GDP and provided 257,000 jobs in 2007 (6.3 per cent of total employment) (UNEP and Sustainlabour, 2008). In the medium term, these jobs could be at risk.

Table 1. Potential direct effects of climate change on economic activity and employment in Europe

Geographical location	Main climatic drivers	Expected effects on economic activity and employment	Level of confidence
Mid- and high latitude regions	Rising temperature, high atmospheric CO_2 concentration	Positive impact on agricultural productivity. Positive impact on employment overall.	Medium/ High
Southern Europe	Rising temperature	Negative impact on livestock productivity and employment.	Low
Mediterranean regions	Higher fire risk due to rising temperature and droughts	Negative impact on forestry productivity and employment.	Medium
General	Increase in frequency and intensity of extreme weather events	Negative impact on agricultural and forestry productivity, and employment.	Medium/ Low
Fisheries communities (Iceland, Baltic Sea, Spanish and Portuguese coast notably)	Changes in sea surface temperature, wind regime, water runoff, ice melt, or marine currents	Mix of negative and positive impacts on fisheries productivity and employment depending on the region. Shifts in maritime industries, e.g. in the Arctic.	Low

Source: ETUC (2006).

The employment aspects of climate change adaptation

Can measures aimed at protecting populations from climate change protect workers from the job losses described above? Adaptation strategies, by improving societies' and economies' capacity to react and adapt to climate change, should not in essence have a negative impact on employment.

Generally speaking, there are two kinds of adaptation policies in terms of their positive effects on employment: policies that *avoid job losses* by changing the element in production affected by climate change (i.e. changing crops); and policies that *create jobs* by preparing the country for climate change, engaging in labour-intensive projects (i.e. large infrastructure projects).

For example, in the agriculture and forestry sectors, in which climate change is expected to reduce yields and damage crops, erode soils and increase livestock deaths, adaptation policies need to focus on expanding non-farming activities and farming crops that are able to face greater variability in weather conditions. In the tourism sector, the vulnerability of workers can be reduced through policies that focus on the development of different tourist activities or the promotion of economic diversification. These policies will reduce the negative impacts of climate change on this economic activity and the employment opportunities it generates.

Having said that, it is fair to note that policies aimed at adaptation to climate change in different productive sectors need to take into account the labour-intensity of the output product that is being substituted, in order to avoid conflicts between workers' short-term income needs and mid- to long-term policies (ILO, 2007). If the implementation of policies substitutes a product by another because it is more economically and environmentally viable, as well as less labour-intensive, then policy makers should acknowledge the potential job losses and its impacts on the local economy.

This was made clear in an example on rice substitution in Bangladesh (ILO, 2007). In this case, policy-makers should take into account the employment consequences of substituting rice or fisheries by another agricultural product that is more economically and environmentally viable but requires less labour for its production. What is needed is a set of transitional measures for workers affected by the change in production, designed with the participation of workers and their representatives, and adopted at the very beginning of any adaptation measure.

Vulnerability to climate change is a direct consequence of poverty. Poor people have few resources to plan and implement adaptation strategies to deal with the changes that will occur in their workplaces (notably in the informal economy), in their homes (often in slums or extremely precarious housing) or within their families (for instance with regard to the health effects of climate change). Adaptation policies can start a virtuous circle driving local jobs creation which, with decent wages, can increase workers' wealth, and by doing so, reduce their vulnerability. This virtuous circle is starting to be explored by United Nations agencies, such as the ILO and FAO (ILO, FAO, WHO and UNIFEM, 2009), but it has been rarely mentioned in the UNFCCC negotiations, where the major decisions on adaptation planning practices are made.

Adaptation could also provide positive opportunities for sectors at risk and might even help to improve workers' education and income. Lesotho's National Adaptation Action Plan (NAPA) on Climate Change illustrates this well (Lesotho Meteorological Services, 2007). In the latter, all adaptation measures are expected to be analysed according to their impact on employment and on poverty reduction, and the country planned to choose those with positive outcomes in these two areas. However, Huq and Hugé (in this

issue) show that employment and the involvement of actors in affected economic sectors are not often taken into account in NAPAs.

New jobs will also be created in the construction sector as a consequence of infrastructure investments, such as the building of coastal defences, flood protection, drainage containment, road adaptation, etc. Buildings, infrastructure and homes will have to be better adapted to climate change, and political decisions that promote these strategies will lead to new job opportunities.

Annex II presents a set of adaptation measures and their impacts on employment, and focuses on the sectors that are most at risk and where adaptation is most important. It indicates that adaptation measures can result in some positive effects on employment, or, at least, reduce the negative employment impacts of climate change.

The effects of mitigation on employment

Adaptation efforts such as those mentioned above will encounter serious difficulties in the future if ambitious measures to reduce the amount of greenhouse gas emissions in the atmosphere are not taken. This is because a rise of GHG in the atmosphere above 450–550 ppm will cause irreversible damage to ecosystems and human lives (Meehl et al., 2007, p. 826).

This section reveals that many economic sectors will face important challenges during their transformation. However, job losses are not an automatic consequence of climate policies, but the consequence of a lack of investment, social policies and anticipation. On a more positive note, this section also compiles a certain number of sources that demonstrate that mitigation measures can indeed have positive impacts on employment, by creating new sectors and new activities in sectors affected by the targeted GHG emission reductions. Annex III describes in detail the impacts outlined in this section for more economic sectors.

Climate change mitigation is not all good news: The potential challenges arising from emission reduction policies

Efforts aimed at reducing GHG emissions will have negative effects on some economic sectors. Sectors linked to fossil fuel energy and other energy-intensive ones will be profoundly modified by emissions reduction policies. The former include industries such as steel, iron, aluminium but also energy-intensive services such as road transport.

A study on green jobs (UNEP, ILO, IOE and ITUC, 2008a) identifies four impacts of climate change on labour markets. One is explored in the next section and relates to *job creation* opportunities arising from climate policies. The other three ways are:

- *Job substitution*, including changes within sectors, where employment will shift from fossil fuels to renewables. This is well illustrated in the study presented by Miguel Esteban in this issue, which highlights the opportunities for workers in the offshore oil industry who could be re-employed in the offshore renewable industry. Hebe Barber indicates a dynamic of substitution. She describes the consequences of mitigation policies (in this case the promotion of agro fuels in Argentina) as a substitution of a relatively labour-intensive agricultural commodity, citrus, by a less labour-intensive and more land-extensive agriculture commodity, soybean (Verheecke, 2010).
- *Job elimination*, which would imply changes across sectors because there will be no direct replacement for certain jobs. This dynamic is well described in the ETUC research. As an example, job losses are expected in the European coal sector and the oil refining industry. Significant employment consequences are expected in coal mining from the closure of coal plants (ETUC, 2006). Panneels described those impacts (Verheecke, 2010).
- And the most common one: *transformation and redefinition of existing jobs* such as those experienced in industrial sectors which provide materials for cleaner technologies, or service jobs which are oriented towards energy or resource savings.

Gabriela Miranda raises an additional effect: *job displacement* as a consequence of carbon leakage (or the displacement of investments towards territories with less stringent environmental standards) (Verheecke, 2010).

Other possible negative impacts relate to changes in trade regulations which might have impacts in export-oriented sectors. While no trade barriers have been erected on climate grounds, increased awareness by consumers in developed countries might lead to changes in consumption patterns and thus to changes in developing countries' labour markets. A partial example (as the market reduction is not only due to a drop in consumer demand but also to the global recession) is that of around 1,200 jobs lost as a result of the decline in Kenyan flower exports to Europe, a sector which represents 23 per cent of Kenya's GDP (Global Changes, 2009).

However, changes in labour markets arising from the implementation of mitigation policies need to be understood across two fundamental variables: time and space. First, changes will not necessarily happen at the same time in the short term. If climate policies are ambitious enough and put in place in a relatively short period of time, most of the labour market changes are to be expected in the medium run. Second, changes will not be equally distributed geographically, but will likely be concentrated in certain regions.

Time and space gaps also apply to the opportunities offered by mitigation, and they make imperative the introduction of social stabilizers adapted to the magnitude and scope of the transition expected if we are to achieve a

low-carbon and climate-resilient society in a generation's time. These transitional measures, regrouped under the concept of "Just Transition", are defined and exemplified below.

Finally, it is important to note that the sectors which might be affected by climate regulations and actions are not evolving in a vacuum. Many of them are also facing other challenges. This is the case in certain fossil fuel-based energies, in which the ratio of job/KW has decreased as a consequence of an increase in the capital intensity in the sector. Coal, for instance, even across a wide range of different labour intensity figures, has seen its employment factor decrease and is projected to employ fewer people, independently from renewable energy development (IEA, 2009, p. 21).

For other sectors, rising automation, restructuring and outsourcing have had more substantial impacts than environmental regulations (OECD, 2010a). The decline of some industrial regions needs to be attributed to the globalization of production, technological change, footloose industries and productivity changes that led to structural changes with substantial declines in jobs and inhabitants (Martinez-Fernandez in OECD, 2010a). This is not to say that concerns about employment consequences of climate change policies should be ignored. On the contrary, this information helps to understand the hardship these communities are already facing and the fear that climate policies might add a burden to an already difficult situation.

Industries have tended to make labour pay the cost of their lack of investment in research and development. In their race to reduce production costs, industries have closed factories and looked for cheaper workforce elsewhere without necessarily investing in sustainability to modify the CO_2 patterns in their sector of activity. The transition towards a low-carbon economy must therefore enshrine respect for the livelihoods of workers and their communities and the need for different corporate behaviour.

Table 2. Employment factor for coal production and employment

	Employment factor (existing generation) ***Jobs per GWh***	**Employment factor (new generation)** ***Jobs per GWh***
World average	0.4	0.25
OECD North America	0.03	0.02
OECD Europe	0.36	0.17
OECD Pacific	0.05	0.02
India	0.59	0.25
China	0.52	0.02
Africa	0.11	0.07
Transition economies	0.46	0.19
Developing Asia	Use world average as no employment data available	
Latin America	Use world average as no employment data available	
Middle East	Use world average as no employment data available	

Source: Greenpeace and EREC (2010).

Will climate policies drive decent employment creation?

In the last few years, several policy-makers, advocacy groups and researchers have debated around the "green job creation" potential of climate policies, in particular mitigation.

When the positive aspects of mitigation policies for employment are discussed, an argument put forward by researchers is the labour intensity of low-carbon options in the energy efficiency, power generation and transport sector, vis-à-vis their high-carbon and currently used alternatives (Kammen, Kapadia and Fripp, 2004).

The International Energy Agency (IEA), for example, indicated that in the framework of economic recovery policies, energy efficiency, smart-metering and development of renewable energies created more jobs in the short term than traditional energy sources (IEA, 2009).

As table 3 demonstrates, even when a decrease in labour intensity over time is taken into account (as a consequence of the tendency to increase the ratio of capital over labour with the progress of a certain technology), clean technologies and processes keep their labour intensity-potential (Greenpeace and EREC, 2009 and 2010).

Only one global assessment (UNEP, ILO, IOE and ITUC, 2008a) and one macroeconomic study for more than one country, the European Union (ETUC, 2006), have been published in this area. While both are cautious regarding the net employment impacts of "green" policies, both coincide on the important potential for job creation in a certain number of sectors. This is confirmed by an important body of research focusing either on one sector, or on a specific country.

Notably, Pollin and Wicks-Lim (2008) show how an ambitious mitigation framework would generate employment across a certain number of

Table 3. Employment factors by energy source

Fuel	Construction, manufacturing and installation Person years/MW	Operation and maintenance Jobs/MW	Fuel Jobs/GWh
Coal	7.7	0.1	Regional factors
Gas	1.5	0.05	0.12
Nuclear	16.0	0.3	0.001
Biomass	4.3	3.1	0.2
Hydro	11.3	0.2	
Wind	15.0	0.4	
PV	38.4	0.4	
Geothermal	6.4	0.7	
Solar Thermal	10.0	0.3	
Ocean	10.0	0.3	
Multiplier for CHP		1.3	

Source: Greenpeace and EREC (2010).

sectors. Equally, studies concentrating on certain sectors shed light on the potential positive consequences of mitigation policies.[4]

The French Agency for the Environment and Energy Management (ADEME) estimates the number of direct jobs in the energy efficiency, renewable energy and public transport infrastructure at 260,000 FTE, a level equivalent to the chemical industry and with a growth rate of 27 per cent compared with 2006 and 13 per cent compared with 2007 (ADEME, 2009).

In Brazil, current accounting of employment in environmentally friendly sectors also shows the positive effects of green policies.

> In 2008, the number of employees in companies listed as performing green economic activities reached 1,405,001. This amount represents 3.6 per cent of the total formal employment generated by the Brazilian economy in that year. Between 2006 and 2008, employment in green economic activities grew at an annual rate of 7.9 per cent. At the same time, employment in economic activities producing oils based on renewable resources grew at a annual rate of 15.7 per cent (Caruso, 2010).

When these trends are studied from a sectoral perspective, opportunities are also found.

Regarding *energy efficiency*, while numbers at the global and economy-wide levels are not available, there is a general consensus around the idea that measures promoting energy efficiency create jobs in auditing and other energy services. The auditing and evaluation of energy consumption, the analysis of reduction opportunities for industrial and commercial facilities as well as households, are initial activities from which important sources of employment could emerge in the future.

Energy efficiency measures also create opportunities in the building sector. Nevertheless, this sector (a particularly labour-intensive one) faces the challenge of improving job quality, which remains very low.

Several studies estimate that every US$1 million invested in building efficiency retrofits creates 10–14 direct jobs and 3–4 indirect jobs (Hendricks, Campbell and Goddale, 2009). If the positive impacts on employment of retrofitting building were better known, these policies could be promoted as part of a job creation agenda with emission reductions and households' reduced energy consumption as environmental co-benefits.

For instance, one of the aspects of the Brazilian programme "My house, my life" has facilitated poor households' access to solar panels. According to estimations between 2009 and 2010, as a consequence of this programme,

4. In addition to the examples mentioned below, other national case studies are available. For Australia, see: Australian Conservation Foundation (ACF) and Australian Council of Trade Unions (ACTU): *Creating jobs – Cutting pollution, the roadmap for a cleaner stronger economy*, 2010.

around 800 project managers and 7,000 installers of solar panels will be employed (Caruso, 2010).

The expansion of *renewable energies* such as solar, wind, geothermal and agroenergy will have a positive impact on employment. The manufacture, installation and maintenance of solar panels should create in the entire world 6.3 million jobs by 2030, while wind power should create more than 2 million jobs (UNEP, ILO, IOE and ITUC, 2008a). The IEA estimates that for every billion dollars invested in clean energy technology, 30,000 new jobs will be created (IEA, 2009). Kammen, Kapadia and Fripp (2004) reveal that the renewable energy sector generates more jobs than the fossil fuel-based energy sector per unit of energy delivered.

However, labour shortages for this key area have already been identified. They would probably disappear if ambitious training and education programmes were put in place. The CEDEFOP states that:

> Understanding the environmental impact of an occupation needs to be mainstreamed into education and training systems. Integrating sustainable development and environmental issues into existing qualifications is much more effective than creating new training standards. Every new apprenticeship ought to have a low-carbon element (CEDEFOP, 2010).

If these deficiencies are addressed, there is a huge employment potential in the renewables sector. The latest data available for Spain, for example, show that the wind sector alone has created 95,000 new jobs (24,000 direct jobs and 71,000 indirect jobs) driven by the domestic component associated with the design, production and assembling processes (Sanchez Lopez, 2006).

Given the increasing interest in energy alternatives, 2.1 million jobs will be created in wind energy production, 6.3 million in solar photovoltaic and 12 million in biofuels-related agriculture and industry by 2030 (UNEP, ILO, IOE and ITUC, 2008a). In the case of agroenergies, it is clear that the number of jobs created is already very high. A study of Brazil identifies several reasons why ethanol production is a huge opportunity for job creation (IAEA, 2006). We should, however, give greater importance to analysing working conditions and overall environmental and food production impacts ahead of their promotion. Agrofuels will probably worsen the already problematic working conditions in agriculture.

In the *transport* sector, mitigation measures could lead to the creation of an important number of jobs. Rail transportation, for both freight and passengers, should be a source of well-trained and safe jobs. In the United States, a billion dollars spent on public transport generates (averaging between operations and capital projects) around 36,000 jobs, which is 9 per cent and 17 per cent higher than the job creation potential from road maintenance and new roadway projects respectively (Litman, 2009; see also table 4).

Table 4. Economic impacts per US$1 million expenditures

Expense category	Value added 2006 dollars	Employment FTEs*	Compensation 2006 dollars
Auto fuel	1,139,110	12.8	516,438
Other vehicle expenses	1,088,845	13.7	600,082
Household bundles			
Including auto expenses	1,278,440	17.0	625,533
Redistributed auto expenses	1,292,362	17.3	627,465
Public transit	1,815,823	31.3	1,591,993

This table summarizes input-output table analysis. In 2006, a million dollars shifted from fuel expenditures to a typical bundle of consumer goods adds 4.5 jobs to the US economy, and each million shifted from general motor vehicle expenditures adds about 3.6 jobs.
(* FTE = Full-Time Equivalent employees).

Source: Litman (2009).

When the employment dimension of climate change is analysed, it becomes clear that major changes in the labour market are to be expected. Far from being smooth, those changes can be experienced by workers and their families as extremely disruptive.

This is the case because, as we have explained before:

- There are important gaps in terms of time and geographic impacts that need to be addressed.
- Without proactive regulatory action, the costs of policies will be unevenly distributed among citizens (there is a risk for poor workers and households to be the ones that pay the most), which could generate a feeling of unfairness and act as a social barrier in the implementation of climate policies.
- Labour shifts within and across sectors cannot occur automatically and there is a risk for environmental policies not to achieve their outcomes because of a lack of workforce availability (i.e. due to a lack of training, lack of awareness on job opportunities, absence of available workforce in certain regions, etc.)

The following section will explore policy options that have been put forward in order to address those changes and shifts in a socially acceptable manner.

A public policy framework for accompanying labour markets: Just Transition

Climate change and policies aimed to adapt to it or to reduce greenhouse gas emissions will have impacts on labour markets. Those impacts might be considered positive (such as employment creation in infrastructure projects linked to adaptation or renewable energy development) or negative (such as the impacts of climate change on agricultural workers or in energy-intensive

sectors). Nonetheless, this section shows that the employment outcomes of climate change policies vary according to their process of implementation.

This reasoning is the basis of the "Just Transition" strategy which originated in the trade union movement and which has now been adopted by other community and NGO groups, UN agencies and governments, among others.

This section will explore the origins of the concept, but most importantly, its evolution, which turned it into an instrument for workers and communities to claim and ensure attention for their transitional needs in the transformations towards a low-carbon and climate-resilient society.

Definition and evolution of the Just Transition concept

In 1998, a Canadian union activist, Brian Kohler, published what was going to become one of the first mentions of the Just Transition concept in a union newsletter (Kohler, 1998). It constituted an attempt to reconcile the union movement's efforts to provide workers with decent jobs and the need to protect the environment. As Kohler had clearly stated previously: "The real choice is not jobs or environment. It is both or neither." (Kohler, 1996).

In ten years, the union movement perception of environmental challenges has evolved and with it the definition, boundaries and scope of the "just transition" needed.[5] Today, "Just Transition" can be understood as the conceptual framework in which the labour movement captures the complexities of the transition towards a low-carbon and climate-resilient economy, highlighting public policy needs and aiming to maximize benefits and minimize hardships for workers and their communities in this transformation.

In a document prepared by the International Trade Union Confederation (ITUC), Just Transition is defined as a "tool the trade union movement shares with the international community, aimed at smoothing the shift towards a more sustainable society and providing hope for the capacity of a green economy to sustain decent jobs and livelihoods for all" (ITUC, 2009b).

It is important to note that Just Transition is a supporting mechanism of climate action, and not inaction. Just Transition is not in opposition to, but complements environmental policies. This comforts the idea that environmental and social policies are not contradictory but, on the contrary, can reinforce each other.

This approach to the Just Transition concept was unanimously adopted at the 2nd ITUC Congress, in 2010, when the Congress declared "Just Transition" to be "the" approach to fight climate change:

5. Early mentions of Just Transition can also be found in ICFTU: *'Plough to Plate' Approaches to Food and Agriculture*, 2000; ICFTU: *Fashioning A New Deal – Workers and Trade Unions at the World Summit for Sustainable Development*, 2002.

> Congress is committed to promoting an integrated approach to sustainable development through a just transition where social progress, environmental protection and economic needs are brought into a framework of democratic governance, where labour and other human rights are respected and gender equality achieved (ITUC, 2010).

Other Global Union Federations, representing workers in specific economic sectors, joined this policy approach. The International Transport workers' Federation (ITF) adopted, at its 2010 Congress, a resolution stating that "while the urgent adoption of these policies is vital to tackle climate change, the ITF and its affiliates must defend the interests of transport workers by fighting to ensure that these policies are implemented in a way which protects jobs and creates new ones through a process of just transition" (ITF, 2010). Federations of industrial workers have also voiced their positions on Just Transition. The International Federation of Chemical, Energy, Mine and General Workers' Unions (ICEM), for example, states that "with a Just Transition, we can build a public consensus to move towards more sustainable production" (ICEM, 2009).

The Just Transition framework is a package of policy proposals which addresses the different aspects related to the vulnerability of workers and their communities: uncertainties regarding job impacts, risks of job losses, risks of undemocratic decision-making processes, risks of regional or local economic downturn, among others.

A Just Transition framework needs to incorporate, at least, the policies detailed below:

Sound investments in low-emission and labour-intensive technologies and sectors

Climate-friendly investments are positive in terms of employment creation. However, without a massive shift in investments towards these sectors, those opportunities will not be realized, hindering progress on climate policies. Workers from declining sectors or young workers who have not yet entered the labour market need job alternatives, and green investments can provide them. These investments could be driven, in the initial phase, by public sector policies, including procurement, infrastructure projects and public regulations.

Some of these investments have been promoted as suitable for "recovery packages" in the context of the economic crisis (OECD, 2010b).

Research and early assessment of social and employment impacts

Those conditions are crucial to better prepare for change. As stated by the ITUC, "a proper consultation process will not be sufficient unless it is accompanied by relevant studies assessing the impacts of alternative emission reduction scenarios on production systems. Systematic country, region and sector-specific studies on climate change policies and their impacts on employment and labour markets must be carried out. Ex ante analysis of policies is key, as this enables their redesign and improvement" (ITUC, 2009c, p. 15).

An initiative to start addressing those gaps was taken by the ITUC, the Global Unions Research Network (GURN) and the ILO Bureau for Workers' Activities (Verheecke, 2010).

The aspects which still need to be explored, in order to prepare social actors to the transformation our societies are going to face, are examined in the next section, which specifically addresses research gaps.

Social dialogue and democratic consultation of social partners and stakeholders

Governments have to consult with and encourage institutionalized and formal involvement of trade unions, employers, communities, and all other relevant community groups. Consultation and respect for human and labour rights form the baseline conditions for a smooth and effective transition towards a sustainable society.

Social dialogue is a tool used to promote consensus-building and the democratic involvement of the main stakeholders in the world of work. Successful social dialogue structures and processes have the potential to resolve important economic and social issues, to encourage good governance, to advance social and industrial peace and stability and to boost economic progress (UNEP and Sustainlabour, 2008, pp. 89–90).

Studies confirm the value of tripartite social dialogue in the context of climate change. An ILO report which studied a unique experience of tripartism adapted to climate change discussions in Spain highlighted this potential: "Tripartite social dialogue [is] a valid instrument in the analysis of the effects on competitiveness, employment and social cohesion in policies related to climate change". The report found that the experience was considered positive for information and consensus-building, a driver for internal actions in each sector, and potentially useful for monitoring progress (ILO and Sustainlabour, 2010).

Training and skills development

Changes on the ground require workers to be trained in clean processes and technologies. This is key to absorb and develop new technologies and to realize the potential of green investments. Educational leave for workers to acquire new skills might be needed. Many organizations agree on this aspect of the "Just Transition" framework. In addition to the ILO (CEDEFOP and ILO, 2010), UNEP (UNEP, ILO, IOE and ITUC, 2008a) and the OECD (OECD, 2010b), other organizations such as UNCTAD highlighted the importance of skills development: "The key elements of a favourable environment for cross-border flows of low-carbon technology include availability of the requisite skills" (UNCTAD, 2010, p. 31). More references on the need for skills development are available in the section on employment aspects of mitigation.

Social protection

Vulnerability may be a source of reluctance to support change. Social protection schemes, including active labour market policies (social security including social insurance and public employment guarantee schemes, job-creating public works programmes for the unemployed and working poor, income maintenance and job placement services, among others) are key to ensure justice during the transition. A certain number of policies will need to be promoted to avert or minimize job losses, to provide income support and to improve the employability of workers in sensitive sectors.

Social protection also needs to address the consequences of climate change and extreme weather events on the poorest and the most vulnerable. Unfortunately, insufficient attention has been played in the social protection sphere to the long-term risks posed by climate change. However, social protection approaches could inform disaster risk reduction and climate change adaptation based on established implementation frameworks for vulnerability reduction" (IDS, 2007, p. 1).

Local analysis and economic diversification plans

Each region and community at the receiving end of positive or negative employment effects of climate change policies needs its economic diversification plan. Communities cannot be abandoned to situations of ultimate rescue as they never lead to a fair distribution of costs and benefits.

As has been previously highlighted, the impacts of climate change on employment mask local disparities. Although no region will be left unaffected, the effects of climate change are unlikely to be uniform across regions. And the OECD to point out: "the paradox is that while local governments play a

relatively marginal role in designing and implementing climate change regulation, they will play a considerable role in managing transition to a low-carbon economy and enabling green growth" (OECD, 2010b, p. 28).

Diversifying Just Transition strategies

The elements described in the section above, while broad and general, represent an ambitious framework, as it covers a broad variety of measures without questioning the scope of the environmental challenges ahead. Although all those policy options have been tested and proved successful in various contexts, not a single country has yet organized a massive transformation as the one the Just Transition framework calls for.

We consider that while ambitious, the framework should be built upon. The complex reality that different countries and regions are going to face in their transitions to a low-carbon and climate-resilient economy requires the Just Transition concept to be developed taking into account at least three different starting points and consequent policy options:

Carbon-intensive developed countries

These countries are resource-intensive and relatively wealthy. Their per capita consumption rates would exceed the planet's ecological limits if they were reproduced globally. In their case, a deep transformation of production and consumption patterns is needed. The movement towards highly efficient and low-carbon patterns is to be carried out without harming the prosperity of all their inhabitants.

This is the "transition" that has inspired the concept. Emerging evidence focuses on issues such as the means by which certain sectors will adapt to climate regulations, the impacts climate change will have on labour markets and which measures to apply to "smooth" the transition and share its related costs and benefits fairly.

Most of the countries in this group are facing a severe economic crisis, with high unemployment rates. This context has prompted some of them to consider "green recovery" policies, even if these have not been maintained for a sufficient amount of time to drive major changes. This group of countries have also put in place in the last decades a certain number of provisions to cushion the negative effects of changes in labour markets on workers (unemployment benefits, training and skills development, job placement services).

All policies described in the previous section seem relevant to this group which has "inspired" the Just Transition idea. However, several challenges in the implementation of the idea remain: high public debt and recent slowdown in government-led stimulus packages, reduced use of social dialogue

and partnership with trade unions, intense lobbying by enterprises established in carbon-intensive sectors. Table 5 compiles a list of policies for the transitional scenario of this group.

Table 5. Carbon-intensive developed countries[a]

	GHG per capita (tons of CO_2 eq.)[b]	CO_2 Cumulative emissions (% world)[c]	GDP per capita (US$)[a]	Gini coefficient[d]	Unemployment rate (%)[e]
Average	10.5	8.44	36'952	34.48	9.02
Max.	25.0	29.30	32'451	40.80	20.05
Min.	9.0	0.90	45'590	24.90	5.10

Driving investments

- Putting a price to GDG emissions through regulations
- Incorporate "green investments" into recovery plans
- Mainstream climate change needs in public procurement
- Develop "green" fiscality (incorporating environmental protection while preserving the long term sustainability of the system)
- Reform corporate governance (shift from shareholder to stakeholder-driven decision-making)
- Identify priority regions and use investments to prepare their future

Social dialogue

- Adapt social dialogue institutions and use them for climate change decision-making
- Consider developing tripartite dialogue at the sectoral and territorial level for planning the transition
- Promote multi-stakeholder platforms

Skills and training

- Update training schemes to incorporate "green economy" needs
- Mainstream lifelong learning in workers' careers
- Upscale the profile of technical careers

Social protection

- Develop protection schemes adapted to scattered careers
- Accompanying workers and SMEs in declining sectors with programmes of entrepreneurship development, retraining, job placement services support, and other labour market policies

[a] For the purpose of the classification, a country has been considered wealthy when its GDP per capita is above US$30,000.

[b] See http://unstats.un.org/unsd/environment/Questionnaires/country_snapshots.htm. Accessed 16 Sep. 2010.

[c] CO_2 from fossil fuels and cement manufacture, 1850–2002, http://www.wri.org/publication/navigating-the-numbers. Accessed 16 Sep. 2010.

[d] See http://hdrstats.undp.org/en/indicators/161.html. Accessed 16 Sep. 2010.

[e] See http://en.wikipedia.org/wiki/list_of_countries_by_unemployment _rate. Accessed 16 Sep. 2010.

Increasingly carbon-intensive emerging economies

With their increased share of international production and trade, emerging economies seem to follow development pathways similar to those of industrialized countries. This development model leaves social inequalities and environmental protection to be addressed at a later stage, once sufficient wealth has been created. This idea, which might have worked for industrialized countries, seems difficult to realize now. Several environmental challenges

are reaching their tipping points and social unrest is increasing. People might not wait generations for the distribution of wealth to occur. A Just Transition strategy in these countries implies an earlier and different implementation of environmental policies than that of developed countries.

It would include a better integration of environmental and fairness concerns in development planning, the promotion of an original economic model and the development of innovative social protection schemes. The impacts of the transition of emerging economies towards a more environmentally and people- friendly model have rarely been studied. Will a different model delay or advance social progress? In order to respond in a sound manner to this question, further research is necessary, especially on the proposals listed in table 6.

Table 6. Increasingly carbon-intensive emerging economies[a]

	GHG per capita (tons of CO_2 eq.)[b]	CO_2 Cumulative emissions (% world)[c]	GDP per capita (US$)[a]	Gini coefficient[d]	Unemployment rate (%)[e]
Average	6.5	1.9	7134	42.84	9.9
Max.	15.0	8.1	19'841	57.80	25.3
Min.	1.0	0.2	976	31.60	3.7

Investments

- Incorporate climate change in national planning
- Link poverty reduction/job creation to mitigation-friendly investments
- Develop fiscal policies which promote companies' and wealthy households' resource efficiency
- Develop sustainable investment framework for SMEs, which includes decent work provision along with environmental standards
- Develop a sustainable investment framework for MNEs
- Make use of national banks for driving changes in specific sectors

Social dialogue

- Ensure respect of core labour standards
- Adapt social dialogue institutions and use them for climate change decision-making
- Consider developing tripartite dialogue at the sectoral and territorial level for planning the transition
- Promote multi-stakeholder platforms

Training and skills

- Develop skills partnerships with employers
- Develop regional development strategies focusing on specific green options
- Mainstream social progress/environmental protection in universities' curricula
- Develop skills programmes in local "social" centres for poor workers

Social protection

- Reinforce initiatives towards formalization of the workforce/decent work provision
- Develop innovative safety nets
- Scale up access to education

[a] For the purpose of the classification, a country has been considered wealthy when its GDP per capita is between US$900 and US$20,000.

[b] See http://unstats.un.org/unsd/environment/Questionnaires/country_snapshots.htm. Accessed 16 Sep. 2010.

[c] CO_2 from fossil fuels and cement manufacture, 1850–2002, http://www.wri.org/publication/navigating-the-numbers. Accessed 16 Sep. 2010.

[d] See http://hdrstats.undp.org/en/indicators/161.html. Accessed 16 Sep. 2010.

[e] See http://en.wikipedia.org/wiki/list_of_countries_by_unemployment _rate. Accessed 16 Sep. 2010.

Low-carbon, highly climate-vulnerable developing countries

The capacity of developing countries to deliver a Just Transition programme is modest. However, there is a need to ensure that people's resilience is at the centre of their development strategies. Exploring the means to mainstream climate change in development aid, to expand democratic decision-making on these issues, to fight unemployment, informal work and corruption, among others, seems fundamental. A Just Transition strategy in these countries also requires respecting trade union rights to ensure that workers' voices are heard during the transition (see table 7).

Table 7. Low-carbon, highly climate-vulnerable developing countries[a]

	GHG per capita (tons of CO_2 eq.)[b]	CO_2 Cumulative emissions (% world)[c]	GDP per capita (US$)[a]	Gini coefficient[d]	Unemployment rate (%)[e]
Average	1'075	n.d.	507.75	51.1	45.8
Max.	2.4	n.d.	762.00	64.3	95.0
Min.	0	n.d.	159.00	39.0	20.0

Investments

- Mainstream climate change in ODA
- Redirect remittances to low-carbon, climate-resilient investments
- Identify regional priorities and ensure coherence among different development actors on the ground
- Develop fiscal policies
- Verify climate resilience of infrastructure investments
- Social dialogue
- Ensure core labour standards implementation, human rights enforcement and democracy
- Increase awareness of social partners on sustainability issues, including through the media
- Promote tripartism for identifying vulnerability of workplaces and possible solutions

Training and skills

- Promote better access to education
- Incorporate domestic content provision in foreign direct investment on clean technologies
- Use UNFCCC mechanisms for capacity building

Social protection

- Work towards the reduction of informal work and decent work promotion
- Work towards the creation of social protection schemes (health services, education, and unemployment services)

[a] For the purpose of the classification, a country has been considered wealthy when its GDP per capita is below US$900.

[b] See http://unstats.un.org/unsd/environment/Questionnaires/country_snapshots.htm. Accessed 16 Sep. 2010.

[c] CO_2 from fossil fuels and cement manufacture, 1850–2002, http://www.wri.org/publication/navigating-the-numbers. Accessed 16 Sep. 2010.

[d] See http://hdrstats.undp.org/en/indicators/161.html. Accessed 16 Sep. 2010.

[e] See http://en.wikipedia.org/wiki/list_of_countries_by_unemployment _rate. Accessed 16 Sep. 2010.

Research gaps

The previous sections make it clear that research is progressing on a certain number of employment-related aspects of climate change. However, by identifying new policies which could be promoted in the framework of a Just Transition, it also opens new areas to be explored. This paper, along with discussions that took place in 2010 (Verheecke, 2010), reveals numerous research gaps. Filling them is fundamental for social actors to be armed for defending solid, socially acceptable climate policies. This section will describe those gaps and explain why filling them is vital to gain a better understanding of the dynamics of labour markets and climate change.

The geographical gap

Available research has tended to focus on the macroeconomic aspects of mitigation measures in the countries where mitigation has been discussed for several years, namely industrialized countries. Among them, only a minority has dealt with employment. Today, this is not only a barrier to engaging in constructive dialogue on mitigation actions in emerging economies but also an obstacle to knowledge on the impacts of climate change mitigation or adaptation in the three groups of countries.

What could be the impacts of emission reductions in energy-intensive sectors in countries like Brazil, China or Indonesia? What would "reduced emissions from deforestation and forest degradation" (REDD) imply for jobs in the forestry sector? From an employment perspective, is there any difference between climate-resilient infrastructure projects and traditional public works plans? These and other questions remain unanswered due to a lack of available research.

In addition, the lack of geographical analysis masks the different impacts on intra-country disparities, such as income inequalities or social protection schemes. Several studies suggest that the economic impacts of climate measures can be considered small compared to a country's GDP. However, others show that the impacts are often concentrated in a certain sector of the population or in a particular geographical space. The way in which these groups will be able to adapt to a different situation will vary and policy frameworks should thus be developed accordingly.

The sectoral gap

Economic research on the impacts of climate change and climate change policies within sectors is also missing. As revealed in the previous section, a number of sectors will be affected by climate policies. Some due to the

impacts that climate change will have on their output (agriculture, fisheries, tourism), others because of modifications arising from adaptation policies (construction, agriculture, transport) and, finally, some sectors will be transformed as a consequence of emission reduction policies (industry, services, energy production, forestry, etc).

Although some studies have been published on a certain sector in a certain country or region, the amount of research is not sufficient to draw international conclusions or trends on labour markets in those sectors. Some sectors, such as electricity production, have been widely studied. The net effects of a shift towards renewable energies appear positive in terms of employment. However, other aspects of energy generation and distribution are not taken into account in the analyses, highlighting certain biases.

As in the case of geographical gaps, a better understanding of sectoral impacts would help to rebalance the costs and benefits of climate measures and to anticipate more adequately the targeted measures needed for a Just Transition.

The historical gap

Labour markets have faced several large-scale changes since the beginning of wage labour. Those changes sometimes implied profound transformations and most of the times were unplanned, leading to hardship for working families. There is a need to know if certain historical experiences could provide support to understand the means towards socially fair transformations. Research on past reforms and restructuring processes which have led to unfair and/or unsustainable situations should also be identified in order not to repeat past mistakes.

It is true that the level of transformations required to shift to a low-carbon and climate-resilient economy is probably as great as the one observed during the industrial revolution. It is fundamental to acknowledge that in society's interest, this transformation should be planned as much as possible to reduce social shocks and to use the changes as drivers to transform the other failing elements of our systems.

What elements have been key for workers to accept and support in-depth transformations in a certain sector or region? What was the role of trade unions? What role was played by certain regulations, social dialogue or other labour market regulations? How were the "transitional" systems financed? Were there any voluntary measures set by companies in addition to regulations? The greater the number of experiences gathered, the more the transition will be perceived as fair and will help our societies to achieve prosperity and environmental sustainability.

The skills gap

As seen in the previous section, the skills development aspects of the transition are studied by a series of actors. If skills are considered as "the best insurance against unemployment and an important factor for personal development and active citizenship" (European Commission, 2009, p. 2), many questions remain unanswered. The discussion on whether the low-carbon economy will imply the development of "old skills in new contexts", new skills, or a mix of both is mobilizing most of the attention.

Other questions though deserve attention: How many workers will have to acquire new skills in the next 10–15 years? Will the transformation have a differentiated impact on workers, depending on their skills level? How can the transition benefit low-skilled workers? How can skills gaps be filled when there are no public training schemes? What role can social partners play to fill those gaps?

The decent work gap

The quality of the employment opportunities arising from clean investments still needs to be better studied. It has been said that there is no automatic link between green jobs and decent work (UNEP, ILO, IOE and ITUC, 2008a), but only a few studies on the working conditions in emerging sectors have been pursued.

In addition, a huge gap remains to be filled regarding three fundamental questions: What strategies are available to improve working conditions in new sectors? Are these sectors fundamentally different from other non-organized ones? Can these new sectors drive a transformation of labour markets where decent work is not the rule?

Understanding the way in which a climate-resilient and low-carbon economy will impact and hopefully improve the lives of the most vulnerable workers is also crucial, in particular regarding workers in the informal economy or migrant workers, for instance.

Answers to these questions are central in order to build strategies needed to ensure that the Decent Work Agenda is enshrined in sustainable, low-carbon strategies and that workers reap the benefits of the transition through dignifying working and living conditions.

The gender/age gap

This is probably one of the most under-studied aspects of labour market dynamics in the context of climate change and climate policies. Only one study is available on the gender impacts of green jobs (Stevens, 2009). No studies

are available on the differentiated impacts of climate policies in terms of age, despite the fact that clearly there are differences in the opportunities and challenges workers face depending on their age and gender.

A recent symposium highlighted some gaps in gender studies in relationship with climate change. However, it did not identify women's employment dynamics as a research gap (GenderCC, 2010). This is surprising when we know that it was found that there is a risk that women will not enjoy the benefits of green jobs development. Stevens found that "the majority of green jobs are expected to be in the construction, manufacturing and engineering fields where women are significantly under-represented". As a result, "the green economy may unintentionally exclude women" (Stevens, 2009, p. 7).

There is also a need to understand if job creation in emerging sectors (as a consequence of mitigation or adaptation policies) will address the rising problem of youth unemployment and what kind of policies can help young workers to meet the needs of future labour markets. This debate is also linked to the need to know if the working conditions of young workers will be decent. Job opportunities in non-organized sectors might imply an access to employment, but not necessarily to decent work.

Although these research gaps are not exhaustive, they identify a very ambitious agenda for researchers, who could, through their proposals, participate in the understanding of social movements of the transformations to be expected, and become active agents of change in the construction of a progressive climate change agenda.

Conclusion

The way forward seems complex. On the one hand, progress on the climate change agenda (at the UNFCCC, at the national level) is far from having reached the pace necessary to avert dangerous climate change; on the other, a certain number of actors (trade unions, non-governmental organizations, community groups) are now actively lobbying for the inclusion of social aspects (including employment) in climate change decisions.

Certainly, an increase in the amount of research in the areas highlighted in this paper would help the understanding of the employment impacts of climate change and, in so doing, help trade unions, governments and other social actors to build a more consensual, socially friendly and ambitious climate policy.

However, this will not be enough to change the current trajectory of our societies. The origins of environmental and social crises find a common source in the prevailing economic model and, it is fair to say, little or no progress has been made in changing that model. Most of the policies advocated today to protect the climate are aimed at increasing the efficiency in the use

of natural resources rather than changing production and consumption patterns that are environmentally harmful, socially unfair and unsustainable.

Traditional neoliberal recipes seem to be gaining ground in this moment of economic crisis. A diminished role for the State and for public investments, a certain resistance to new regulations, all these contradict the policies which will be necessary to stimulate a low-carbon economy.

This paper has summed up some of the research available on climate change and labour markets, also indicating that the transition will lead us to a better world only if the ultimate outcome of the transformation – the decision about what kind of society we want for present and future generations – as well as the process for getting there are democratically decided and inclusive of the most vulnerable.

Our collective capacity to manage and achieve a Just Transition cannot be taken for granted. Efforts will have to be made by all groups. Only time will tell if we were up to the challenge of anticipating and protecting those who needed protection, or if particular, short-term interests were stronger. For the moment, the time is still with us for putting pressure on leaders and at the grassroots level, making clear that a Just Transition is the best solution in our hands for giving a decent future to our people.

References

ACF/ACTU. 2010. *Creating jobs – Cutting pollution, the roadmap for a cleaner stronger economy – Australian Conservation Foundation*, Australian Council of Trade Unions, Australia.

ADEME. 2009. "Maîtrise de l'énergie et développement des énergies renouvelables: un marché en croissance continue malgré la crise économique", in *Adème & Vous*, No. 22 , 1 Dec.

Caruso, L. 2010. *Skills for green jobs in Brazil*. Unedited background country study, International Labour Office, Skills and Employability Department (Geneva).

CEDEFOP. 2010. "Skills for green jobs – Developing a low-carbon economy depends on improving existing skills rather than specialised green skills", Briefing Note, July.

—; ILO. 2010. *Skills for green jobs*: *European Synthesis report*, European Union publication office, available at: <http://www.ilo.org/wcmsp5/groups/public/–-ed_emp/–-ifp_skills/documents/publication/wcms_143855.pdf> [accessed 16 Sep. 2010].

ETUC. 2006. *Climate Change and Employment: Impact on Employment in the European Union-25 of Climate Change and CO_2 Emission Reduction Measures by 2030* (Brussels).

European Commission. 2009. *New skills for new jobs: anticipating and matching labour market and skills needs* (Brussels).

GenderCC. 2010. *Symposium Gender and Climate Change Research: Gaps and Questions*, Germany, June, available at: <http://www.gendercc.net/policy/meetings.html> [accessed 10 Sep. 2010].

Global Changes. 2009. *Kenya's Flowers Diminish,* blog post available at: <http://www.global-changes.com/kenyas-flowers-diminish/> [accessed 16 Sep. 2010].

Global Footprint Network. 2010. *Earth Overshoot Day.* Available at: <http://www.footprintnetwork.org/en/index.php/GFN/page/earth_overshoot_day/> [accessed 16 Sep. 2010].

Global Unions. 2010. "Take action on jobs to sustain the recovery", Global unions' statement to the G8/G20 Ontario Summits, Canada, Trade Union Advisory Committee to the OECD (Paris).

Greenpeace; EREC. 2009. *Working for the Climate – renewable energy and the Green Job [r]evolution* (Sydney).

—; —. 2010. *Energy [R]evolution, a sustainable world energy outlook*, 3rd edition.

Hendricks, B.; Campbell, B.; Goddale, P. 2009. *Rebuilding America: A National Policy Framework for Investment in Energy Efficiency Retrofits,* Center for American Progress, Aug. (Washington, DC).

IAEA. 2006. *Brazil: A country profile on Sustainable Energy Development* (Vienna).

ICEM. 2009. "Sustainability – a Role for Labour, a Role for the ICEM", International Federation of Chemical, Energy, Mine and General Workers' Unions (Geneva).

IDS. 2007. "Connecting Social Protection and Climate Change Adaptation", in *Institute of Development Studies*, No. 2, Nov. (London).

IEA. 2009. *Ensuring Green Growth in a time of economic crisis: The role of energy technology* (Brussels).

ILO. 2007. "Green jobs: Climate change in the world of work", in *World of Work*, No. 60, Aug. (Geneva).

—. 2008. *World of Work Report 2008: Income Inequalities in the Age of Financial Globalization*, International Institute for Labour Studies (Geneva).

—; FAO; WHO; UNIFEM. 2009. Joint submission to the UNFCCC. Available at: <http://unfccc.int/resource/docs/2009/smsn/igo/041.pdf > [accessed 16 Sep. 2010].

—; Sustainlabour. 2010. *The impact of climate change on employment: management of transitions through social dialogue* (Geneva).

ITF. 2010. *Resolution 1: Responding to Climate Change*, 42nd Congress, 5–12 Aug., Mexico City.' Federation.

ITUC. 2007. "Trade Union Statement to COP13 United Nations Framework Convention on Climate Change", UNFCCC Bali, Indonesia, 2007, Available at: <http://www.ituc-csi.org/IMG/pdf/COP13_Statement.pdf > [accessed 16 Sep. 2010].

—. 2009a. *A Recipe for Hunger, How the World is Failing on Food*, available at: <http://www.ituc-csi.org/IMG/pdf/food_crisis_EN.pdf>.

—. 2009b. "A Just Transition: a fair pathway to protect the climate", available at: <http://cc2010.mx/assets/001/5232.pdf>.

—. 2009c. "Trade unions and climate change, equity, justice and solidarity in the fight against climate change", Trade Union statement to COP15, International Trade Union Confederation, Dec. 2009.

—. 2010. Resolution No. 10: Combating Climate Change through Sustainable Development and Just Transition, 2nd World Congress, International Trade Union Confederation, 21–25 June, Vancouver, Canada.

Kammen D.; Kapadia, K.; Fripp, M. 2004. *Putting renewables to work: How many jobs can the clean energy industry generate?* Energy Resources Group, Goldman School of Public Policy (University of California, Berkeley).

Karamat, J. 2010. *Pakistan's Water World: The Political and Economic Impact of the Recent Floods*, Brookings up front blog. Available at: <http://www.brookings.edu/opinions/2010/0817_pakistan_floods_karamat.aspx > [accessed 16 Sep. 2010].

Kohler, B. 1996. *Sustainable development: a labor view – The real choice is not jobs or environment. It is both or neither.* Presentation at the Persistent Organic Pollutants Conference, held on 5 Dec., Chicago, IL. Available at: <http://www.sdearthtimes.com/et0597/et0597s4.html > [accessed 16 Sep. 2010].

—. 1998. *Just Transition – A labour view of Sustainable Development*, CEP Journal on-line, Summer, Vol. 6, No. 2, available at: <http://oldsite.cep.ca/journal/1998_summer/9808just.html> [accessed 16 Sep. 2010].

Lesotho Meteorological Services. 2007. *Lesotho's National Adaptation Programme of Action (NAPA) on Climate Change*. Available at: <http://unfccc.int/resource/docs/napa/lso01.pdf> [accessed 16 Sep. 2010].

Litman, T. 2009. *Smart transportation economic stimulation: infrastructure investments that support economic development*. Victoria Transport Policy Institute (VTPI). Available at: <http://www.vtpi.org/econ_stim.pdf > [accessed: 16 Sep. 2010].

Meehl, G. A.; Stocker, T. F.; Collins, W.D. et al. 2007. "Global Climate Projections", in *Climate Change 2007: The Physical Science Basis*. (Cambridge, Cambridge University Press), pp. 747–845.

OECD. 2010a. *Greening jobs and skills: The local labour market implications of addressing climate change*, OECD Local Economic and Employment Development (Paris).

—. 2010b. *Interim report of the green growth strategy: implementing our commitment for a sustainable future* (Paris).

Parry, M.L.; Canziani, O.F. ; Palutikof, J.P. et al. 2007. *Technical Summary. Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* , IPCC (Cambridge University Press, Cambridge).

Pollin, R.; Wicks-Lim, J. 2008. *Job Opportunities for the green economy: A state by state picture of occupations that gain from green investments*, Political Economy Research Institute University of Massachusetts (PERI), Amherst, June.

Sanchez Lopez, Ana Belén. 2006. *Empleo en PyME del sector de las energías renovables e industrias auxiliares en España*, Instituto Sindical de Trabajo, Ambiente y Salud (ISTAS), Nov.

Shah, A. 2008. Global Food Crisis 2008 *Global Issues*, available at: <http://www.globalissues.org/article/758/global-food-crisis-2008> [accessed 16 Sep. 2010].

—. 2010. "Poverty Facts and Stats", *Global Issues,* available at: <http://www.globalissues.org/article/26/poverty-facts-and-stats> [accessed 16 Sep. 2010].

Stern, N. 2007. *The Economics of Climate Change: The Stern Review* (Cambridge University Press, Cambridge).

Stevens, C. 2009. *Green Jobs and Women Workers: Employment, Equity, Equality, Draft Report*, Sustainlabour.

Torres, R. 2009. "Income inequalities and the crisis". Presentation made at the ETUI. Available at: <http://www.etui.org/en/Events/Past-events/2009/September-10-11-2009-Brussels-Conference-Beyond-the-crisis-Developing-sustainable-alternatives/Income-inequalities-and-the-crisis> [accessed 16 Sep. 2010].

UNCTAD. 2010. *World Investment Report 2010: Investing in a Low-Carbon Economy* (New York).

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

—. 2009. *Fast Facts: Environment, Energy and UNDP.* Available at: <http://www.undp.org/publications/fast-facts/FF-environment.pdf > [accessed 16 Sep. 2010].

—; WHO. 2009. *Energy Access Situation in Developing Countries* (New York).

UNEP. 2007. "IPCC Report: Millions at risk of hunger and water stress in Asia unless global greenhouse emissions cut", in *ScienceDaily,* 11 Apr., available at: <http://www.sciencedaily.com /releases/2007/04/070410134724.htm> [accessed 16 Sep. 2010].

—; ILO; IOE; ITUC. 2008a. *Green Jobs: Towards decent work in a sustainable, low-carbon world* (Nairobi).

—; —; —; —. 2008b. *Green Jobs: Towards decent work in a sustainable, low-carbon world. Policy messages and main findings for decision makers* (Nairobi).

UNEP; Sustainlabour. 2008. *Climate Change, its Consequences on Employment and Trade Union Action: Training manual for workers and trade unions* (Nairobi).

United Nations. 2010. *The Millennium Development Goals Report 2010* (New York).

Verheecke, L. 2010. Workshop on Climate Change, its impacts on employment and labour markets – Trade Unions and Climate Change, Conference News 1, International Trade Union Confederation (ITUC). Available at: <http://www.ituc-csi.org/IMG/pdf/Conference_News_1.pdf > [accessed 16 Sep. 2010].

WHO. 2009. *Protecting health from climate change: Connecting science, policy and people* (Copenhagen).

—. 2010. *UN-water global annual assessment of sanitation and drinking-water (GLAAS) 2010: Targeting resources for better results* (Geneva).

WWF International. 2008. *Living Planet Report 2008* (Geneva). Available at: <http://www.footprintnetwork.org/en/index.php/GFN/page/living_planet_report/> [accessed 16 Sep. 2010].

Annex I
Climate change and examples of major projected impacts by sector

Positive and/or negative impacts on employment identified

Phenomenon and trend	Examples of major projected impacts by sector		
	Agriculture, forestry and ecosystems	Human health	Human settlements and society
Over most land areas; warmer and fewer cold days and nights; warmer and more frequent hot days and nights	Increased yields in colder environments; decreased yields in warmer environments; increased insect outbreaks	Reduced human mortality due to less exposure to the cold	Reduced energy demand for heating; increased demand for cooling; declining air quality in cities; reduced disruption to transport due to snow and ice; effects on winter tourism
An increase in the frequency of warm spells and heat waves over most land areas	Reduced yields in warmer regions due to heat stress and an increase in the risk of wildfires	Increased risk of heat-related mortality, especially for the elderly, chronically sick, very young and socially isolated	Reduction in the quality of life for people in warm areas without appropriate housing; impacts on elderly, very young and poor
An increase in the frequency of heavy precipitation events over most areas	Damage to crops; soil erosion, inability to cultivate land due to waterlogging of soil	Increased risk of deaths, injuries, infectious, respiratory and skin diseases	Disruption of settlements, commerce, transport and communities due to flooding; pressures on urban and rural infrastructures; loss of property
Areas affected by increases in the frequency of drought	Land degradation; lower yields and/or crop damage and failure; increased livestock deaths; increased risk of wildfire	Increased risk of food and water shortage; increased risk of malnutrition; increased risk of water- and food-borne diseases	Water shortages for settlements, industry and communities; reduced hydropower generation potentials; potentially, population migration
An increase in intense tropical cyclone activity	Damage to crops; windthrow (uprooting) of trees; damage to coral reefs	Increased risk of deaths, injuries, water- and food-borne diseases; post-traumatic stress disorders	Disruption by flood and high winds; withdrawal of risk coverage in vulnerable areas by private insurers; potential for population migrations; loss of property
Increased incidence of extreme high sea level (excludes tsunamis)	Salinization of irrigation water, estuaries and freshwater systems	Increased risk of deaths and injuries by drowning in floods; migration-related health effects	Costs of coastal protection versus costs of land-use relocation; potential for movement of populations and infrastructure

Source: IPCC (2007) and, regarding employment, UNEP and Sustainlabour (2008) – updated by the author for this publication.

International Journal of Labour Research
2010
Vol. 2
Issue 2

Annex II
Examples of adaptation measures and initial identification of their positive and negative impacts

	Negative effects of climate change	Examples of adaptation measures	Employment effects of some adaptation measures
Agriculture, forestry and ecosystems	• Reduced yields in warmer regions due to heat stress	• Increase productivity of paddy farming for new climate conditions	
	• Damage to crops • Soil erosion, inability to cultivate land due to waterlogging of soil	• Expand non-farming economic activities	
		• Farm crops that are able to face a wider variability in weather conditions. A broad range of tolerance will be more important than optimal tolerance to one stress factor	However, it takes 2–3 years before any income/livelihood benefits arise from new trees (fruit/fodder/fuel wood). In addition, the labour required for new crops or species may in fact be less. In these cases, workers need to be rewarded with outside funding in order for schemes to be viable
	• Land degradation	• Use drought-tolerant, low-growing leguminous species useful as fodder and fuel	
	• Increased livestock deaths	• Investigate the use of new forestry species	
	• Damage to coral reefs	• Promote indigenous/local technologies	
	• Salinization of irrigation water, estuaries and freshwater systems	• Establish local tree nurseries, contour planting	
		• Fencing against livestock	Attention should be given to impacts on employment in pastoralist communities
		• Economic diversification	The gradual shift of economic activity from a climate-sensitive agricultural and shrimp/fish culture or to the climate-insensitive industry and service sectors is a viable option to minimize risks, conserve natural resources and shift towards sustainable development. Training and other accompanying measures should be designed to minimize suffering to workers and their families

	Negative effects of climate change	Examples of adaptation measures	Employment effects of some adaptation measures
Human health	• Increased risk of heat-related mortality, especially for the elderly, chronically sick, very young and socially isolated	• Increase capacity for management of climate-related risks	
	• Increased risk of deaths, injuries, infectious, respiratory and skin diseases • Increased risk of food and water shortage • Increased risk of malnutrition	• Adapt health-care and social care infrastructure (hospitals, nursing homes) to be more resilient to the effects of heat, gales and floods	Improvements in health systems can create new and greater employment opportunities. However, for this to be true, certain conditions must be fulfilled: increased training, improved protection of health workers from occupational health and safety risks
	• Increased risk of water- and food-borne diseases • Increased risk of deaths, injuries, post-traumatic stress disorders • Increased risk of migration-related health effects	• Measures against health impacts (any measure that could counter increasing risks of death, injuries and illnesses)	Any measure aimed at improving health conditions of workers will tackle the negative effects of climate change on available labour force and the productivity of workers, thus having a positive impact on employment

Annex II (cont'd)

	Negative effects of climate change	Examples of adaptation measures	Employment effects of some adaptation measures
Human settlements and society	• Reduction in the quality of life for people in warm areas without appropriate housing • Disruption of settlements, commerce, transport and societies due to flooding and water shortages	• Investments in infrastructure, such as coastal defences, flood protection, drainage containment, roads adaptation	In areas such as infrastructure, water management, labour-based processes in public works programmes could create large numbers of jobs
	• Pressures on urban and rural infrastructures	• Make buildings, infrastructure and homes more adaptable to climate change	
	• Impacts on the tourism sector (winter tourism, Caribbean tourism)	• Technology and behavioural changes; modifications in seasonal tourism; economic diversification	Positive/negative: depending on regions, technology and behavioural changes could slow the deteriorating impact of climate change. However, tourism can only be salvaged in the long run by ambitious climate change policies

Annex III
Some effects of mitigation measures on employment

Sector affected	Employment-related mitigation measures	Comments
Energy	• Switch in fossil fuels from coal to gas plants	We should expect losses in the coal sector and some new employment opportunities in the gas sector. The closure of coal centrals will probably also have effects on employment in the coal-mining sector
	• Expand renewable heat and power capacities, such as hydropower, solar, wind, geothermal and agro-energy	While employment is expected to grow in the renewable energy sector, losses in the fossil fuels/electricity sector are to be expected. Substitutability of jobs is still unclear
	• Expand energy audits of industrial and commercial facilities	Employment opportunities are expected to arise from investments in this area
Buildings	• Promote and invest in efficient lighting and day light	Buildings renovation is a labour-intensive source of direct employment. However, the quality of the jobs is weak and the building sector will thus have to make an effort on workers' training and qualification
	• Promote the use of more efficient electrical appliances, and heating and cooling devices	
	• Improve insulation	
Transport	• Encourage shifts from road transport to rail and from private to public transport systems	Rail should benefit from the shift in modes of transport, mainly in freight and passengers. Workers in the road transport sector (which should see its importance reduced) could be retrained to work in rail or other public transport options
	• Further develop agrofuels, above all second-generation ones	While agrofuels are labour-intensive options, labour conditions, as well as overall environmental impacts need to be looked at more carefully. Labour-sound development of second-generation agrofuels could bring jobs to poor agricultural communities
	• Reduce individual transport use	The consequences of this measure will have different impacts depending on how the early industry shifts towards cleaner vehicles, being positive on a "first mover wins" dynamic
Industry	• Implement energy efficiency measures	Some sectors already suffering from outsourcing could be impacted by climate protection measures. However, R&D and a global move towards cleaner production could avert these negative impacts
	• Promote material recycling and substitution	
	• Control non-CO_2 gas emissions	
	• Develop process-specific technologies	

Source: IPCC (2007) and, regarding employment, Sustainlabour (2008) – updated for this publication.

International
Journal
of Labour
Research

2010
Vol. 2
Issue 2

Workers' rights in climate change policies

The case of adaptation programmes in Small Island Developing States

Nazmul Huq

Jean Hugé

Human Ecology Department
Vrije Universiteit Brussel
Brussels, Belgium

The size and insularity of Small Island Developing States (SIDS) are characteristics often associated with vulnerability. SIDS were identified as a special group at the 1992 United Nations Conference on Environment and Development (FAO, 2010). They are especially vulnerable to climate change, due to their geographical location, their limited resource base and the strong influence of the oceanic circulation system. If no country is immune from the adverse impacts of climate change (World Bank, 2009a), the SIDS are more vulnerable as their climate is influenced by large ocean–atmosphere interactions such as trade winds, El Niño and the monsoons (UNFCCC, 2007). These climate characteristics, combined with their particular socio-economic situation, make SIDS – among which there are 12 Least Developed Countries (LDCs) – some of the most vulnerable countries to the effects of climate change (UNFCCC, 2007). The rise in sea level constitutes a major threat to the countries' resource base and especially their agricultural sector, on which a large part of their populations depend. Within the United Nations Framework Convention on Climate Change (UNFCCC), funds have been set up to support climate change adaptation efforts. The Least Developed Countries Fund has been used to support the preparation of National Adaptation Programmes of Action (NAPAs) by LDCs. NAPA preparation is a prerequisite for accessing funding from the UNFCCC's financial mechanism. NAPAs identify, communicate and respond to the most urgent adaptation needs. They thus aim to develop short- and mid-term adaptation strategies consisting of a series of tangible projects.

This paper examines how the rights of the agricultural workforce are taken into account in the NAPAs of three climate-vulnerable SIDS located in the Asia-Pacific region. The States selected are Kiribati, the Maldives and Vanuatu. The paper seeks to establish how the NAPAs take rights of participation into account, as well as the extent to which the documents consider agricultural livelihoods and their protection, and alternative livelihoods in the face of climate change. The focus is on agriculture, as the impact of climate change on this sector is potentially devastating, as well as on the workers and families who depend on it. The paper concludes with recommendations on enhancing the quality of the NAPA process and on the role trade unions can play in advocating a rights-based approach to climate change policies.

Climate change and rights

Although climate change is already understood to be both an environmental and a development problem, and increasingly also an economic one, its social and human rights dimension has been given very little attention so far (Aminzadeh, 2007). Yet climate change can – and should – be regarded as a human rights issue. It is already undermining the application of a broad range of internationally protected human rights: the right to health (and even the right to life); the

rights to food, water, shelter and property; rights associated with livelihood and culture, with migration and resettlement, and with personal security in the event of conflict (ICHRP, 2008). Climate change is seen as one of the biggest threats to the achievement of the Millennium Development Goals (MDGs) by 2015 (Klein and Persson, 2008; Oxfam, 2007), objectives that are considered to be the minimum set of development standards, or, to put it bluntly, the starting point of equitable development for communities whose rights are poorly protected. Development and human rights should be two reinforcing policy goals, and indeed both can only exist together. Decent living standards, food, shelter, livelihoods and security are universally regarded as the preconditions of sustainable human development (Sperling, 2003). A continued and sustainable development process logically protects and enhances human rights. Although adaptation to climate change is considered to be an important part of the development cycle continuum (Klein and Persson, 2008), stand-alone adaptation initiatives still dominate adaptation action on the ground (McGray, Hammill and Bradley, 2007). Regardless of the types of adaptation action (integrated or isolated), human rights should be key in their design and implementation, so as to avoid socially unacceptable "mal-adaptation" (Doussa, 2008).

Table 1. Relation between human rights and climate change

Human rights norms in international law	Impacts of climate change on human rights and development
The right to life and security "Everyone has the right to life, liberty and security of person." (Universal Declaration of Human Rights, Article 3)	More deaths, disease and injury are projected, due to an increasing number of natural disasters. Up to 20 per cent of the world's population live in low-lying areas that are likely to be affected by increased flood hazard by the 2080s.
The right to food "The States Parties to the present Covenant, recognizing the fundamental right of everyone to be free from hunger…" (International Covenant on Economic, Social and Cultural Rights, Article 11)	Natural disasters are affecting food security, leading to increased malnutrition and famine. Reduction of crop yields will put 50 million people at risk of hunger by 2020 and an additional 132 million by 2050.
The right to subsistence "Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing…" (Universal Declaration of Human Rights, Article 25) "In no case may a people be deprived of its own means of subsistence." (International Covenant on Civil and Political Rights, Article 1.2 and International Covenant on Economic, Social and Cultural Rights, Article 1.2)	Around 3 billion people will suffer from severe water stress by 2020, which will further cause malnutrition and diseases. It is estimated that by 2050, 15–20 per cent of plant and animal species assessed so far are likely to be at increased risk of extinction if average global temperatures rise more than 1.5–2.5°C. This includes impacts on the supply of animal proteins for 1 billion people.
The right to health "The States Parties to the present Covenant recognize the right of everyone to the enjoyment of the highest attainable standard of physical and mental health." (International Covenant on Economic, Social and Cultural Rights, Article 12)	Over 150,000 people are currently estimated to die each year from diarrhoea, malaria and malnutrition caused by climate change. Child malnutrition will increase, damaging growth and development prospects for millions of children. Children and pregnant women are particularly susceptible to vector and water-borne diseases. Water stress and warmer conditions will encourage diseases.

Sources: Adapted from DFID (2002); Oxfam (2008); UNFCCC (2008).

Table 1 lists some of the links between climate change, human rights and development, based on international human rights norms.

Climate change has the potential to exacerbate existing threats to human rights, as is suggested in table 1. Climate change effects on the development processes deny the essential rights of human beings as endorsed by different internationally agreed conventions, such as the Universal Declaration of Human Rights, the International Covenant on Civil and Political Rights, and the International Covenant on Economic, Social and Cultural Rights. The rights of marginalized groups such as subsistence farmers, disabled people, women and children are especially at risk.

We call for a human rights approach to climate change policy, together with international organizations (Oxfam, 2008) and scholars such as Dazé, Ambrose and Ehrhart (2009). A human rights approach provides a conceptual framework for analysing and improving climate change policies at various decision-making levels. The International Labour Organization has 188 Conventions on respect for human rights at work. All the signatory countries are supposed to respect those enshrined rights. In this paper, we assess how much account is taken of one particular type of rights in climate change policy processes (the NAPAs). These are the rights of agricultural workers. Our approach is based on the premise that policy is only truly responsive to societal problems when effective consultation with vulnerable stakeholders has taken place, and when their rights have been taken into account. The NAPA process puts special emphasis on consultation and participation in the decision-making process. We go on to describe how this was done in the SIDS under consideration in this paper. The focus is on the "rights to participation", the "rights to (alternative) livelihoods" and the "rights to association". Some ILO Conventions, such as the Right of Association (Agriculture) Convention, 1921 (No. 11), the Workers' Representatives Convention, 1971 (No. 135), the Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87) and the Right to Organise and Collective Bargaining Convention, 1949 (No. 98), are useful benchmarks when assessing agricultural workers' rights. Regardless of whether a country has or has not ratified all the abovementioned Conventions, the question arises as to whether its adaptation policy/programme responds to the dangerous impacts of climate change on its most critical agricultural resources. Unless consideration of the rights of the vulnerable communities is ensured, climate change policy may take the form of "mal-development" as described by Doussa (2008) and Klein and Persson (2008), which may then even intensify climate vulnerabilities.

Small Island Developing States and climate change

The group of Small Island Developing States (SIDS) is composed of 51 States and territories that are highly vulnerable to climate change and are

already feeling its effects (UNFCCC, 2008). The projected impacts of climate change cut across all economic sectors. Moreover, the vulnerability and the low adaptive capacity of SIDS is inextricably linked to the socio-cultural and economic context of these island States (ibid.). The Fourth Assessment Report (FAR) of the Intergovernmental Panel on Climate Change (IPCC) explores the key sectoral vulnerabilities and impacts. The report has firmly identified several impacts of climate change with "very high" and "high" confidence.[1] It states that:

- SIDS have special characteristics which make them especially vulnerable to the effects of climate change, sea level rise and extreme events (very high confidence).
- Sea level rise is likely to exacerbate inundation, storm surge, erosion and other coastal hazards, thus threatening the vital infrastructure that supports the socio-economic well-being of island communities (very high confidence).
- There is strong evidence that under most climate change scenarios, water resources in small islands are likely to be seriously compromised (very high confidence).
- Climate change is likely to heavily impact coral reefs, fisheries and other marine-based resources (high confidence).
- On some islands, especially those at higher latitudes, warming has already led to the replacement of some local species (high confidence).
- It is very likely that subsistence and commercial agriculture on small islands will be adversely affected by climate change (high confidence). (IPCC, 2007)

Different studies also confirm the major sectoral vulnerabilities of SIDS. Water, agriculture and food security, health, terrestrial ecosystems and coastal zones are identified as the most vulnerable sectors (IPCC, 2007; UNFCCC, 2005 and 2008). It is very likely that agricultural production will face severe impacts such as short-term crop failure and long-term production decline (IFPRI, 2009; Stern, 2006). UNFCCC (2008) again reports that the agricultural and food security impacts will be further aggravated by other climate change impacts. Agricultural land and thus food security are affected by sea level rise, inundation, increased soil salinity, seawater intrusion into freshwater lenses,[2] and decline in fresh water supply. Furthermore, the fisheries sector will face the consequences of sea surface warming, sea level rising and

1. Confidence expresses the likelihood of occurrence. For very high confidence it is at least nine out of ten chances and for high confidence it is at least eight out of ten chances (for more information: http://www.ipcc.ch/publications_and_data/ar4/wg1/en/tssts-2.html)
2. Freshwater lens: the layer of fresh water floating above saline water beneath an island – Ed.

tropical cyclones. According to IFPRI (2009) and FAO (2004), thin markets, a lack of diversification in production, a high degree of economic openness, a rapidly growing population, susceptibility to natural disasters, a lack of economies of scale, remoteness, high transportation and communication costs and costly public administration further increase the SIDS' vulnerability to agricultural and food insecurity. In this context, it is clear that human rights issues and climate change issues do overlap, both in the analysis and in the required policy responses. Indeed, as the SIDS' economies are mostly based on subsistence agriculture and on fisheries (FAO, 2004), the workforce dependent on those sectors will be severely hit by the repercussions of climate change.

However, despite the high level of physical climate vulnerabilities, limited information is available on the social and economic dimension of climate change for SIDS. The IPCC assessment reports (UNFCCC, 2008), technical reports, the Stern Review of the Economics of Climate Change (Stern, 2006) and other influential publications spell out the physical vulnerabilities of SIDS, but essential social and economic aspects, such as the number of people affected, effects on employment, and the loss of agricultural production and livelihoods, are insufficiently documented at this point, making it difficult for decision-makers to translate the physical predictions into concrete policy responses. Combined with the lack of easily available statistics, all this means that drawing up a comprehensive vulnerability analysis of climate change impacts on SIDS is a real challenge.

An introduction to National Adaptation Programmes of Action (NAPAs)

The emergence of the NAPA

Even if no country is immune from the impacts of climate change, the Least Developed Countries (LDCs) will and do suffer most because of their low level of adaptive capacity. This realization requires an urgent response. Recognizing this, the UNFCCC has been providing support to LDCs to adapt to the impact of changing climatic conditions. The National Adaptation Programme of Action is meant to be the configuration process for identifying immediate adaptation needs and actions. According to the UNFCCC, the NAPA is to provide a process for LDCs to identify priority activities that respond to urgent and immediate needs with regard to adaptation to climate change – those needs for which further delay would increase vulnerability and/or costs at a later stage (UNFCCC, 2009b). The origins of the NAPA can be traced back to the Seventh Conference of the Parties to the UNFCCC, which was held in Marrakesh, Morocco in 2001. The Marrakesh Accords that emerged from this process included three funds relevant to

adaptation. The Least Developed Countries Fund (LDCF) is one of them. It has been set up to support the world's poorest and most vulnerable nations in adapting to climate change impacts (Abdullah et al., 2009). The chronological evolution of the NAPA is set out below (UNFCCC, 2009a):

- Article 4.9 of the United Nations Framework Convention on Climate Change (UNFCCC) recognizes the specific needs and special situations of the LDCs.
- Decision 5/CP.7 of the Seventh Conference of the Parties (COP) also acknowledged the specific situations of LDCs, in that they do not have the means to deal with problems associated with adaptation to climate change, and established an LDC work programme including NAPAs as well as other supporting activities.
- Decision 28/CP.7 set the guidelines for NAPAs.
- Decision 29/CP.7 set up an LDC Expert Group (LEG) to provide guidance and advice on the preparation and implementation strategy for NAPAs.

The UNFCCC puts the emphasis on using existing information for preparing NAPAs, which are to be action-oriented, country-driven, flexible and based on national circumstances (UNFCCC, 2009c).

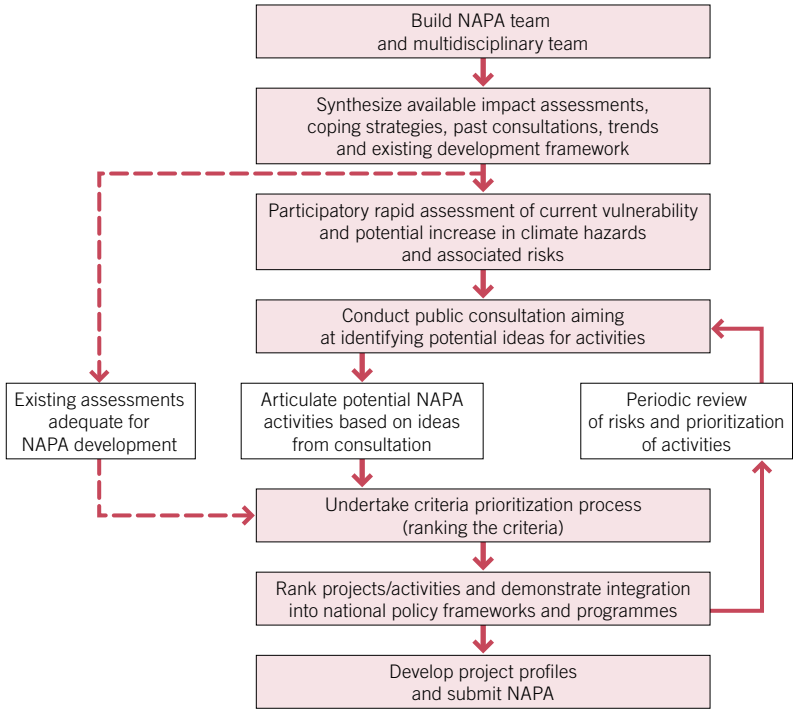
The NAPA process

The preparation of a NAPA is a systematic process. The UNFCCC has designed stepwise guidance to ensure the NAPAs are democratic, inclusive, participatory, action-oriented, country-driven and, of course, responsive to climate change adaptation. The flowchart in figure 1 outlines the main steps in the development of a NAPA, as given in the Least Developed Countries Expert Group (LEG) guidelines.

The following steps are to be followed in the NAPA preparation process:

- *Establishment of the NAPA team and multidisciplinary teams*: The composition of the team must balance inclusiveness with efficiency, and include the most relevant key players in order to capture the country's immediate and pressing climate change issues. The teams should be cohesive and enduring through the NAPA preparation and implementation process in order to ensure institutional memory and continuity, notwithstanding the common problem of high staff turnover in government agencies of LDCs.
- *Synthesis of available information*: The second step guides the collection of available information on adverse effects of climate change and coping strategies, taking into consideration national development plans, strategies and programmes.

Figure 1. Flowchart of the NAPA process



Source: Reproduced from UNFCCC (2009c).

- *Rapid participatory vulnerability assessment*: This stage involves an integrated assessment of current vulnerability risks. It focuses on identifying climate-related vulnerable livelihoods. Regional workshops with different stakeholders provide a detailed insight into climate vulnerability, and this is one of the imperatives at this stage.
- *Consult stakeholders and the public*: LDCs have become increasingly experienced with processes that integrate the views of all interested parties or stakeholders, as well as the general public, into project decision-making. The diversity of stakeholders, including government ministries, academic and research institutions, NGOs, civil society organizations, community-based organizations, political and traditional leaders, and the private sector, must be respected in the NAPA process.
- *Identify potential NAPA activities:* Identification of relevant adaptation options, including capacity-building, policy reform, integration into sectoral policies and project-level activities.
- *Prioritize criteria and screen activities:* Current NAPA guidelines already provide some guiding principles for selection criteria, including the degree of poverty reduction, the extent of adverse effects of climatic

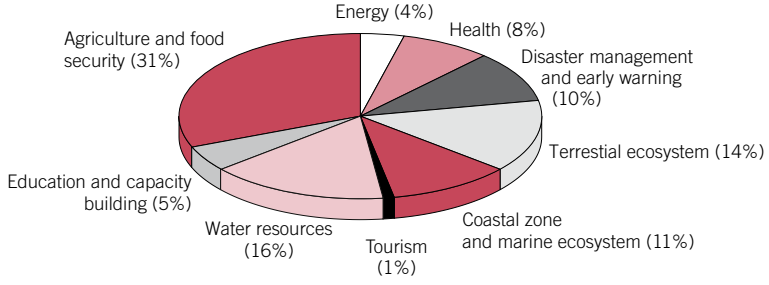
changes, cost-effectiveness and synergies with Multilateral Environment Agreements (MEAs).

- *Rank activities*: With the list of adaptation options prepared and criteria selected and weighted, there are several tools that can be used to prioritize and screen the NAPA activities. Cost Benefit Analysis (CBA) and Cost Effectiveness Analysis (CEA) are two of the most common tools used for this purpose.
- *Development of NAPA project profiles and submission of NAPA:* This is the final stage of NAPA preparation. After completion of the project profiles, the NAPA is submitted to UNFCCC for consideration.

NAPA experience

To date, 42 NAPAs have been prepared and submitted to the UNFCCC secretariat and the remaining six are expected to be completed by 2010 (UNFCCC, 2009b). A total of 433 projects have been identified by NAPA so far. Eighty per cent of all projects fall into four major categories (UNFCCC, 2008, 2009b and 2009c). One hundred and thirty-eight projects concern agriculture and food security, followed by 78 water resources projects, 62 terrestrial ecosystem projects and 50 marine and coastal management projects. In addition, 45 projects have been identified for disaster management and early warning systems. The estimated total costs for the projects are US$352 million for agriculture and food security, US$837 million for water resources, US$146 million for coastal zones and marine ecosystems and US$133 million for terrestrial ecosystems (UNFCCC, 2009b). The total cost of implementing all 433 projects has been estimated at US$2 billion at least. This is the amount required to implement the urgent and immediately needed measures to address the challenges of climate change in LDCs. Figure 2 shows the sectoral distribution of proposed NAPA projects.

Figure 2. Sectoral distribution of NAPA projects



Source: UNFCCC (2009b).

As of 15 September 2009, only 32 Project Information Forms (PIFs), covering 75 projects out of the 433, had been submitted to the Global Environment Facility's (GEF) Least Developed Countries Fund (LDCF) for approval and funding. The overall budget of the 32 submitted PIFs is US$286 million, while the present level of funds available in LDCF is US$176.5 million. Thus, while urgent adaptation needs are estimated at US$2 billion, less than US$200 million have been mobilized so far (UNFCCC, 2009a, 2009b and 2009d). There are other possible options for funding adaptation action such as the Special Climate Change Fund (SCCF), the Adaptation Fund (AF) and bilateral and multilateral partnerships. However, the LDCF is the only fund specially developed for NAPA project implementation. Among the proposed projects, some of the most common are related to the diversification of crop production, water harvesting, construction and rehabilitation of reservoirs and dams, soil conservation, land use planning, food preservation and processing through improvement of small scale industries, food/cereal banks etc. (UNFCCC, 2009a, 2009b, 2009c and 2009d).

Materials and methods

This paper will assess the consideration of the rights of the agricultural labour force in the NAPAs of three selected SIDS. The analysis is qualitative in nature and is based on a document analysis of available policy documents and scientific literature. However, there is a paucity of literature addressing the impact of climate change on workers' rights (Doussa, 2008), even though some authors, such as Sinden (2008), frame climate change as a human rights issue. The paper thus aims to contribute to filling a current knowledge gap.

This paper focuses on one particular type of human rights: those of agricultural workers. Four aspects of rights have been taken into account:

- *Rights of participation*: According to the NAPA preparation guidelines, active stakeholder participation is key to sound decision-making (UNFCCC, 2009d). The level of participation by the agricultural workforce in preparing the NAPA is assessed.
- *Rights to livelihood support*: As mentioned, the agricultural workers of SIDS will face livelihood difficulties due to climate change. Hence, the level of support to the vulnerable agrarian workforce is assessed. This support can entail training, credits, relocation, etc.
- *Rights to alternative livelihoods*: Climate change causes negative impacts on employment, especially in agrarian societies. Major climate change-induced extreme weather events carry with them the potential to cause damage and disrupt transportation lines and industrial infrastructure. This will not only impact on the workers' ability to be present at work, but also lead to the closing down of industrial installations that find themselves in the path

of the major weather disasters (UNEP, 2008). Hence, it is most vital to provide the affected communities with the means for alternative livelihood support.

- *Rights of association*: These allow the affected communities to be united and be actively involved in a sustainable transition to a climate-resilient society, by allowing them to play a strong role in decision-making.

Three SIDS in the Asia-Pacific Region were selected for this assessment, namely Kiribati, the Maldives and Vanuatu. They were chosen for the similarity of their socio-economic context, based on a series of criteria:

1. Environmental vulnerability, as defined by SOPAC and UNEP (2010): "the tendency of the environment to be damaged"
2. The Human Development Index (UNDP, 2009)
3. Gross Domestic Product (GDP) (US$ billions)
4. Share of agriculture in total employment (per cent)
5. Share of agriculture in GDP (per cent).

Table 2 provides an overview of the selection criteria values for the three countries.

As the NAPA is supposed to be a guiding climate change policy document in LDCs, we assessed whether the NAPA was supportive/coherent with other national strategies such as Poverty Reduction Strategy Papers (PRSP), National Development Strategies (NDS) and Decent Country Work Programmes (DWCP). Figure 3 provides an outline of the analysis framework.

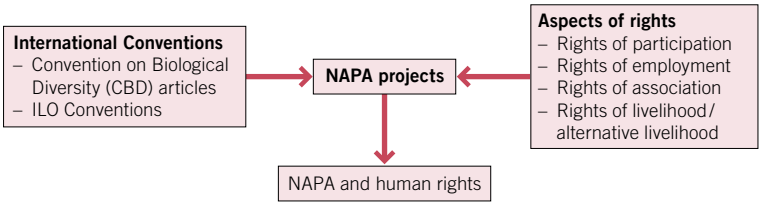
Table 2. Values of the selection criteria for the three selected SIDS

SIDS	Vulnerability index	HDI	Area (km²)	Population (million)	GDP (US$ bn)	Agriculture workforce as %	Share of agriculture in GDP (%)	Unemployment rate (%)
Kiribati	extremely	NA	726	0.1	0.1	71	14	2.0
Maldivas	extremely	0.771	298	0.3	1.1	25	14	14.4
Vanuatu	vulnerable	0.693	12,189	0.2	0.5	61	15	1.7

HDI: Human Development Index of the UNDP.

Sources: CIA (2010); SOPAC and UNEP (2010); UNDESA (2003); UNDP (2009).

Figure 3. Outline of the analysis framework



Results

Assessment of agricultural workers' rights in the Kiribati NAPA

Agriculture and climate change in Kiribati

Kiribati as a nation is threatened by climate change. The people and their vital natural resources, such as groundwater and food crops, and even infrastructure and their livelihoods are at risk (START, 2006). The livelihoods of the majority are at the subsistence level and depend directly on natural resources. They are based on indigenous tree crops: coconuts, pandanus, bwabwai (giant taro), breadfruit and banana (MoELAD, 2007). Climate change, through its impacts on sea level rise leading to coastal erosion, and more frequent and damaging storm surges at the edges of the land, is expected to lead to a further reduction in agricultural productivity, such as that of pandanus varieties and coconut (ALM, 2010). Agricultural systems are seriously affected by drought conditions, seawater intrusion into land, and increased air temperature. Coconut trees and pandanus trees, which are most resilient to dry conditions, wither away during prolonged droughts (MoELAD, 2007).

Agricultural workers' rights and the Kiribati NAPA

The Kiribati NAPA consists of nine projects. Although the country's economy is based on its natural resources and on subsistence agriculture, this sector receives very little attention in the NAPA list of priority projects (MoELAD, 2007). While climate change-induced vulnerabilities such as the decline of agricultural production and the depletion of natural resources are identified, there is surprisingly no hint of any action aimed at protecting agricultural livelihoods from the adverse impacts of climate change. Not taking those vulnerabilities into account amounts to an infringement of the rights of the workforce related to those sectors as well as their dependent communities. This shortcoming in a strategic policy document may actually strengthen future climate vulnerabilities.

In the process of developing the NAPA, the committee responsible organized three consultation meetings, which appear not to have included the most vulnerable people. All the meetings were conducted with local elites and local government officials who compiled a first list of 50 projects. The consultative process sidelined the marginalized opinions about the actual needs in terms of adaptation priorities. From the very beginning of the NAPA process, grassroots organizations and local communities were deprived of their rights to participation. This top-down approach is contrary to the process promoted by the UNFCCC.

Within the final list of nine priority projects, the project on "agriculture food crops development" is ranked sixth. The main project aspects are the development of a gene bank, the promotion of agricultural products and cash crops and the diversification of agriculture. The project's sub-components indicate a lack of consideration of the rights of the agricultural workers. If they are not provided with the necessary support and if their efficiency is not developed in the face of a changing climate, the very goals of agricultural diversification and promotion could be jeopardized. Kiribati is by nature an import-dependent country and its domestic market is very small (START, 2006). As it is a net food-importing country, one of the potential adaptation measures could be the enhancement of local production as well as the expansion of local markets to support this. The Kiribati NAPA is supposed to supplement the 2004–07 national development strategy (NDS) (MoELAD, 2007). In reality, both documents are running in parallel. In the NDS, the enhancement of critical livelihood capitals and sustainable growth are considered to be paramount objectives, whereas in the NAPA those objectives are not considered. The lack of policy coherence in the field of livelihood support threatens the consideration of workers' rights in Kiribati's policies. This is a major flaw in the consideration of climate change risks.

Assessment of agricultural workers' rights in the Maldives NAPA

Agriculture and climate change in the Maldives

The Maldives is considered to be one of the countries most vulnerable to climate change. A number of scientific and technical assessments undertaken since 1987 have reiterated the need for long-term adaptation to climate change (MoEEW, 2007). For the Maldives, adaptation is a multi-dimensional goal that aims to increase the resilience of the vulnerable systems to climate hazards and risks, so as to achieve sustainable development outcomes. Agriculture accounts for just 2.6 per cent of Gross Domestic Product (GDP) (MPND, 2006), so the country is extremely dependent on imports for its food security (MoEEW, 2007). This has led to instances of food crisis in the recent past (MPND, 2004).

Agricultural workers' rights in the Maldives NAPA

Despite its importance, the agricultural sector is less of a priority for adaptation than tourism, fishing and health in the Maldives NAPA (MPND, 2006). It is indeed a matter of concern that neither agriculture nor the labour force concerned receive adequate attention in the document. Eight critical sectors

requiring immediate adaptation action have been identified. The agricultural sector was ranked fifth as a result of public consultation. However, only three consultation meetings were conducted: one at national level and two at the regional level (MoEEW, 2007). Three consultation meetings can hardly form the basis upon which to build the document that will be guiding adaptation action for the coming years. Such a limited participatory exercise cannot provide detailed insights into the vulnerabilities of different sectors and societal groups.

Under the eight identified critical sectors that need to be "climate-adapted" urgently, there are 51 strategic plans. Of these, only nine are dedicated to the agricultural sector, but there are no provisions on better livelihoods for the agricultural labour force, support, or alternative livelihood options. All nine consist of highly ambitious agricultural development plans, which depend on the skills of the agricultural labour force. Ironically, skills development for agricultural workers is absent from the priority list.

Furthermore, when the 51 strategies are narrowed down to 30, only one agriculture-related plan remains. The plan entitled "Introduce new technologies to increase local food production" is the only nod towards agriculture in the whole list. Agricultural development and enhancement of skills, efficiency, and the training needs of the agricultural workers are not considered. This negligence may provoke further vulnerabilities within the agrarian communities. Sometimes, this phenomenon is identified as "adaptation risk" in the literature: indeed, imprudent adaptation action may increase the vulnerabilities of the people at risk (Doussa, 2008; UNEP et al., 2008). In conclusion, the Maldives NAPA does not include agrarian communities in the decision-making process. Despite their importance, their rights are insufficiently taken into account.

Assessment of agricultural workers' rights in the Vanuatu NAPA

Agriculture and climate change

Vanuatu is one of the States most vulnerable to the risks of climate change, climate variability and sea level rise (NACCC, 2007), coupled with other natural disasters such as drought, earthquakes, landslides and coastal flooding. The livelihoods and economy of Vanuatu are greatly shaped and driven by climate-sensitive sectors. The effects of climate and sea level change are already very real and pose a tangible threat to the future socio-economic well-being of the country (ibid.). According to the agricultural census of 2006, 80 per cent of the total population of 209,920 live in rural areas. In Vanuatu, agriculture is entirely rain-fed and is susceptible to changes in rainfall distribution. Intense and prolonged rainfall could damage seedlings, result in greater run-off and soil erosion and encourage conditions that promote pests and diseases. Drought combined with higher temperatures could cause added thermal stress in plants.

Projected increases in sea surface temperatures combined with increased ocean acidification (from increased CO_2 concentrations in the atmosphere) are likely to put pressure on the marine food chain. This in turn potentially threatens aspects of marine food supply and associated livelihoods (ALM, 2010). The economy of the country comprises a large smallholder subsistence agricultural sector (14.9 per cent of GDP) and a small monetized sector. Small-scale agriculture provides income for over 65 per cent of the population while fishing, offshore financial services and tourism also contribute to government revenues. The livelihoods of rural people are dependent upon subsistence agriculture characterized by a very small domestic market. Fisheries, forestry and tourism also make an important contribution to the national economy.

Workers' rights and the Vanuatu NAPA

The 2007 Vanuatu NAPA is socially strong. It considers the relocation of vulnerable communities and proposes adaptation strategies tailored to provincial needs. The major focus is on population resettlement, enhancing livelihood capital, agricultural development, hazard mapping, developing micro-level adaptation plans, etc. Stakeholder consultations were conducted in each of the provinces and priority strategies were listed. This process resulted in 19 adaptation strategies, of which ten were directly connected with agricultural and livelihood support. These included the relocation of vulnerable settlements and infrastructure, alternative fisheries, livestock and agriculture practices. This is expected to be achieved through capacity building, awareness raising, technology transfer and promotion of traditional knowledge (NACCC, 2007). Finally, the Vanuatu NAPA shows an agrarian focus in the 11 selected priority strategies. Indeed, these strategies all include the impacts on livelihoods, which are considered to be key vulnerability criteria. At the top of the list are strategies aimed at agricultural development, with the options of alternative agriculture, land-use management and relocation. All 11 projects grant the highest priority to agricultural and livelihood promotion.

A critical analysis of the Vanuatu NAPA shows some positive components in terms of ensuring the rights of the workforce involved in agriculture. As most of the projects are directly related to agricultural production, promotion and protection, implicitly the agricultural workforce is also part of the projects. This reality is reflected in different initiatives throughout the NAPA process. They include the preservation and processing of agricultural products for better livelihoods, the modernization of equipment, the use of traditional knowledge in agriculture, the promotion of rainwater harvesting etc. These are encouraging signs that the rights of the agriculture-based community are being acknowledged. But rights to alternative livelihood supports are sidelined in the process and the term is not even included in the document. Furthermore, the process of participation is not so satisfactory,

as only one consultation meeting has been conducted in each province. This is not the most ambitious interpretation of participation. Moreover, the relocation aspect is not well elaborated, nor is it placed in a holistic perspective centred on human rights, despite the fact that Vanuatu has already relocated communities due to climate change impacts (NACCC, 2007). In the field of policy coherence, Vanuatu is the only Pacific island country to have completed both a National Adaptation Programme of Action (NAPA) and a National Action Plan (NAP) for disaster risk reduction. Furthermore, the government is committed to following through on the Hyogo Framework to integrate the management of climate change adaptation and disaster risk reduction. Additionally, there is a commitment to merge the National Advisory Committee on Climate Change and the National Disaster Management Committee (ALM, 2010). In conclusion, the Vanuatu NAPA can be considered as a good start on socially robust adaptation action, but as far as rights are concerned, some fundamental issues such as participation and alternative livelihood support are still receiving insufficient consideration.

NAPAs and policy coherence

In order to ensure sound adaptation policies, major policy documents and strategies should be coherent and adequate synergies should be strengthened. However, Eriksen et al. (2007) and Prowse, Grist and Sourang (2009)

Table 3. Comparative overview of policy coherence with regard to climate change policy in Kiribati, the Maldives and Vanuatu

SIDS	Criteria	PRSP/National Development Plan	NAPA	DWCP
Kiribati	Poverty–climate nexus	Identified	Identified	Not mentioned
	Identification of vulnerable communities and sectors	Identified	Well identified	Not mentioned
	Impacts on employment	Not mentioned	Not mentioned	Not mentioned
	Response to climate change	Mentioned	Adaptation project Identified	Not mentioned
Maldives	Poverty–climate nexus	Not well elaborated	Only mentioned	N/A
	Identification of vulnerable communities and sectors	Only mentioned	Identified	N/A
	Impacts on employment	Not mentioned	Not identified	N/A
	Response to climate change	Mentioned but not well defined	Some adaptation projects identified	N/A
Vanuatu	Poverty–climate nexus	N/A	Identified	Not mentioned
	Identification of vulnerable communities and sectors	N/A	Identified	Not mentioned
	Impacts on employment	N/A	Not mentioned	Not mentioned
	Response to climate change	N/A	Some adaptation projects identified	Not mentioned

Sources: Government of Maldives (2008); ILO (2009 and 2010); MoEEW (2007).

state that policy documents such as a country's NAPA, its Poverty Reduction Strategy Paper (PRSP) and other national development plans rarely converge towards a single goal. Rather, they radiate in different directions. Not only the LDCs themselves, but also coordinating bodies such as UNFCCC, as well as other development stakeholders, should pay special attention to this issue. Table 3 provides a comparative qualitative overview of policy coherence in the three SIDS analysed. The qualitatively analysed documents were the National Adaptation Programme of Action (NAPA), the Poverty Reduction Strategy Paper (PRSP) and the Decent Work Country Programme (DWCP), when available.

Table 3 reveals some facts about the policy divergence on climate change issues. Most of the national development plans identified climate change as an issue of lesser importance. The lack of synergies and the juxtaposition of different views on the same problems in one country create inconstancy in the identification and prioritization of climate change-related issues, and hence decrease policy efficiency.

Discussion

Climate change, rights and NAPAs

The above brief analysis of three SIDS' NAPAs reveals a key fact: although a NAPA has been developed for prioritizing adaptation action, the preparation process shows important flaws. Livelihood development is rarely considered in these documents. Besides, vulnerability and the adverse impacts that would be felt by the huge labour force involved in the agricultural sector are not adequately considered. The countries drafting their NAPA, as well as the UNFCCC Secretariat, should pay more attention to the issue of rights in NAPAs, as climate change will impact on the rights of the most vulnerable – often agricultural – communities. Rights regarding livelihood protection, and support for the development of alternative livelihoods, are key elements of a sound climate change adaptation policy. A correct appreciation of these rights is possible only when the rights to participation and association are respected. This is the only way to ensure a needs-based and tailored policy response that adequately considers a key aspect of the social dimension of sustainable development, namely the people's human rights. The LDCs' economies are based on agriculture. Negative climate change-related impacts on agriculturally based economies will bring untold livelihood collapse for the workforce related to agriculture (Stern, 2006). This fact further underlines the necessity of involving and helping agricultural communities as regards adaptation policies such as NAPAs. Another flaw in the NAPAs analysed is the lack of holistic perspective. For instance, retaining agricultural biodiversity is another important factor in enhancing resilience (World

Bank, 2009a). But the paradox is that, out of 138 NAPA projects that come under the heading of "agriculture and food security", very few take livelihood protection for agricultural workers and the improvement of agro-biodiversity into account. Furthermore, the NAPAs studied contain very few indications of how to enhance the coping capacity of vulnerable communities. How are they going to adapt to changing conditions? What are the alternative livelihood solutions available to them? It is time to revisit the NAPA process, as so far the rights of the agricultural workforce have not been sufficiently taken into account.

As mentioned, climate change is an issue that can lead to the denial of basic human rights. The negative aspects of climate change prevent people – especially the poor and vulnerable communities – from claiming such entitlements as the rights to life, to a decent livelihood, to a fair wage, to education etc. Consequently, governments and international bodies have a moral and ethical obligation to ensure better protection and promotion of these rights. This entails fostering rights-based approaches to adapting to climate change. The general commitment to reconcile development and environmental considerations has been reiterated in several important international forums such as the 1992 Earth Summit and the World Summit for Sustainable Development in 2002, and more recently, in the Millennium Development Goals. Unfortunately, this commitment has been insufficiently reflected in the NAPA documents analysed.

What about mitigation? The role of the agricultural workforce in Nationally Appropriate Mitigation Action (NAMA)

While adaptation is accepted as the most urgent need for LDCs, every country should also contribute to a reduction in greenhouse gas emissions and as such, achieve its part of the required global mitigation effort. Alongside adaptation to climate change, LDCs should also focus on the role of (agricultural) workers in Nationally Appropriate Mitigation Action (NAMA). The term recognizes that different countries may take different nationally appropriate mitigation actions on the basis of equity and in accordance with common but differentiated responsibilities and respective capabilities. The term was first quoted in the 2007 Bali Action Plan, but is also part of the 2009 Copenhagen Agreement (UNDP, 2008b). It has different meanings and entails different actions for developed and developing countries respectively. The UNFCCC's Article 4.7 states that "economic and social development and poverty eradication are the first and overriding priorities of the developing country Parties". The clarification of the related articles demystifies NAMA in the context of developing countries. In developing NAMA, a number of criteria should be respected. According to Bratasida (2008), NAMA should:

- be in line with decentralization;
- ensure environmental sustainability and at the same time be pro-growth, pro-poor and pro-employment;
- focus on the development of renewable energy, based on the abundance of the resources available; and
- be based on collaboration among all stakeholders.

Those guidelines point to some tasks that can be taken up by trade unions. In the context of NAMA, trade unions can play a vital advocacy role. By creating collective negotiating power, they can make the voice of the workers heard – especially agricultural workers in LDCs – and hence contribute to a better NAMA design, in which human rights (and especially workers' rights) should be adequately taken into account.

Conclusion

Climate change is the biggest threat to sustainable development. Human development is profoundly threatened by the adverse impacts that climate change will cause. Small Island Developing States are some of the most vulnerable Least Developed Countries, which need to develop tailored adaptation responses to cope with climate change. Through an analysis of National Adaptation Programmes of Action (NAPAs) of three Asian Pacific SIDS, this paper has focused on an issue that has been left virtually untouched in climate change policy literature: the NAPAs are assessed from a rights perspective. The paper has explored to what extent and in what way four dimensions of rights of the agricultural workforce are reflected in NAPAs. The findings indicate that the NAPA process mostly sidelines human rights issues, both in the preparatory process (by an incomplete consultation process) and in the final document (by an insufficient consideration of rights in the proposed projects). We take the view that the marginalization of human rights issues in NAPAs, especially the rights of workers in a key sector such as agriculture, will hamper the successful implementation of NAPAs and will not lead to a socially sound sustainable development. We call for a shift in the way the NAPA processes are carried out in SIDS, so as to ensure due consideration of workers' rights. One example to be followed is the Lesotho NAPA (Lesotho Ministry of Natural Resources, 2007), where projects are actually assessed (amongst other criteria) on their contribution to employment creation. The rights to participation, to protection of livelihoods and to support for alternative livelihoods need to be guaranteed in NAPAs, as well as in other key national policy documents. Only a coherent and holistic policy response will adequately meet the challenge of climate change. Moreover, collective action rights need to be respected and taken into consideration, in

order to strengthen the potential of collective action. Trade unions can play a major role in this respect. Some suggestions for trade unions in the SIDS context include:

- Forming trade unions to ensure the promotion of collective rights where trade unions do not exist.
- Trade unions should work as a key stakeholder in close collaboration with government.
- Trade unions can play an awareness-raising role on climate change issues.
- Trade unions can bring the issue of the green economy into the spotlight of societal and political debate.
- The workforce can play a key role in the transitional movement towards sustainable production and consumption.
- Trade unions can and should act as watchdogs on and for the government.
- Trade unions should build on their international network to strengthen the case for a rights-based approach to climate change.
- Trade unions should promote environmentally sustainable jobs within the new "green economy" paradigm.

It is clear from the qualitative analysis performed in this paper that much remains to be done in order to ensure that adaptation strategies acknowledge the rights dimension of climate change and to guarantee that a holistic vision of development is put forward in the interests of vulnerable workers. Trade unions can play an important role in contributing to the achievement of these aspirations.

References

Abdullah, A.; Konate, M.; Muyungi, R.; Reazuddin, M. 2009. *National adaptation funding: Ways forward for the poorest countries* (London, International Institute of Environment and Development).

ALM (Adaptation Learning Mechanism). 2010. Vanuatu Country Profile. Available at: http://www.adaptationlearning.net [accessed 17 Aug. 2010].

Aminzadeh, S.C. 2007. "A Moral Imperative: The Human Rights Implications of Climate Change", in *Hastings International and Comparative Law Review*, Vol. 30, No. 2, pp. 231–265.

Bratasida, L. 2008. *What is "nationally appropriate mitigation action"?* OECD Annex I Expert Group, Paris, May 2008 (Paris, OECD), available at: http://www.oecd.org/dataoecd/39/16/40633672.pdf.

CIA (Central Intelligence Agency). 2010. *The World Factbook* (Washington, DC), available at: https://www.cia.gov/library/publications/the-world-factbook.

Dazé, A.; Ambrose, K.; Ehrhart, C. 2009. *Climate Vulnerability and Capacity Analysis* (Geneva, CARE International).

DFID (Department for International Development). 2002. *Climate change: What we know and what we need to know* (London).

Doussa, J. V. 2008. *Climate Change and Human Rights.* Available at: http://cpd.org.au/article/climate-change-and-human-rights.

Eriksen, S.E.; Klein, R. J.; Ulsrud, K.; Næss, L.O.; O'Brien, K. 2007. *Climate Change Adaptation and Poverty Reduction: Key interactions and critical measures* (Oslo, Norwegian Agency for Development Cooperation (Norad)).

FAO (Food and Agriculture Organization of the United Nations). 2004. *FAO and SIDS: Challenges and emerging issues in agriculture, forestry and fisheries* (Rome).

—. 2010. *Small Island Developing States.* Available at: http://www.fao.org/sids/

Government of Maldives. 2008. *Maldives: Poverty Reduction Strategy Paper. Seventh National Development Plan 2006-2010 – Creating New Opportunities.* Available at: http://www.imf.org/external/pubs/ft/scr/2008/cr0826.pdf.

HREOC (Human Rights and Equal Opportunity Commission). 2008. *Background Paper: Human Rights and Climate Change*, Australian Human Rights Commission. Available at: http://www.hreoc.gov.au/pdf/about/media/papers/hrandclimate_change.pdf [accessed 17 Aug. 2010].

ICHRP (International Council on Human Rights Policy). 2008. *Climate Change and Human Rights: A Rough Guide* (Versoix).

IFPRI (International Food Policy Research Institute). 2009. *Climate Change – Impacts on Agriculture and Costs of Adaptation* (Washington, DC).

ILO. 2009a. *Decent Work Country Programme: Kiribati* (Geneva). Available at: http://www.ilo.org/public/english/bureau/program/dwcp/download/kiribati.pdf.

—. 2009b. *Decent Work Country Programme: Vanuatu* (Geneva). Available at: http://www.ilo.org/public/english/bureau/program/dwcp/download/vanuatu.pdf.

IPCC (Intergovernmental Panel on Climate Change). 2007. "Summary for policymakers", in *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge, Cambridge University Press).

Klein, R.; Persson, A. 2008. *Financing Adaptation to Climate Change: Issues and priorities. SEI Briefing Note for the European Climate Platform* (Stockholm, Stockholm Environment Institute).

Lesotho Ministry of Natural Resources. 2007. *Lesotho's National Adaptation Programme of Action on Climate Change*. Available at: http://unfccc.int/resource/docs/napa/lso01.pdf.

McGray, H.; Hammill, A.; Bradley, R. 2007. *Weathering the Storm: Options for Framing Adaptation and Development* (Washington, DC, World Resources Institute). Available at: http://pdf.wri.org/weathering_the_storm.pdf

MoEEW (Ministry of Environment, Energy and Water). 2007. *National Adaptation Programme of Action (NAPA)– Maldives* (Male).

MoELAD (Ministry of Environment, Land and Agriculture Development). 2007. *National Adaptation Programme of Action – Republic of Kiribati* (Tarawa).

MPND (Ministry of Planning and National Development). 2004. *Statistical Yearbook of Maldives* (Male).

—. 2006. *Statistical Yearbook of Maldives 2006* (Male).

NACCC (National Advisory Committee on Climate Change). 2007. *National Adaptation Programme of Action (NAPA) – The Republic of Vanuatu* (Port Vila).

Oxfam. 2007. *Adapting to climate change. What's needed in poor countries, and who should pay.* Available at: http://www.oxfam.org.uk/resources/policy/climate_change/downloads/bp104 _adapting_to_climate_change.pdf.

—. 2008. *Climate Wrongs and Human Rights,* Briefing paper (Oxford).

Pender, J.S. 2008. *What Is Climate Change? And How It Will Affect Bangladesh?* (Dhaka, Church of Bangladesh Social Development Programme).

Prowse, M.; Grist, N.; Sourang, C. 2009. *Closing the gap between climate adaptation and poverty reduction frameworks.* (London, Overseas Development Institute).

Read, R. 2010. *Economic vulnerability and resilience in small island developing States* (Geneva, International Centre for Trade and Sustainable Development).

Sinden, A. 2008. *Climate Change and Human Rights.* Temple University Legal Studies Research Paper N° 2008-49.

SOPAC; UNEP. 2010. Environmental Vulnerability Index. Available at: www.vulnerabilityindex.net

Sperling, F. (ed.). 2003. *Poverty and Climate Change—Reducing the Vulnerability of the Poor through Adaptatio.* (Washington DC, AfDB, ADB, DFID, EC DG Development, BMZ, DGIS, OECD, UNDP, UNEP and the World Bank).

START. 2006. *Climate change threats Kiribati* (Suva, START-Oceania Secretariat) http://www.pmel.noaa.gov/people/ganachaud/References/OceanicWavesSept06.pdf.

Stern, N. 2006. *Report of the Stern Review: The Economics of Climate Change* (London, HM Treasury).

UNDESA (United Nations Department of Economic and Social Affairs). 2003. *World Statistics Pocketbook Small Island Developing States* (New York).

UNDP (United Nations Development Programme). 2008a. *Human Development Report – Fighting climate change: Human solidarity in a divided world* (New York).

—. 2008b. *The Bali Action Plan: Key Issues in the Climate Negotiations. Summary for Policy Makers.* An Energy & Environment Group Publication (New York).

—. 2008c. *Climate Change, its Consequences on Employment and Trade Union Action* (Nairobi).

—. 2009. Human Development Reports (New York). Available at: http://hdr.undp.org/en/statistics.

UNEP (United Nations Environment Programme). 2008. *Adaptation Source book: Integrating adaptation to Climate Change into UNEP Programming*, 8-9 Apr., 2008.

—; ILO; ITUC; IOE. 2008. *Green Jobs: Towards decent work in a sustainable, low-carbon world* (Nairobi).

UNFCCC (United Nations Framework Convention on Climate Change). 2005. *Climate change, small island developing States* (Bonn).

—. 2007. *Vulnerability and Adaptation to Climate Change in Small Island Developing States* (Bonn).

—. 2008. *Climate Change: Impacts, Vulnerabilities and Adaptation in Developing Countries* (Bonn).

—. 2009a. *Chronological Evolution of LDC Work Programme and Concept of NAPAs*. Retrieved on 3 March 2010, from: http://unfccc.int/cooperation_support/least_developed_countries_portal/ldc_work_programme_and_napa/items/4722.php

—. 2009b. *The Least Developed Countries – Support needed to fully implement National Adaptation Programmes of Action (NAPAs)* (Bonn).

—. 2009c. *The Least Developed Countries' National Adaptation Programme of Action: Overview of Preparation, Design of Implementation Strategies and Submission of Revised Project Lists and Profiles* (Bonn).

—. 2009d. *Step-by-step Guide for Implementing National Adaptation Programmes of Action* (Bonn).

World Bank. 2005. *International Coalition Tackles Impacts of Climate Change in Kiribati* (Washington, DC). Available at: http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/EASTASIAPACIFICEXT/EXTEAPREGTOPENVIRONMENT/0,,contentMDK:20585703~menuPK:502892~pagePK:34004173~piPK:34003707~theSitePK:502886,00.html

—. 2009a. *Convenient Solutions to an Inconvenient Truth: Ecosystem-based Approaches to Climate Change* (Washington, DC).

—. 2009b. *World Development Report 2010 – Climate Change and Development* (Washington, DC).

International
Journal
of Labour
Research

2010
Vol. 2
Issue 2

Climate change, poverty and migration processes in Chiapas, Mexico

Laura Elena Ruiz Meza
Universidad de Ciencias y Artes de Chiapas, Mexico

The climate change process has gained an important place in the international debate due to the magnitude of its environmental, economic, political and social implications, to the point that it is now included in the agendas of planners, governments and different social agents involved in the field of development.

The United Nations Framework Convention on Climate Change defines it as "a change in the climate which may be directly or indirectly attributed to human activity, which changes the composition of the world's atmosphere and is added to the natural climate variability observed during comparable time periods" (IPCC, 2001, p. 79).

Scientific evidence has confirmed the existence of a relationship between human activities, such as the consumption of fossil energy or changes introduced to farming methods, and an increase in the emission of carbon monoxide, which causes the greenhouse effect and brings about the rise in the planet's surface temperature. Temperature changes have a direct impact on other climate parameters, which in turn results in modifications in rainfall patterns, in changes in the intensity and frequency of extreme climate events, and in the rise of the mean sea level. Due to the social impact of these changes, society faces the challenge of adapting to the changing climate conditions and, at the same time, of implementing mitigation strategies.

Climate change adaptation refers to the human and natural systems adjustments made in response to foreseen climate stimuli or to their effects; these adjustments mitigate damage or take advantage of favorable circumstances. Mitigation refers to human intervention aimed at reducing emissions or at improving greenhouse gas sinks (IPCC, 2001). At a global level, Mexico comes eleventh in the emission of greenhouse gases into the atmosphere and first in Latin America (Sánchez-Cohen et al., 2008).

While the scientific bases for climate change seem to have been established, its consequences on human population are just starting to be documented. In particular, the relationship between climate change and migration has not been widely researched. This relationship seems to be difficult to predict, since it is necessary to consider on the one hand the different skills and resources which allow a community to adapt to the impact of climate change and, on the other, the variables affecting migration. Nevertheless, the international community increasingly acknowledges that environmental degradation and climate change may lead to population displacement (Morton, Boncour and Laczko, 2008).

Migrations as a consequence of climate change do exist, although other social contexts also contribute to them. Such is the case of government policies, ecosystem degradation, poverty and the capacity of a community to withstand extreme climate events, factors which impact on a population's vulnerability level.

Vulnerability is a key concept in the analysis of the social abilities to respond to climate change. It is defined as the level to which a system is

susceptible to or incapable of facing the adverse effects of climate change, including climate variability and extreme phenomena. "Vulnerability depends on the nature, magnitude and index of climate variability to which a system, its sensitivity and adaptation capacity are exposed" (IPCC, 2001, p. 91). Vulnerability is a social condition which results from the differentiated access to natural, economic, social and power resources, and which is associated to conditions of social injustice.

Some authors use the term "climate change migrant" (Brown, 2008) or "environmentally induced migrant" to refer to people and communities that decide or are forced to migrate as a result of environmental or climatic factors. Within these factors we may include people forced to flee from a natural catastrophe and those impoverished farmers who abandon their land and migrate in search of alternative means of sustenance (Morton, Boncour and Laczko, 2008). The concept is intended to account for the phenomenon of induced human displacement as a result of climatic change.

This paper explores the links between climate change, poverty and migration in Chiapas, on Mexico's southern border. Chiapas is noted not only for being a region of reception and transit, but also for being the origin of migration flows, which create a complex scenario where it is possible to differentiate between local and Central American migration. This study intends to demonstrate that the migrations caused by the extreme hydro-meteorological events which have stricken the Mesoamerican region and particularly Chiapas coastal basins contribute to the increase of economically motivated migration. The vulnerability affecting the impoverished population contributes to the generation of cross-border displacements.

Climate change in Mexico

Mexico still exhibits striking inequalities based on class, gender, ethnicity and geographical location. More than half of the population lives below the poverty line. The availability and quality of water and sanitation is also asymmetrical and precarious in many rural and peri-urban zones. More than 11 million people have no access to a safe drinking-water supply and almost 23 million have no basic sanitation facilities. The drinking-water network in rural areas reaches 68.2 per cent of the population (UNDP, 2007).

Mexican structural poverty is made worse by the climate change affecting the national territory, from the desertification of arable lands in the north of the country to the more intense and frequent hurricanes on the Pacific, the Caribbean and the Gulf coasts, and floods and landslides in several central and southern states. Temperature rises and variations in precipitation levels contribute to increasing the risk of easily transmitted

infectious diseases like malaria and dengue.[1] Mexico presents a very rugged relief, which encourages people to settle on steep slopes which are vulnerable to landslides and water erosion. The effects of climate change undoubtedly increase poverty levels, diminish job opportunities, threaten food safety and increase migration. Thus, climate change has become an issue affecting national security and even social justice (Fetzek, 2009).

The most relevant effects of climate change are found in the agricultural sector and in the field of food production. Gradual changes in temperature and precipitation and the presence of frost, coupled with the ruggedness of the soil and Mexico's socio-economic conditions make food safety especially vulnerable to climate change (INE-SEMARNAT, 2006).

Corn production has already been affected; it is possible to notice agricultural yields have dropped because of droughts, excessive rain and irregular precipitation patterns. A diminished production has led to an increase in food imports. Added to its impact on nutrition and on health, food insecurity has led to conflicts in the country because it resulted in corn price rises and compromised food sovereignty. Mexico imports about half the food it consumes in spite of being a major agricultural producer. Considering that there is a simultaneous tendency towards population growth and diminishing national food production, Mexico is likely to depend more on food imports in the future, with all the social and political impact that this entails.[2]

Although irrigation infrastructure is to be found mainly in the north, the most suitable lands for agriculture are in the south of Mexico. Corn-producing organizations in Chiapas have reported that northern agricultural producers are interested in buying southern arable lands (Fetzek, 2009). The southern region is the poorest in the country; it is populated mainly by indigenous inhabitants and has long been fighting for land and for autonomous territorial management.

In Mexico, 24 per cent of the population makes a living from agricultural activities. At present, about 58 per cent of the rural population suffers from unsatisfied basic needs: their income is not sufficient to meet their food, education and health needs. Poverty is responsible for people's moving to cities and to the United States, with an average of half a million people leaving their birthplace. Since the creation of the North American Free Trade Agreement (NAFTA), 1,780,000 rural jobs have been lost. Migrant workers

1. Anthropogenic activities are the direct causes of climate change. The climate has been warming twice as fast over the past century. Heavy precipitation has grown alarmingly since 1950. What is more, droughts have also increased since 1970, especially in the tropical and subtropical regions, a phenomenon which is related to a decrease in precipitations and higher temperatures (Galindo, 2008).

2. Simulation models foresee a notable reduction in corn, rice and wheat production in Mexico by 2025 due to low water availability. The most affected regions are located in the arid and semi-arid northern and central areas, where population is more concentrated (Sánchez-Cohen et al., 2008).

may be seen as contributing to the country's security, since they support their families and their native regions economically through money remittances. In 2006 these remittances amounted to 60 per cent of the revenues generated from oil (Sánchez-Cohen et al., 2008).

Social consequences of Chiapas climate change

Chiapas is the poorest state in the country, and at the same time it possesses great cultural and biological wealth. In spite of this, its ecodiversity has quickly deteriorated as a consequence of a number of interrelated factors. The most relevant of these factors is the implementation of an economic model based on the extraction and exploitation of natural resources. The absence of adequate territorial planning, of regional development, and of decisive and efficient public policies for the sustainable management of natural resources is related to population growth, deforestation, unbalanced urbanization processes and overexploitation of precious woods, the intensive exploitation of the soil and the growth of cattle farming.

Chiapas coastal basins are especially affected by water erosion processes. In these regions, precipitation ranges from 1.4 mm in coastal areas to 4.5 mm in the higher areas of the basins. The ragged topography, thin erodible soils and changes in the use of land for agriculture have resulted in higher erosion levels ranging from 200 to 415 ton/hectare a year, which has led to floods and to greater silt loads in estuary and lake systems (Arellano, 2008).[3]

Besides, water quality keeps deteriorating due to the organic and chemical pollution deriving from the frequent use of agrochemicals (IMTA, 2007). The deforestation of water recharge areas affects water supplies, which generates social conflicts in the use of the resource.

In the past years climate change has led to major alterations in hydrologic regimes, to longer drought periods and to the occurrence of forest fires. In areas where it rains less than 1.2 mm (annual average), rains are now more frequent, while in those where precipitations are above 2.4 mm it rains less; that means that in greater areas precipitations diminish and in smaller areas rainfalls are intense and take place in violent spells (Hernández, 1998; Arellano, 1999).

According to a study of Mexican climate change economy, Chiapas comes second among the states with least ability to overcome the effects of climate change (Ibarrarán and Rodríguez, 2007). It is estimated that at least 75 per cent of its territory will be affected by droughts and floods, which will certainly spoil the production of basic crops (Aguilar, 2006). Chiapas is the

3. The Pacific slope of Chiapas Sierra Madre forms a river landscape typical of coastal basins, with great and short torrential rivers which flow on the plains in a drainage network towards the coastal wetlands (Arellano, 2008).

fourth national corn producer and its grain possesses a great genetic wealth which is in danger of being lost because of climate change and also because of the recently authorized experimental cultivation of transgenic corn.

Chiapas coastal basins are characterized by their high environmental and social vulnerability when faced with extreme hydro-meteorological events. In 1998 and 2005 torrential rains and hurricanes severely damaged impoverished populations, ecosystems, crops and communications infrastructure. The impact of these events is measured in terms of human casualties and economic losses.

In 1998 a vast area in Chiapas suffered the devastation brought about by one of the most intense hydro-meteorological phenomena in the state's history. During the long dry season forest fires ravaged an area of 198,808 hectares, damaging even protected natural regions. The zones affected by the fires proved to be susceptible to the erosion brought about by heavy rain some months later. Due to tropical depressions coming from the Pacific Ocean, which were unusually more severe than those that often reach the mainland during the tropical season, a heavy and persistent rainfall lashed down the mountainous region and on the coastal basins in a few days (Arellano, 1999).

As a result of these weather phenomena, a series of adverse events was triggered which affected the population: in mountainous regions soil and rocks provoked landslides which, together with superficial draining, caused floods in the lower areas of the basins because of the overflow of rivers and of silting in alluvial plains, marshes and coastal lagoons (Valladares et al., 1999). As a consequence, lives, cattle and crops were lost, houses, roads, bridges and railroads were destroyed and basic public services damaged. As much as 400,000 hectares of crops were lost; half a million people lost their houses, and 400 died. The rural population was the most affected sector (Arellano, 2005).

In 2005, in turn, hurricane Stan caused severe damage in 41 of the 118 municipalities in the state; 700,000 inhabitants were isolated because 6,000 km of roads and highways were destroyed; 25,000 families lost their houses; hundreds of thousands of hectares of crops were lost; huge landslides affected large forest areas and 34,500 hectares of soil were heavily eroded; to this we should add the loss of human lives (Secretaría de Desarrollo Social, 2005).

Crops were seriously affected: 70 per cent of the coffee plantations were damaged. Coffee is the region's main export; more than 100,000 producers gain their livelihood from these plantations, and they lost an estimated 185 million US dollars. The corn harvest was severely harmed, as was the production of banana, soy, sesame and sorghum; in these plantations, workers come from Guatemala and Chiapas (Villafuerte and García, 2006).

Thus, it is possible to say that poverty and social marginalization conditions and the impact of climate change are signs of a severe problem which is made evident in the significant increase of social vulnerability and in the degradation of natural resources.

Migration and climate change

One of the most noticeable effects of climate change is the increase in migration flows, which contributes to the extreme poverty of this state; this section is devoted to presenting this issue.

Extreme poverty and precarious employment

The state of Chiapas is predominantly rural, and exhibits the highest levels of poverty and marginalization in the country. To structural poverty it is necessary to add the poverty generated by the neoliberal policies implemented as from the 1980s, which meant a drastic reduction of subsidies, development policies and public investment, and the dismantling of the state sector; between 1994 and 2000, federal investment in rural areas fell by 90 per cent. Furthermore, NAFTA trade and the crisis in agricultural product prices, especially in the price of coffee, have had devastating effects on peasant economy and, in general, on the agricultural sector.[4]

Villafuerte and García (2007) point out that the lack of employment options outside the agricultural sector keeps a large labour force tied down to primary-sector activities and working on a part-time basis, which has led to migration to labour markets in the north of Mexico and the United States. The following paragraphs are devoted to an analysis of census data which makes it possible to measure the magnitude of poverty and rural unemployment in Chiapas, situations which have become more serious in the past decades.

The proportion of economically active population (EAP) devoted to agriculture has been decreasing, from 57 per cent in 1980 to 47 per cent in 2000 and to 37.3 per cent in 2009. As the industrial sector is not developed in Chiapas, the EAP has turned to the trade and services sector, which grew from 13 per cent in 1980 to 37 per cent in 2000 and to 48 per cent in 2009 (Villafuerte and García, 2007; INEGI, 2009). In the regions which were most affected by hurricane Stan in 2005 – Sierra, Soconusco and Istmo-Costa – the EAP devoted to agricultural activities is still substantial, since it is more than 50 per cent, and in some municipalities it exceeds 80 per cent, especially in the Sierra region, where social marginalization is widespread (INEGI, 2005).

4. Among other structural reforms one can mention the changes introduced to agrarian and water legislation, which liberalized policies governing land and water rights to facilitate their privatization, thus harming peasant interests and benefiting export-oriented commercial agriculture, which has profited from state support. Another factor contributing to this is the stimulus given to foreign factories which started to operate on the northern border and also in the south of the country.

In 1980 the agricultural sector contributed 28.6 per cent of the national gross domestic product (GDP), and the trade and services sector the 47.2 per cent; but in 2000 the contribution of the agricultural sector to the GDP fell to 15.6 per cent and that of the trade and services sector increased to 63.4 per cent (Villafuerte and García, 2007). In 2008 the contribution of the agricultural sector to the national GDP was 8.5 per cent, while the trade and services sector contributed 66.3 per cent (INEGI, 2009).[5]

As regards employment, in 1990 the population devoted to the agricultural sector was formed by 63.5 per cent of self-employed workers, 21.9 per cent of employees and day labourers, and less than 1 per cent of employers. By 2000 self-employed workers amounted to 57 per cent, employees and day labourers to 24.6 per cent and employers to 0.8 per cent. The number of unpaid family workers rose form 8.8 per cent in 1990 to 13.2 per cent in 2000, figures which testify to a deepening of the impoverishment process (Villafuerte and García, 2007).

The tendency towards impoverishment in Chiapas agriculture in the past decades may be observed in indicators of income in the agricultural population: 48.5 per cent of the EAP did not get any kind of income in 1980, and of those who did, 19.7 per cent received less than the minimum wage and 25.4 per cent got between one and two minimum wages; this means that 45 per cent of the EAP with an income were in a situation of poverty or extreme poverty.[6]

In 1990, after a decade of structural adjustment measures, these figures rose considerably. Considering the agricultural population that declared they had received income, around 70 per cent received less than the minimum wage and only 16.2 per cent earned between one and two minimum wages; thus the 86 per cent declaring incomes were below the poverty line and in extreme poverty. In 2000 this group amounted to the 90.7 per cent of the rural labour force; these indicators show the severe impoverishment process of most of Chiapas rural population (Villafuerte and García, 2007).

To these data it is necessary to add the number of workers who can only find part-time jobs. According to the 1990 Agricultural Census, 79.2 per cent of the labour force employed in production units did not earn a salary, and of those who did, 83.3 per cent were seasonal workers. Unemployed workers and those working on a part-time basis would add to the migration flow to the towns, to the north of the country and to the United States in search of means of sustenance. In 2006 the Agricultural Census established that 314,814 people (93.8 per cent of whom were men and 6.2 per cent

5. Another effect of neo-liberal policies on rural areas has been a narrow productive structure, based solely on three commercial products (coffee, banana and sugar cane) around which Chiapas agricultural productive structure is centred.

6. According to official criteria, the sector of the population which earns up to two minimum wages is considered poor.

women) were hired by farmers, but 91.6 per cent worked for less than six months (INEGI, 2008), which means that part-time employment was higher and still widespread.[7]

Forced migrations

Within a context of growing poverty in Chiapas rural areas, it is possible to foresee that agricultural incomes will be substituted with remittances sent by people who emigrated to the United States (Villafuerte and García, 2006).

The effect of extreme hydro-meteorological events has aggravated the already precarious living conditions of Chiapas communities, which exhibit the lowest indicators of human development. Several studies on migration in Chiapas and Central America agree in noting that extreme climate events have strengthened already existent migratory processes, reshaping migratory activity on Mexico's southern border (Pickard, 1999; Ángeles and Rojas, 2000, 2009; Castro, 2005; Villafuerte and García, 2006, Vásquez, 2008; INM, 2009).

Oli Brown (2008) relates that as from 1990 the Intergovernmental Panel for Climate Change had pointed out that migration was one of the most serious consequences of climate change, since millions of people would have to relocate because of coastal erosion, flooding and crop failure. In several regions of the world the occurrence of migration processes as an adaptation response to the strain provoked by the climate has been detected, though it is acknowledged that the intervention of diverse social, economic and environmental factors makes it impossible to determine a linear relationship between anthropogenic climate change and migration. The author suggests the term "forced climate migrant" to refer to the induced relocation of population as a consequence of the effects of climate change, a term which is used in this section.

Chiapas has not traditionally been a state which ejects workers to the north of Mexico and the United States, but the impact of extreme climatic events has forced a growing flow of people to look for employment in other places. Consequently, the state has become the a source of emigration.

Thus, in the past years migration in the south of Mexico has become more dynamic and complex, because it has turned simultaneously into a place of arrival, transit and origin of migrants – in a territory populated by immigrants, transmigrants and emigrants who form a complex mosaic of rural and urban migrants (Ángeles and Rojas, 2009; Villafuerte, 2008).

7. In 2006, the female population employed in farms amounted to 4.9 per cent, those working in the industrial sector to 18.8 and those working in trade and services to 76.3 per cent (INEGI, 2008).

As a place of arrival, Chiapas receives workers who migrate from Guatemala – migrations which have been taking place for more than a century – to work in the plantations and coffee farms in the region of Soconusco. Coffee harvesting requires the greatest number of workers.[8] Other migratory flows have been led by native women who work as maids in middle- and upper-class households in towns near the southern Mexican border. Women have traditionally formed part of the migration flows of agricultural workers as day labourers often move with their families, all of whose members share their chores in agricultural activities so as to contribute to the support of the family (Ángeles and Rojas, 2009).

Economic imbalance between town and country and the effects of the hurricanes have exerted a negative impact on traditional agricultural activities. Although they still employ most migrant workers, their economic role is now less relevant; urban services, trade and building have become new labour options for Central American workers, most of whom originate from Guatemala. Thus, in the past few years these migrants have seen their work destinations diversify, and are to be found in greater numbers in urban centres of the states on the southern Mexican border (ibid.).

The extreme climatic events that hit the Mesoamerican territory in 1998 initiated a migratory process of Central American people who, apart from working in Chiapas, have shown a tendency to migrate to the United States. Chiapas has thus become a transit place, since in the past decades it has developed into a strategic point in migration flows which, coming from Guatemala, Honduras, El Salvador and even from South American countries, head for the United States (Villafuerte, 2008).

A survey on cross-border migration between Guatemala and Mexico carried out in 2006 by the National Migration Institute (*Instituto Nacional de Migración*; INM, 2009) reports on the labour and social effects of 2005 hurricane Stan on the migrant population moving to Mexico. The hurricane paralysed economic activity on both sides of the border, but trade and labour co-dependence fostered a revival of everyday activities in quite a short time.

The survey shows that 71 per cent of migrants are men, most of them unschooled and between the ages of 20 and 29. Before hurricane Stan, 93 per cent used to work in Mexico, mainly in the agricultural and trade sectors, but around 78 per cent noted that they had not lost their jobs after the climatic phenomenon, although these were the most affected sectors. Among labourers who did lose their jobs, those most affected were agricultural workers (42.4 per cent) and building workers (23.4 per cent). The quick recovery of

8. Since the end of the nineteenth century, coffee plantations in the Chiapas border region have demanded not only Chiapas day labourers but also seasonal workers from Guatemala, a flow which grew throughout the twentieth century. In the past few years Guatemalan workers have been substituted with workers from Honduras (Villafuerte, 2008).

the labour market allowed 64 per cent of workers to go back to work in less than a month, especially in the building sector. However, most of those who remain unemployed after the hurricane (71.4 per cent) used to work in the agricultural sector, which shows the extent to which this sector was affected.

Although the labour market was severely harmed, 94 per cent of migrants stated that they did not move to Mexico or to the United States because access to the southern Mexican border and the roads used to cross that border were unsafe. Indeed, more than half of the surveyed workers note that there has been an increase both in delinquency and in extortion on the part of migration officers (INM, 2009).[9]

As a consequence of stricter immigration controls on Mexico's southern border, migrants in transit have explored the possibilities offered by new migration routes in order to enter Mexican territory and reach the northern border. This has resulted in an increase in the extortion, mugging and abuse perpetrated on migrants, both by immigration authorities and by common and organized criminals. These violations of the migrants' human rights have contributed to the establishment of a culture of abuse and impunity around migration (Ángeles and Rojas, 2009).

Emigration from Chiapas

As a point of departure for migration, in the past decade Chiapas has started to be noted as one of the states showing the most significant migration dynamics to the north and to the United States. In 2000, more than 300,000 Chiapas people moved to different states in the country. Peasants have resorted to migration as a strategy to mitigate the adverse effects of the climate on their productive activities. Though the climatic factor is far from being the only cause of rural emigration, it is part of an intricate correlation of political, social, economic and environmental variables.

It has been pointed out that the implementation of neoliberal policies in rural areas has devastated the agricultural sector as from the 1980s. However, as Villafuerte and García argue (2006), the migration dynamics in this state calls for a more complex explanation and cannot be attributed exclusively to poverty or to a rural crisis. Poverty and rural crises have been taking place for a longer period and they had not been directly related to international migration; this relationship was established, nevertheless, in Oaxaca and Guerrero, states which, together with Chiapas, have been the poorest in the country.

9. Although the statistics compiled by the National Migration Institute (INM) contribute to a description of the migration phenomenon dynamics, they fall short of showing the magnitude and the complexity of the problem, since they notably underestimate the dimension of the issue due to the fact that migrants are reluctant to express their real intentions of moving north.

It is possible to assert, then, that the beginning of Chiapas peasants' and indigenous people's emigration to agricultural plantations and to towns in the north of Mexico and in the United States is related to the extreme hydro-meteorological events which took place by the end of the 1990s. This claim is supported by a number of facts.

By 1998, after hurricane Mitch, foreign factories offered jobs to those who had been affected by it, and they even paid for their trip to Tijuana, Mexicali and Monterrey, northern towns where these factories operate; in this way, between October and December of that year, about 35,000 people from Chiapas had started their journey along the road to the north. Since then, the transportation business from the Chiapas–Guatemala border to the United States has thrived (Castro, 2005).

According to a survey on migration in the north Mexican border (*Encuesta sobre Migración en la Frontera Norte de México*), the number of Chiapas emigrants who were returned to Mexico by the border patrol between 1995 and 1999 grew from 6,129 to 13,372. In the years 1999–2000, after the hurricane, the number of deported Chiapas emigrants reached 30,523 – it more than doubled in a year. Of these, 12.6 per cent were women (Gobierno del Estado de Chiapas, 2004).

In 2005, 40 per cent of Chiapas population living in the United States came from Istmo-Costa, Soconusco, Sierra and Fronteriza, the regions which were most affected by the above mentioned extreme climate events (Olivera and Sánchez, 2008).[10]

While a great portion of the affected population emigrates, others prefer to stay. A study of people affected by hurricane *Stan* shows that some moved to other towns, either in Chiapas or in other states within the country, but others stayed in their birthplace trying to find the way to rebuild their homes, since they said they did not have any other choice (Álvarez, 2009). Those who decide to stay in Chiapas do it precisely because they live in extreme poverty, since the possibility of migrating depends on social and economic resources. The people most vulnerable to climate change are precisely not the ones who are most likely to emigrate. Although the land is not their means of sustenance as in former times, peasants cling to their homeland and to their piece of land for fear of the job insecurity they will probably face if they emigrate.

The exponential growth of remittances sent by Chiapas émigrés is another indicator that emigration to the United States is the consequence of extreme climate events. In ten years the amount of money remitted multiplied

10. There is also evidence of environmentally induced migration in Tabasco, a state adjoining Chiapas. So far, Tabasco has shown the nation's lowest emigration rate, but after the 2007 flood, during which 80 per cent of the state was under water, some civil organizations in the north of Mexico noted an increase in the number of emigrants coming from Tabasco on the Mexico–United States border.

33 times, growing from US$19.8 million in 1995 to 655.3 million in 2005 (Villafuerte and García, 2007). In 2006 the amount grew to US$800 million, which equals the production value of the agricultural sector, and puts Chiapas tenth in the country in the reception of remittances, above other states with a longer migratory tradition (Olivera and Sánchez, 2008).

The growing economic importance of remittances has not meant more opportunities for investment or employment, nor has it brought about a revival in peasant economies; at best, they contribute to mitigate hunger and social discontent. Nevertheless, they also have undesired consequences, such as the inequality that exists between the homes of those who receive remittances and those who do not (Villafuerte, 2008), and a significant increase in the number of rural homes run by women, who assume responsibility for their families' social production.

This migration to the United States has consequences for the labour market, since the demand for Central American workers increases in the more dynamic productive sectors in Chiapas, creating precarious and marginal job opportunities for migrant workers from Honduras and El Salvador who leave their countries because of unemployment.[11]

These phenomena have resulted in the creation of migratory flows which incorporate new migrants lacking the social networks formed by Central American traditional migrants who travel to the United States. These new groups are made up in part of married and single women from Chiapas and Central America who migrate without identification papers (Ángeles and Rojas, 2000).

Migrations to, from and through Chiapas are interrelated phenomena with a common feature, the deepening of poverty and vulnerability in the population as a consequence of climate change. The data presented here account for the complexity of the migratory issue in the past years, and for the job instability to be found in different economic sectors in the countries involved. In Chiapas and Central America the economy is unable to generate sufficient and adequate employment opportunities to cater for the needs of the growing population, and as a consequence poor families have had to diversify their means of sustenance through pluriactivity; as a strategy, migration is acquiring a growing importance.

11. There are no exact figures of the number of irregular migrants who enter Mexico. The only figures that are made available are those gathered by the National Migration Institute (*Instituto Nacional de Migración*, INM) on the number of migrants who are arrested and sent back to their country. In 2009, 64,061 foreigners were arrested by the INM, 60,383 of them coming from El Salvador, Guatemala, Honduras and Nicaragua. Another 60,143 returned to their countries voluntarily or were expelled; 2,846 were allowed to become legal migrants, and 87 asylum applicants were granted refugee status. One-fifth of these were girls and women (Amnesty International, 2010).

Female migration

Women constitute an important migrant group on the southern Mexican border. This section presents information obtained from the characterization of female migration made by Martha Rojas (2007). Temporary female migrants come from Honduras, El Salvador and mostly from Guatemala, and cross the border to work in Chiapas and other neighbouring states. Most of them are peasants who enter the country legally. However, it is also possible to find undocumented female agricultural workers, as well as maids and tradeswomen in the same situation. They are young, single or married, and generally illiterate. They emigrate looking for work opportunities and for better wages than those they received at home. They work as labourers cultivating the main commercial crops, and they are mostly hired temporarily for the coffee harvest.

The women who work as maids go to the main urban centers, such as Tapachula, the second important town in Chiapas. They are teenage indigenous Guatemalan women, mostly single, and some are under age; those who have children leave them with relatives at home. They work long hours, six days a week, for a poor salary; they rarely receive medical attention when they get ill, and some of them fall into prostitution and trafficking networks.

Migrant women are greatly exposed to different risks which add to their vulnerability. Apart from their gender, the discrimination they suffer is made even worse by the fact that they are undocumented, poor and indigenous. They accept jobs that are badly paid, precarious, marginal, temporary and unsafe. Those who find a job send remittances to their homes like men do, but they often send higher sums than men although they generally get lower wages for the same job (Pickard, 2006).

Within this group of temporary migrants it is also possible to find boys and girls who work informally in the service sector. They work as salespeople, waiters, shoe-shiners, cleaners, and in similar occupations. Occasionally they move to Chiapas with their families, but most of them do it on their own. Children run the risk of being sexually exploited or abused (Ángeles and Rojas, 2009).

Another group of female migrants consists of women who enter Chiapas and other border areas on their way to the United States. However, there are those who need to work temporarily in Chiapas to earn the necessary resources to continue on their way north. Generally they work in the service sector and, in some circumstances, they are forced to practise commercial sex just as a work strategy to gather monetary resources for their journey. These women migrate without identification papers.

The migration flow formed by women coming from Chiapas who intend to reach the United States started as a consequence of the devastating effects of the extreme climate events mentioned above. Those who emigrate are mostly young women who travel independently looking for a job for themselves, and though they may travel together with relatives or friends, they do not do it accompanying other migrants.

Migrant women face high risks due to the numerous obstacles they have to overcome. Their human rights are violated when they are subjected to mugging, extortion, sexual violence, kidnapping, maltreatment, arbitrary arrest, discrimination and even death at the hands of delinquents and corrupt officers.[12] Women who stay in their communities have to withstand maltreatment, since as their husbands are not with them, they are sexually harassed and their land is taken away. Prevailing laws and customs do not protect their human rights.

Gender and climate change

In this unfavourable context, rural communities face a loss of control over their natural resources and means of sustenance. The counter-agrarian reform, the gradual neglect of farming activities and a growing migration process, together with a rise in the water and land markets, have led to plundering as well as to various community restructuring processes and to a redefinition of family relations. Added to this, there has been a significant increase in female-headed households, where women have assumed the responsibility for ensuring the social reproduction of their families.[13]

The conditions of poverty faced by peasant and indigenous women, their direct dependence on natural resources for their sustenance, the traditional gender roles that discriminate against them and their lack of autonomy place them at a disadvantage when it comes to dealing with the effects of climate change. In a social context marked by unequal power relations, men and women are not equally equipped to face and adapt themselves to any disaster; what is more, natural catastrophes do not affect them in the same way (Gomáriz, 1999).

Women's duties towards their families and households make them more vulnerable to environmental changes. Droughts, deforestation and irregular rainfall result in a rise in women's working hours, if they wish to ensure their means of sustenance. In the event of disasters, the relocation of affected towns impacts negatively on family ties and also on social networks supporting women, which are central to their survival skills. However, in the event of natural disaster and subsequent male migration, women have shown

12. Human rights organizations have raised their voices to denounce violations of migrants' dignity and rights, and to claim for their protection and access to justice. A recent report from Amnesty International (2010) reveals that migrant women also run the risk of falling into trafficking networks. It is estimated that six out of ten girls and women suffer sexual violence on their way to the United States.

13. In the last decades, one noticeable phenomenon in the Mexican rural community has been the feminization of the countryside. In 2005, 25 per cent of the rural homes were headed by a woman (INEGI, 2005). In Chiapas, 37 of every 100 homes live only on the income earned by women.

to be ready to respond to the new situation by adopting traditionally male roles and carrying out strenuous activities.

Their greater vulnerability and smaller capacity to cope with and adapt to climate change can also be explained by several factors, all of which limit their mobility and access to services: restricted access to natural, material and financial resources, lack of secure homes, absence of necessary skills and knowledge, cultural barriers. Though women play a key role in the handling of water, biodiversity and food production, they do not have control over such resources; besides, their property rights over family, land and house assets are precarious.

According to official figures, female landowners in Mexico amount barely to 20 per cent, and in Chiapas only 13.5 per cent of the total number of landowners holding agrarian rights are women (INEGI, 2008). Women have no access to water rights either, as the current legislation considers that only those who are legal landowners can be users of this resource. Due to increasing male migration, it is women who take over crop and livestock production; however, as they are not legal owners, their contribution to farming activities remains invisible, and they are denied recognition as farmers. Thus, the traditional denial of women's right to the ownership of land finds a correlation in their access to water resources for productive goals. The fact that they cannot be landowners excludes them from access to management and decision-making bodies, a situation which aggravates their social vulnerability. Several studies carried out in Chiapas report a considerable participation of women in the four existing risk districts, from 8 to 32.5 per cent of the total number of users; however, they are not recognized as producers, nor are they listed in the Water Consumer Associations (*Asociaciones de Usuarios del Agua*) (Ruiz, 2005 and 2009).

What is more, the fact that women do not own their land or their home excludes them for support programmes directed to those villages affected by extreme climate events, nor are they included in subsidy programmes, whose regulations require legal ownership of land.

Cultural prejudices are to be added to these legal problems. Tradition and cultural practices have restricted women's rights to property and their participation in the public life of the community. On the one hand, the gender-based patterns of labour division have confined women to the domestic realm, and there is a presupposition that farming is an exclusively male activity; on the other, traditional patterns of land and home inheritance have predominantly benefited men (Ruiz, 2005).

In spite of the wide international acknowledgment of the existence of links between gender, water and climatic change, women's voices remain unheard in negotiations, processes and mechanisms dealing with climatic change at both national and international levels. Additionally, policies and programmes dealing with water resources and with basin and risk management have not yet been approached from a gender perspective.

Consequently, the inhabitants of these regions are not on an equal footing when it comes to responding and adapting to social and environmental changes; their abilities and opportunities are different because they are divided by their social class, gender, age and ethnicity.

Some adaptation policies: Basin management programmes

In an attempt to face up to the impacts of climate change, public institutions from the environmental sector and several national and international civil organizations have for several years been promoting a number of programmes for hydrographic basins management; these include assorted mitigation and adaptation measures by means of environmental conservation and remediation, water erosion control and flood prevention, actions which involve rural settlements in more than 15 municipalities in Chiapas coastal areas.

Reaching different levels in the scope of their intervention, basin management programmes have laid emphasis on soil and water conservation and on the environmental hydrological rehabilitation of the basins in order to reduce vulnerability and mitigate the impact of extreme hydro-meteorological events. It has been pointed out by those coordinating these basin management experiences that there has been some progress in the recovery of the productive capacity of farming systems based on agroecological principles. Likewise, there have been significant achievements in developing productive systems that are more resilient to the impacts of climate change.[14]

As to institutional coordination, multisectoral groups called basin commissions and micro-basin commissions have been created with a view to achieving the social management of water resources; they aim to promote the participation of the various sectors of water consumers and social actors, both at local and regional level. These participation and decision-making organizations work in different ways as spaces of environmental action in coordination with municipal governments.

Local authorities have received support for the elaboration of projects for the prevention of disasters caused by heavy rainfalls. Though areas of environmental vulnerability have been identified, social vulnerability conditions are still unknown and rarely approached in connection to natural threats.

Despite the various measures taken and the progress achieved, these experiences are still isolated and have not been combined into a strategy that exhaustively stimulates the environmental restoration and reparation of basins,

14. An assessment made after the passage of hurricane Stan indicates that soil conservation works have helped retain sediments, which has resulted in an almost 40 per cent decrease of erosion (Arellano y López, 2009). Another study reveals that the hillside areas where soil conservation devices were set up are safer and more stable in the event of landslides and collapses of land (Ruiz and Arellano, 2007).

and the reduction of socio-environmental vulnerability. Mitigation measures, for their part, are still incipient.

The State Programme of Action for Climate Change *(Programa Estatal de Acción ante el Cambio Climático)* has just started to be designed, so consistent strategies for mitigation and adaptation are yet to be developed. However, for its actions to be fair and to promote the population's access to employment, the environmental, social and economic dimensions of climate change must be considered in an integrated way; so far, only economic and technical measures have been considered relevant.

A recent study about the economy of climate change in Mexico, devised to orientate public policies regarding the issue, prioritizes technological and economic measures to mitigate the impacts of that change, for example fixing higher prices and taxes on goods and public services such as electricity and water; this is done with a view to discouraging demand, which could have an important social impact on large sectors of the population as it would seriously affect their economy (Galindo, 2008).

The inter-institutional efforts made to integrally face climate change are still small; in the best of cases, the coordination of policies is only carried out by institutions from the environmental sector. Public organizations and other social actors concerned with social and productive development which support job creation and employment opportunities are not willing to join the action management offices already created, mainly because they belong to different governmental realms. The environmental and social impacts of climate change are generally dealt with separately in public programmes.

So far there have been no studies on the impact of basin management programmes on food safety, rural employment and peasant families' migration; these studies would be essential to identify the ways in which different communities have been able to retain their population and strengthen the farming families' means of living.

Also, it is necessary to promote the education of local inhabitants in risk management. By risk management we understand the development and implementation of policies, strategies and practices to reduce risk and minimize existing conditions of social vulnerability, to lessen the negative impacts of natural threats, and to respond to emergencies and act promptly and honestly after the occurrence of a natural disaster. Basin management programmes should improve the way in which they cooperate with Civil Protection organizations; this would strengthen the capacities being acquired by the population to mitigate the effects of natural threats derived from climate change.

The challenge still remains: to move from the emergency-oriented predominant approach favoured by Civil Protection organizations to an integral form of risk management based on multi-sectoral responsibilities and on the wide participation of regional and local social actors. It is thus worth reflecting whether it is enough to organize committees to attend to

emergencies, or whether it is convenient to foster and strengthen local capacities for an integral risk management. This entails preventive and mitigation actions, as well as early intervention through the coordinated work of governmental offices and social groups; it also requires consistent processes for the reduction of social and environmental vulnerability through the strengthening of the populations' means of living and of higher levels of governance in the management of water and other natural resources.

The full implications of basin management experiences have not yet reached the traditionally excluded population in Chiapas. Though some of the projects are directed at encouraging the participation of both rural women and young people in the process of change to a new water culture and to new ideas of environment management, it must be acknowledged that a wide social representation in the environment-management and decision-making organizations is yet to be accomplished.

The formation of councils and basin committees – organizations intended as spaces for agreement and planning created by the National Waters Act *(Ley de Aguas Nacionales)* – has not yet resulted in an increase in the social participation by all social actors, which may be attributed to the fact that those organizations have been imposed on the communities and that they have neither executive nor financial autonomy. The exercise of power in decision-making differs from some social groups to others depending on their rank in the economic and political regional structure, which translates into marked inequalities within those organizations.[15] Accordingly, the few micro-basin committees that were set up have not received the counselling, training and monitoring needed to promote the development of competencies and their organizational sustainability.

No efforts for strategic planning favouring the governance of water management have yet been made; nothing has been done either to promote spending transparency and fiscal accountability or the financial sustainability of the various projects.[16] Initiatives aimed at empowering users' organizations and local governments to participate more actively in decision-making have been sidestepped. To sum up, the governance of water management in Chiapas is far from being fair and democratic.

The governance of environmental management constitutes a tool to face the effects of extreme climatic events. Local and national governments have

15. Several studies on the organization of basin committees reveal that vertical and corporate styles have been prevalent in their formation process, whereas their functioning, based on the control exercised mostly on government representatives' control, has resulted in participation instances which are far from being inclusive; thus, water management democratization is yet to be achieved (Vargas and Mollard, 2005).

16. Governance presupposes a fair exercise of all the citizens' sovereign rights over social assets and over their territories and natural resources; these rights are shared by all the social actors that coexist in different communities. It implies an inclusive and impartial social participation, the construction of consensus, transparency and fiscal accountability.

not proved capable of reacting quickly enough to disasters, which has weakened the confidence in those institutions.[17]

It could then be asserted that the varied experiences in basin management implemented in Chiapas are still a long way from generating processes of construction of local capacities in order to improve water management and successfully respond to the social and economic consequences of climate change in the state.

Conclusions and recommendations

Climate change manifestations, whose most significant consequences can be observed in the agricultural sector and in food sovereignty, add to Mexico's persistent structural poverty. In Chiapas, Mexico's southernmost state, the influence of extreme weather events has exacerbated the already precarious living conditions of the inhabitants, who exhibit the lowest rates of human development. It is in this context that one of the most visible social outcomes of climatic change can be observed: the increase in migration flows. International migrations have Chiapas as a point of origin, transit and departure; these are interrelated phenomena which result in the aggravation of poverty conditions and in people's vulnerability as a result of climatic change.

The information presented in this article intends to account for the complexity which migratory dynamics have acquired on the southern Mexican border in the last few years, and for job insecurity in the rural sector. Female migration has turned out to be an outstanding phenomenon: female migrants both in Chiapas and in transit to the north are likely to experience extreme vulnerability conditions, not only because they are poor and indigenous but also because they are undocumented female immigrants. Those women who decide to stay in their communities are in no better situation: power relations ruling the family and the community result in human rights violations and in the weakening of their capacity to face and adapt themselves to environmental and climate changes. Since they are homemakers, they take

17. Several months after hurricane Stan, there were frequent social protests which expressed the population's dissatisfaction with the slow governmental process of reconstruction of infrastructure and the provision of fair and timely allocation of means for the rehabilitation of homes and crops. There was also annoyance because of the slow unclogging of river beds. The answer to some of those protests was police repression. Governments have encouraged some housing programmes, though many of the new settlements, which were built for the relocation of the inhabitants of the more vulnerable areas, are in poor condition; this has resulted in the low acceptance rate of that relocation. Social dissatisfaction has also manifested itself during the year owing to the lack of governmental capacity to provide answers to the consequences of a lengthy drought and low rainfalls, added to the protests against transnational mining operations which are damaging, more than ever before, the fragile coastal and hillside ecosystems in Chiapas.

on a great deal of responsibilities; however, they do not receive any social recognition or support in the event of disasters.

Though some actions have been promoted in Chiapas for the adaptation to climate change via basin management programmes, the governance of environmental management and the construction of local capacities to solve social and economic issues related to climate change are goals still to be achieved.

Environmental factors and the negative influence of climate change boost migration, which is also related to social, economic and social factors; these in turn translate themselves into power relations which result in an unequal access to and control of the key resources for subsistence and in the generation of widespread socio-environmental vulnerability. It is therefore relevant to consider environmental factors when studying migration.

Migration has been a survival mechanism, and it is becoming also an adaptation mechanism. It would be advisable, however, to encourage research on the issue in order to determine whether migrants are those who possess the means and social networks to emigrate or whether they are those most likely to be affected due to their dependence on natural resources for their subsistence. It has been noticed that those who are most vulnerable to climate changes may not be in a condition to emigrate. An investigation agenda should be promoted aimed at identifying and analysing the links between climate change, vulnerability and migration, and at making visible the local capacities that play a role in adaptation and migration processes. The generation of knowledge will facilitate the integration of social and gender equality issues to different interventions on climate change and on socio-environmental and territorial management.

Current political answers to climate change tend to centre on emergencies instead of pointing to the long-term consequences of environmental degradation. It would be useful, then, to develop an integral view of risk in order to start to concentrate on reducing social and environmental vulnerability. The programmes of adaptation to climate change and environmental management should coordinate actions not only with risk-reduction programmes, but with economic and social policies as well.

The fostering of local capacities to adapt to climate change goes hand in hand with sustainable community development. It is impossible to think of reducing social vulnerability, environmental change, unemployment and migration without economic and distributive justice, or without social participation and governability.

The Mexican State must urgently promote policies directed at mitigating the consequences of climate change; without these measures, efforts to achieve adaptation will prove pointless; besides, these policies should form part of integrally conceived principles of sustainable development.

The design of climate change policies and programmes should consider international treaties on migration, labour issues, human rights, women,

indigenous people and food sovereignty. The role and commitment of labour unions should be directed towards demanding the creation of respectable jobs, so that emigration be considered only one of many possible employment options, and not the only and extreme survival strategy for male and female workers. It is essential that migration policies decriminalize migration, on both the southern and the northern borders of Mexico.

References

Aguilar, G. 2006. *Los asentamientos humanos y el cambio climático en México. Un escenario futuro de vulnerabilidad regiona*l (Mexico, Instituto de Geografía de la UNAM).

Álvarez, G. 2009. "Las percepciones del riesgo; el caso del huracán Stan en Motozintla, Chiapas", in J. L. Cruz and A. Nazar: *Sociedad y desigualdad en Chiapas. Una mirada reciente* (Mexico, El Colegio de la Frontera Sur), pp. 24–46.

Amnesty International. 2010. *Invisible victims. Migrant workers on the move in Mexico* (London).

Ángeles, H.; Rojas, M. 2000. "Migración femenina internacional en la frontera sur de México". *Papeles de Población 23* (Mexico, UAEM), pp. 127–151.

—. 2009. "Temas pendientes sobre la migración internacional en la frontera sur de México", in P. Vargas, S. Giorguli, D. Castillo, J.E. García, M.L. Rojas Wiesmer, C. Pederzini, V. Montes de Oca, A. Sandoval and M. Ordorica (eds): *Foro Nacional Las políticas de Población en México. Programa Nacional de Población, 2008-2012, Debates y propuestas* (Mexico, Consejo Nacional de Población).

Arellano, J. L. 1999. "El manejo de cuencas en Chiapas: una estrategia para el desarrollo regional sustentable", in R. Medina Mendoza Raúl (ed.): *Memorias Simposio 4 Manejo Integral de Cuencas Hidrológicas*. IX Congreso Nacional de Irrigación (A.C. Culiacán, Sinaloa, Asociación Nacional de Especialistas en Irrigación), pp. 29–48.

—. 2005. *Apropiación territorial, deterioro ambiental y gestión de recursos hídricos en la cuenca superior del río Custepec, Chiapas*. Tesis de Maestría en Ciencias en Desarrollo Rural Regional. Universidad Autónoma Chapingo (San Cristóbal de Las Casas, Chiapas).

—. 2008. "La gestión integral de recursos hídricos en cuencas: Una estrategia para reducir la vulnerabilidad ante inundaciones en la Sierra Madre de Chiapas", *Memorias del IV Seminario Internacional de Uso Integral del Agua.* Asociación Mexicana de Hidráulica (AMH), Instituto Mexicano de Tecnología del Agua (IMTA), Universidad Autónoma Chapingo (UACH) (Juitepec, Morelos).

—; López, J. 2009. "Resiliencia y vulnerabilidad en las cuencas de la Sierra Madre de Chiapas, México", in *LEISA, Revista de Agroecología*. *Respuestas al cambio climático* (Lima), pp. 17–19.

Brown, O. 2008. *Migration and climate change* (Geneva, International Organization for Migration).

Castro, G. 2005. *Las remesas de los migrantes. La migración en Chiapas*. CIEPAC Boletín 480. Available at: http://www.ciepac.org/boletines/chiapasaldia.php.

Fetzek, S. 2009. *Climate-related impacts on national security in Mexico and Central America*. Interim Report (London, Royal United Services Institute).

Galindo, L. (ed.). 2008. *La economía del cambio climático en México* (Mexico, SEMARNAT).

Gobierno del Estado de Chiapas. 2004. *Propuesta de política migratoria para el Estado de Chiapas* (Tuxtla Gutiérrez, Chiapas).

Gomáriz, E. 1999. *Género y desastres. La crisis del huracán Mitch en Centroamérica* (San José, Costa Rica, Fundación Género y Sociedad).

Hernández, H. 1998. *Análisis de la variabilidad en tiempo y espacio de la precipitación anual en Chiapas*. Tesis Profesional, Facultad de Ingeniería. Universidad Autónoma de Chiapas (Tuxtla Gutiérrez, Chiapas).

Ibarrarán, E.; Rodríguez, M. 2007. *Estudio sobre Economía del Cambio Climático en México* (Puebla, Instituto Nacional de Ecología and Universidad Iberoamericana Puebla).

IMTA (Instituto Mexicano de Tecnología del Agua). 2007. *Estimación del riesgo de contaminación de agua y sedimentos por uso de agroquímicos en el Distrito de Temporal Tecnificado 018 Huixtla, Chiapas*. Informe de Investigación (Juitepec, Morelos, SEMARNAT – CONAGUA).

INE-SEMARNAT (Instituto Nacional de Ecología y Secretaría de Medio Ambiente y Recursos Naturales de México). 2006. *Tercera Comunicación Nacional ante la Convención Marco de las Naciones Unidas sobre el Cambio Climático* (Mexico).

INEGI (Instituto Nacional de Estadística y Geografía). 2005. *Conteo Nacional de Población y Vivienda* (Aguascalientes).

—. 2008. *Censo Agropecuario 2007, IX Censo Ejidal* (Aguascalientes).

—. 2009. *Resultados de la Encuesta Nacional de Ocupación y Empleo en el Primer Trimestre de 2009 del Estado de Chiapas*, Comunicado 143/09 (Tuxtla Gutiérrez, Chiapas).

—; STPS (Secretaría de Trabajo y Previsión Social). *Encuesta Nacional de Ocupación y Empleo 2006*, second quarter (Mexico).

INM (Instituto Nacional de Migración). 2009. *Encuesta sobre migración en la frontera Guatemala-México* (Mexico).

IPCC (Intergovernmental Panel on Climate Change). 2001. *Climate Change: Impacts, Adaptation, and Vulnerability*. Contribution of Working Group II to the Third Assessment Report (Cambridge, Cambridge University Press).

Morton, A.; Boncour, P.; Laczko, F. 2008. "Human security policy challenges", in *Forced Migration Review* 31, pp. 5–7.

Olivera, M.; Sánchez, L. 2008. "Género: ¿estructura estructurante de la migración?", in D. Villafuerte and M.C. García (eds): *Migraciones en el sur de México y Centroamérica* (Mexico, Editorial Porrúa/UNICACH), pp. 247–274.

Pickard, M. 1999. *La migración en Chiapas y México*. CIEPAC Boletín 157. Available at http://www.ciepac.org/boletines/chiapasaldia.php?id=157 [accessed 10 Mar. 2010].

—. 2006. *La migración vista desde Chiapas*. CIEPAC Boletín 519. Available at www.ciepac.org/boletines/chiapasaldia.php?id=519 [accessed 10 Mar. 2010].

Rojas, M. 2007. "Mujeres y migración en la frontera sur de México", in *Amérique Latine Histoire et Mémoire. Les Cahiers ALHIM,* 14. Available at http://www.alhim.revues.org/index2252.html [accessed 10 May 2010].

Ruiz, Laura. 2005. "Gestión de recursos naturales y relaciones de género en el Ejido Benito Juárez, Mpio. La Concordia, Chiapas", in A. León, E. Guzmán, F. López, J. Romaní and L. Ruiz: *Relaciones de Género y Acceso a la Tierra* (Mexico, Espacio Autónomo, A.C./INDESOL/UAM-Xochimilcopp), pp. 49–90.

—. 2009. *Transformaciones rurales, género y derecho al agua y a la tierra en Chiapas*. Tesis de Doctorado en Sociología (Mexico, ICSI-BUAP).

—; Arellano, J. L. 2007. *Transferencia de tecnología para la conservación del suelo y agua en microcuencas en Chiapas. Informe de Sistematización del Proyecto* (San Cristóbal de Las Casas, Chiapas, Comisión Nacional del Agua, INIFAP).

Sánchez-Cohen, I.; Díaz-Padilla, G.; Ojeda Bustamante, W.; Chehbouni, G.; Orona Castillo, I.; Villanueva Díaz, J.; Gonzáles Cervantes, G. 2008. *Variabilidad climática en México: algunos impactos hidrológicos, sociales y económicos*. Ingeniería Hidráulica en México, 23(4), pp. 5–24 (Mexico).

Secretaría de Desarrollo Social. 2005. *Boletín informativo 1*. Delegación Chiapas (Tuxtla Gutiérrez, Chiapas).

UNDP (United Nations Development Programme). 2007. *Building effective and democratic management of water and sanitation (A & S) in Mexico towards the MDGs* (Mexico).

Valladares, R.; Aguirre, R.; Duch, G.; Arias, M.; Valladares, A.; Horanszky, A. 1999. *El caos en Chiapas. Los siniestros de septiembre de 1998* (Mexico, SEMARNAP).

Vargas, S.; Mollard, E. 2005. *Problemas socio-ambientales y experiencias organizativas en las Cuencas de México* (Mexico, Instituto Mexicano de Tecnología del Agua and Institut de Recherche pour le Développement).

Vásquez, M.A. (ed.). 2008. *Zonas afectadas por el huracán Stan en las regiones Istmo-Costa, Sierra y Soconusco* (San Cristóbal de Las Casas, Chiapas, ECOSUR, COCYTECH, CONANP, IDESMAC, UNICACH).

Villafuerte, D. 2008. "Migración y desarrollo en el área del Plan Puebla-Panamá", in D. Villafuerte and M.C. García: *Migraciones en el sur de México y Centroamérica* (Mexico, Editorial Porrúa/UNICACH), pp. 171–219.

—; García, M.C. 2006. "Crisis rural y migraciones en Chiapas", in *Migración y Desarrollo*, available at http://www.redalyc.uaemex.mx/redalyc/src/inicio/ArtPdfRed.jsp?iCve=66000604 [accessed 10 Mar. 2010].

—. 2007. "Veinte años de neoliberalismo en el campo chiapaneco", in *Anuario CESMECA 2006* (Tuxtla Gutiérrez, Chiapas, UNICACH), pp. 139–167.

International
Journal
of Labour
Research
2010
Vol. 2
Issue 2

Employment opportunities from climate change mitigation policies in the Netherlands

Jerry van den Berge
Federatie Nederlandse Vakbeweging (FNV)
(Federation of the Dutch Labour Movement)

International Journal of Labour Research
2010
Vol. 2
Issue 2

Climate change is a process that will affect our societies. For a long time now, the political discussion in the Netherlands has emphasized that we must make efforts both to mitigate climate change and to adapt to it. Mitigation policy is facing resistance from industry because it is seen as expensive and as a threat to competitiveness. This paper makes the case for taking serious account of employment issues when formulating climate and environmental policy. At the same time, it aims to create awareness among (Dutch) trade unions that mitigation is not a threat to our jobs, but instead an opportunity to create new, green and decent employment.

In 2007, Dutch trade unions and environmental NGOs formed an alliance. They took the view that Dutch energy policy was too defensive in facing two huge problems of our time: climate change and security of energy supply. They agreed to write a policy plan to tackle these problems simultaneously and commissioned a report on green energy policy, Green4sure. This contained a plan to achieve a 50 per cent reduction in CO_2 emissions by 2030 and at the same time reduce energy dependence on other countries, thus increasing security of energy supply. Green4sure was the first such report to take employment effects into consideration and showed that a green energy policy has on the whole positive employment effects. Several recommendations were made to the Dutch government, which incorporated some of them into the country's energy policy for the period 2009–12. This paper builds on the Green4sure report and sets out several policy options and measures. It attempts to make good use of the employment opportunities arising from solid mitigation policies. Most of the measures are still at the proposal stage. Whether or not they are ever implemented will depend largely on government policies. Discussions about prioritizing mitigation or adaptation are continuing. Recession made it clear that government funding is not unlimited and that more investment in one sector means less investment in another. Choices need to be made. Examples from Germany, Denmark and Spain, countries that made these choices, are described. The paper ends with recommendations for trade unions.

Energy policy

Dutch energy policy since the end of the twentieth century has been focused on liberalizing the energy market. For many years, there has been no other objective. With climate change and security of energy supply emerging as the biggest challenges of this century, criticism of Dutch energy policy has also risen over the past decade. Energy policy was characterized by inconsistency and incoherence regarding the shift to greater sustainability – the "energy transition", as it was called by the Dutch government. The need for an energy transition was politically recognized, but policy was restricted to the introduction of a Task Force on energy transition (which later became the Energy Transition Board) to advise the government.

According to the Dutch Energy Transition Board (ETB), transition to a sustainable energy supply should follow two main paths:

1. **Improving efficiency** – limiting the primary need for energy both by reducing demand and by converting energy losses.
2. **Using more renewable energy** – going through the learning curve, and changing over (step by step) from fossil-based to renewable energy sources.

During the transitional period, renewable energy sources are being given priority over other energy sources. This situation was legally regulated in 2009. The complementary use of fossil fuels may be further phased out. Over the next few decades, fossil fuels will still form the largest part of the energy supply. However, if the transition is to succeed, the complementary use of fossil fuels must meet two criteria:

1. **Flexibility –** the energy system must meet fluctuating demand, and must be able to capture the variable supply from renewable energy sources.
2. **Clean fossil fuels –** due to the urgency of the climate problem, additional measures will be required to limit the CO_2 emissions released through the use of fossil fuels.

These four elements form an interlinking cluster. The first and most logical option is to save energy. However, current energy systems also need to be flexible in order to incorporate an increasing use of renewable energy, the production of which is still variable. Expanding the basic capacity with new coal-fired power plants reduces this flexibility and makes it harder to incorporate renewable energy. There are several ways of increasing flexibility, but the ETB suggests that coal gasification is the best option. If coal is used via gasification, this increases the flexibility of the energy system, which means that more renewable energy can be used in the national power network. The transition strategy has 2020 as its initial target, but this is no more than an intermediate step. The ETB expects further growth in renewable energy use over the longer term. Applications such as solar and offshore wind energy can form a substantial part of the Dutch energy supply in the long term (ETB, 2008).

The Green4sure alliance decided to draw up a plan with a long-term vision on energy policy. It became a market-based energy plan in the spirit of our times, tying green targets to realistic policy instruments that have been well thought through in terms of economics. The point of departure is the ambitious target of a 50 per cent reduction in CO_2 emissions by the year 2030, compared with a 1990 baseline. Although this target goes beyond that set by the Dutch government (30 per cent reduction by 2020), there is in fact little discrepancy between the two. We have chosen to extend our vision to the year 2030 because this is long enough for a major turnaround, while still ensuring that the proposed changes can be readily envisaged.

The Green4sure targets represent the first step towards the further cuts in carbon emissions needed in the course of the present century. Green4sure has opted for government policies designed to change the behaviour of trade and industry and of individual citizens. These policies impinge on decision-making behaviour of all kinds and make due allowance for the resistance to change that will inevitably arise. Most of the policies are generic rather than specific. The core policy at the heart of the plan is the allocation of carbon budgets to all energy users, similar to the EU Emissions Trading Scheme now in force for industry. This quota system would be supported by efficiency standards for domestic appliances, vehicles and buildings; targets and, later, standards for the use of renewable sources by energy suppliers; and facilitation of sustainable choices. Facilitation encompasses a multitude of new financial and fiscal measures, including road pricing and suitable compensation for low-income groups and others, but also new investments in utilities and changes to current legislation. So that change can start at once, an interim set of policies is proposed to support measures taken to protect the climate, until such time as the new regime of budgets and efficiency standards has reached maturity. These include what is known as Green Funds, and research grants to promote innovation, a variety of charges, environmental permits, an interim Electricity Act, tax incentives and differentiation of property transfer tax (Rooijers, Boon and Faber, 2007).

Another key choice concerns differentiation between sectors. The Green4sure energy plan fully reflects the realization that any major changes to energy systems may have a far greater impact on energy-intensive and internationally operating industries than on energy-extensive businesses whose competitiveness is governed far less by energy costs. For this reason Green4sure proposes three different carbon budgets: one for industry, electrical power generation and greenhouse horticulture, a second for the transport sector, and a third for the built environment (households, offices and small businesses). This differentiation ensures that each sector contributes to the cuts according to its capacity to do so and provides scope for specific flanking policies. The choices made in the proposed policy package make it possible for this to be a domestically led strategy; measures that can be taken at the national level can be implemented immediately. For a number of sectors and instruments, though, a European approach will be essential. The costs of Green4sure are certainly higher than in scenarios involving no additional climate policy, but these are offset by a variety of benefits. With time, there will be modest growth in employment as well as added benefits in terms of new market opportunities and improved local quality of life – less air pollution by particulates and nitrogen oxide (NOx) (Blom and Wienhoven, 2007).

Employment

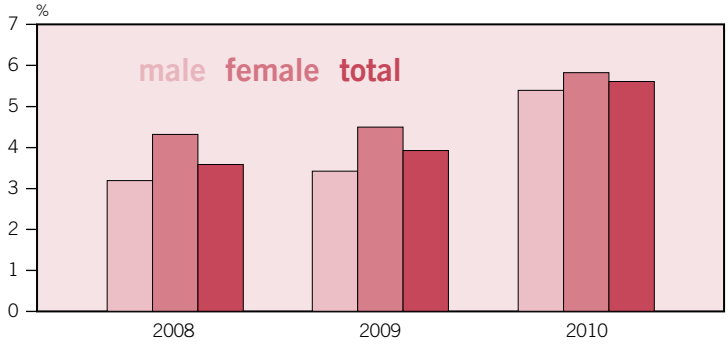
In January 2010, unemployment in the Netherlands stood at 430,000, which is equivalent to 5.6 per cent of the working population (see figure 1). For men the unemployment rate was 5.4 per cent, and for women 5.8 per cent. In January 2009, there were 320,000 unemployed, or 3.9 per cent (3.4 per cent for men, 4.5 per cent for women). The rise in unemployment is directly related to the crisis. Especially in technical jobs, unemployment has risen over the past year, mainly in construction. Most affected by the crisis are low- and medium-skilled jobs. This explains the greater rise in men's unemployment than in women's. Before the crisis, in mid-2008, unemployment was at its lowest since 2001, at 3.6 per cent (CBS, 2010).

Unemployment rose most in low- and medium-skilled technical (male-dominated) jobs, from 51,000 to 72,000, an increase of 42 per cent (!) in one year between January 2009 and January 2010, whereas in care jobs (performed mainly by female workers) it rose by only 3 per cent (CBS, 2010).

Instead of forcing people into another, completely different sector, these opportunities should be taken to employ people in new technical *green* jobs. In this way, a green policy can incorporate a just transition, which is an important union demand. This requires investments in green development and clear political choices. In 2009, the Dutch government brought in a measure permitting industries that have been severely hit by the crisis to employ staff for 50 per cent of the time and draw on the unemployment fund for the other 50 per cent. This is a way of helping industries such as metalworking and chemicals to survive, and it does prevent lay-offs. At the same time, however, it maintains current unsustainable forms of production and consumption while holding back innovation and a transition to a *greener* industry. Unions can play a role in guiding workers from affected industries to new green industries through what are called "job-to-job" transfer programmes.

Between 1999 and 2007, the number of jobs related to environmental services increased by about 25 per cent to a total of 109,000 full-time jobs

Figure 1. Unemployment rate in the Netherlands, 2008–10



Source: CBS (2010).

(1.5 per cent of total employment). The increase in the number of jobs was high in the following sectors: waste (management and recycling), energy-saving techniques and appliances, renewable energy systems (solar panels etc.), and environmental services. The number of such jobs could rise even further if the Dutch government made clear choices about which sectors to promote (through subsidies, fiscal advantages, legislative standards, simpler procedures, etc.), as this would provide more certainty for investors (CBS, 2009).

If implemented, Green4sure will give rise to plenty of changes in society. One of the first obvious signs of change will be the emergence of all kinds of new products and services that help reduce (fossil) energy consumption. A second change will be that energy consumers, large and small, will see the costs of pollution passed on in energy bills. This will give private citizens, traders and industry a solid incentive to really change their behaviour, leading to a sharp and rapid decline in emissions. Use of fossil fuel will decrease and more investment will be made in energy savings. This will in turn have consequences for employment. It is eminently feasible to halve the Netherlands' carbon emissions at acceptable cost. In doing so, employment will also ultimately rise (40,000 extra jobs by 2030) and there will be a major decrease in the amount of fossil fuels imported (–20 per cent). The share of renewables in Dutch energy supply will grow to 16 per cent, while energy efficiency will improve by 2.1 per cent a year on average (Blom and Wienhoven, 2007).

The use of renewable energy is a labour-intensive sector. Further employment potential is offered by large-scale application of wind energy and biomass. Gasification technologies for coal and/or biomass, and the development of a gas hub, all offer excellent potential for new commercial companies in the Netherlands. As a prominent "gas country", the Netherlands offers opportunities for innovative forms of gas differentiation (ETB, 2008).

Direct employment effects

Four direct effects on employment can be distinguished:

- Changes in employment because of less electricity production, due to lower electricity demand
- Changes in employment through a shift from fossil fuel to renewables
- Changes in employment/jobs due to aiming at higher energy efficiency of products
- Changes in employment because of an increase in technological (research and) development and possibly export opportunities for technologies (SEOR, 2006).

Indirect employment effects

Because the price of energy will also change, it is likely that the effects on employment will occur in other sectors. Four different (indirect) effects can be distinguished:

- Competition: effects of scale. A different energy price will influence employment because it will affect the competitiveness of Dutch companies and of the Dutch economy as a whole in relation to foreign companies or other countries.
- Competition: structure of sectors. A different energy price can also lead to changes in competitiveness among Dutch companies. This could lead to a sectoral shift, leading in turn to an increase in jobs in one sector and a simultaneous decrease in jobs in another sector. For example, a higher energy price will negatively affect energy-intensive sectors and possibly decrease production and jobs, while at the same time encouraging production of low-energy appliances.
- Purchasing power and spending. If energy use becomes more expensive, less money will be available for other consumer goods or services. This means different spending patterns will arise in non-energy-related sectors. If energy prices increase because of renewables, the budget effects are negative (Pfaffenberger, John and Djourdjin, 2006). If, on the contrary, energy prices for fossil fuel increase, the budget effects are positive.
- Price relations inputs. Energy prices influence the price relations between other input factors such as labour and capital. A high energy price stimulates employment and innovation if substitution is possible. It is important to distinguish the effects for different sectors with more or less substitution between energy and labour (SEOR, 2006).

Employment effects from Green4sure

Looking at the energy and energy-related sectors, the Green4sure scenario will cause a loss of 1,000 jobs at the most, due to lower energy demand and lower production of fossil fuel energy. Out of 7 million jobs in the Netherlands, this represents an employment loss of 0.01 per cent. A higher share of renewables (wind and biomass) in energy supply could create up to nearly 4,000 new jobs. According to CRA (2002), investments in energy efficiency would give rise to three to four times more new jobs compared to investments in increased capacity in energy production. The European Commission (2005) estimates that an improvement in energy efficiency of 1 per cent per year will lead to 200,000 new jobs EU-wide in construction and installation. An improvement in energy efficiency of 2.1 per cent per year

following the Green4sure scenario should therefore lead to 18,000 new FTE (full-time equivalent) jobs in the Netherlands by 2030.[1]

Table 1 presents an estimate of possible direct employment effects from the Green4sure scenario. Renewable energy can create around 3,700 new jobs. Substitution partly compensates for this figure. The increase in employment could be greater if more manufacturing, research and development were performed in the Netherlands (Blom and Wienhoven, 2007).

Table 2 presents an estimate of total employment effects of Green4sure. Indirect effects are difficult to quantify. On balance, there will be some 40,000 extra jobs as a total employment effect. Employment in the construction and home improvement sector will have grown, while that in energy-intensive industries will have fallen. Positive effects are expected for exports of

Table 1. Growth in employment through renewables in energy supply (Green4sure), 2000–30

	2000	2010	2020	2030
Increased capacity, on-land wind power (MW)	0	2,000	3,000	4,000
Increased capacity, offshore wind power (MW)	0	700	3,500	9,000
Increased capacity, biomass (MW)	0	560	1,430	1,800
Extra jobs per MW on-land wind power	0.19	0.18	0.16	0.14
Extra jobs per MW offshore wind power	0.19	0.18	0.16	0.14
Extra jobs per MW biomass	1.43	1.30	1.17	1.06
Extra jobs, on-land wind power	0	360	480	560
Extra jobs, offshore wind power	0	126	560	1,260
Extra jobs, biomass	0	728	1,673	1,908
Total extra jobs	0	1,214	2,713	3,728

Source: Blom and Wienhoven (2007).

Table 2. Overview of total employment effects of Green4sure

Type of effect		Minimum	Maximum
Direct	Lower electricity demand	–750	–1,000
	Increased efficiency	+5,400	+18,000
	Renewables	+3,500	+4,000
	Export	+	++
Indirect	Scale	–	– –
	Sector shift	+	+
	Spending	+	+
	Price effects inputs	–/+	–/++

Source: Blom and Wienhoven (2007).

1. The Netherlands accounts for 4.3 per cent of EU inhabitants. So the calculation is $0.043 \times 2.1 \times 200{,}000 = 18{,}000$ jobs.

new technology, shifts from energy-intensive to labour-intensive industries and a changed spending pattern that gives rise to new green (clean tech) industries (Blom and Wienhoven, 2007).

Research by TU Delft shows that total employment effects from offshore wind energy could be a net increase of 1,500 FTE jobs for the Netherlands if 6000 MW capacity is installed by 2030. A further 3,000 FTE jobs would be created abroad because most of the manufacturing is done in other countries (Mutze and Mast, 2007). Research by Greenpeace shows that the growing contribution of renewables is expected to provide between 15,000 and 21,000 jobs in the field of electricity generation from renewable sources in the mid to long term. This includes direct effects related to electricity generation and the production of investment goods, as well as indirect effects covering the upstream production chain. The new jobs will be in photovoltaics (PV), wind power and biomass, rising from 15,000 by 2020 to 21,000 by 2030, especially from more biomass use as a source for electricity, then declining to 16,000 by 2050 because of fewer jobs in wind power generation (Greenpeace, 2006).

Decent work

Green jobs are not necessarily decent jobs. So the creation of new, green jobs does not guarantee that workers will get new, decent employment from mitigation policies. For unions, it is important to seize the opportunities for new employment, while at the same time they must protect working conditions. The Dutch trade union ABVAKABO FNV has had experience of a new company that produced and sold only green energy, but refused to pay its workers according to the energy sector collective bargaining agreement. None of the fossil fuel energy workers accepted a job in the new company, and for union members in the energy industry, this was even a reason to ask the union not to do business with the new company. After a long negotiating period, the new company accepted the collective agreement. The case shows clearly that workers value decent work over green jobs. A collective agreement therefore needs to be ensured by the unions right from the start of a new green industry.

International developments and comparison

Clean energy technology is already a large and growing market. With total sales of €630 billion in 2007, it is bigger than the global pharmaceutical industry. The clean energy technology market consists of two segments. Energy efficiency sales in 2007 totalled €540 billion, and renewable energy added €90 billion. By 2020, clean energy technology will be one of the world's

main industries. In a business-as-usual scenario, the energy efficiency and renewable energy segments will grow by 2.5 per cent and 9 per cent per year to €790 billion and €275 billion respectively in 2020. Between 2000 and 2008, worldwide annual growth averaged 24 per cent for wind energy (from 4 to 27 GW annual installed capacity), 53 per cent for solar energy (0.3 to 5.6 GW annual installed capacity), 31 per cent for biodiesel (2 to 11 Mton output) and 29 per cent for energy-saving light bulbs (from 528 million to 2.4 billion units sold) (van den Berg and van der Slot, 2009).

The successes of the top four countries in clean energy technology – Denmark, Brazil, Germany and Spain – have been analysed. It was found that they share three distinct key success factors:

- early and consistent government support over the innovation cycle;
- high investment in sectors with a strong domestic fit; and
- strong home markets for clean energy technology applications.

Looking at the example of the countries that top this first global clean energy technology country ranking, three recommendations for countries aiming to emulate their success and build strong domestic clean energy technology sectors of their own can be made. These countries should:

- Launch "Technology Action Programmes" that develop a single technology from research to demonstration. This will make government support more consistent and bridge the gap between academia and industry.
- Ensure that central banks encourage the integration of CO_2 risk into financial models to facilitate a shift towards "clean" investments. More capital must also be raised for seed investment in clean energy technology ventures.
- Develop a strong home market for clean energy technology applications by influencing the purchasing decisions of government, business and consumers through government procurement, and greater stability in (policies on) sustainable energy subsidies and tax differentiation (van den Berg and van der Slot, 2009).

Germany

Germany emerged as an early leader in the renewable energy industry, and hence reaped the rewards of some of the first jobs in the green power sector. The German share of renewable energy jumped from 3.8 per cent in 2000 to 9.8 per cent in 2007. The German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety estimated the gross employment in renewable energy for 2008, as a result of the various incentive policies. It found that:

- There has been a marked increase in jobs in renewable energy, despite an economic crisis in late 2008.
- The gross estimate of jobs in renewable energy was 278,000 in 2008, up from 249,000 the year before – a 12 per cent increase.
- The total turnover of the German solar PV industry is estimated at €5.2 billion. This adds up to 57,000 jobs, including operations and maintenance.
- In one year alone, the German solar thermal market almost doubled; the first estimate of the total turnover is approximately €1.2 billion. This adds up to 15,500 jobs, including those in operations and maintenance.
- Geothermal facilities, including the heat pump market, provide around 9,100 jobs.
- Even taking the effects of the economic crisis into account, the Ministry expects that the renewable power sector will continue to grow, and by 2020 at least it should provide 400,000 jobs in Germany (Greenpeace and EREC, 2009). UNEP estimates as many as 700,000 jobs by 2030 (UNEP, 2008).

Research in Germany shows that a 3 per cent improvement in German energy efficiency leads to an employment increase of 40,000 jobs per year (Irrek and Thomas, 2006). To achieve this, the Hans Böckler Foundation (HBS) proposes an energy saving fund to support energy savings programmes and other policy instruments. According to HBS, this would create on average 40,000 jobs per year with a maximum of 75,000 new jobs about ten years after the launch of the fund (HBS, 2006).

Spain

The renewable energy (RE) sector comprises around a thousand enterprises, employing 89,000 workers directly in renewable energy projects and generating another 99,000 indirect jobs in related companies – a total of 188,000 jobs. Half of these enterprises are exclusively involved in RE. The other half is involved in manufacturing, engineering, installation, plumbing and heating activities. Sixty-five per cent of the companies conduct more than half of their activity in the energy sector. Most of the activity concentrates on solar thermal, photovoltaic and wind power projects. The sector that has created most jobs is the wind power industry (37 per cent). Enterprises in the RE sector use a highly qualified workforce. Half of their workers are professionals with qualifications at either the higher education (32 per cent) or the technical education (18 per cent) level. In small enterprises with fewer than ten workers the number of professionals is even higher (38 per cent) (Nieto Sáinz, 2008).

Denmark

Although Denmark already occupies the leading position in wind energy and wind turbine production, there is still potential for further development of energy and climate initiatives that generate employment. Currently, 20,000 people are employed in wind turbine manufacturing, in which Denmark is a world leader. Research by Danish trade union 3F and the Ecological Council shows that in Denmark nearly 50,000 extra jobs could be created, with a duration of three to ten years. Construction of biogas plants (2,700 jobs), offshore wind farms (2,500 jobs) or light rail (1,600 jobs) represents short-term gains in employment. Private heat pumps (11,000 jobs), renovation of poorly insulated housing (9,600) or energy savings in buildings by local authorities (8,500 jobs) can create employment for a longer period of about 10–20 years (United Federation of Danish Workers 3F, 2009).

Mitigation measures that create new employment in the Netherlands

Offshore wind energy

To stimulate green activity and employment, the Dutch trade union confederation (FNV) and the nature and environment foundation "Stichting Natuur en Milieu" (SNM) proposed that the construction of a new set of offshore wind turbines should be accelerated during the period in office of the current Dutch cabinet, and that more ambitious projects should be pursued. Offshore wind energy is an innovative sector which is growing fast globally and can create many employment opportunities for the water-related construction sector, energy companies, the dock industry, steel companies and knowledge-based institutions and engineering companies. As opposed to land-based wind energy, offshore wind energy requires a lot of new technology and a knowledge of construction at sea. The Netherlands has acquired a top position in this field and now has the opportunity to use this expertise for the development of a new green sector and production for export. In total, this would generate an estimated 5,000 new jobs (FNV and SNM, 2009).

Energy savings in buildings

Around one-third of CO_2 emissions are caused by (fossil) energy use in buildings, more than half of this from households. Because many houses are relatively old and therefore uneconomic in energy use, great opportunities exist in energy savings and reduction of CO_2 emissions in existing houses (Hoppe, 2009).

- Establishment of a revolving fund of €500 million for loans to private house owners. The government stands surety for the loans of revolving funds with an interest rate at the level of inflation (maximum of 2 per cent). These low interest rate loans for the renovation and insulation of houses are important because they enable private individuals to make profitable investments in their houses without having to seek consumer credits from banks. According to the Dutch government strategy for reducing CO_2 emissions "Schoon en Zuinig" ("Clean and Thrifty"), at least 500,000 houses should be insulated during the current cabinet period. One hundred thousand of the houses covered by this objective should be private houses. The estimated average investment per house is €10,000. Assuming that 50 per cent of private individuals are willing to take out a loan for this investment, the amount required from the revolving fund up to 2011 would be: 50,000 houses × €10,000 = €500 million.
- Employment: enormous potential for the construction and installation sectors, and suppliers of equipment such as micro-CHP (combined heat and power), insulation materials, heat pumps, etc. An estimated 5,000 extra jobs will be created.

Incentive for energy-saving investments by private homeowners

The Minister of Housing, Communities and Integration intends to make a sum of €350 per house available for a limited number of homeowners. This incentive bonus should stimulate private homeowners to invest in measures to increase the energy efficiency of their houses. However, research by CE Delft (2009) shows that €350 is too little to actually prompt homeowners to take action. The costs for an energy consultant alone already amount to a minimum of €500 per house. Both CE Delft and the project bureau "Meer met Minder" (More with Less) indicate that a minimum amount of €1,000 per house is required if the incentive bonus is to stimulate a sufficient number of private homeowners to make the required investments. This will create employment opportunities for the installation sector, contractors, construction workers and energy consultants.

Green renovation package for existing houses

Housing corporations are responsible for 80 per cent (400,000 houses) of the government target of 500,000 houses to be insulated by 2011. However, housing corporations have great difficulty in obtaining loans to renovate their houses, because banks feel that these investments are too risky. As a rough estimate, a minimum of 100,000 corporation houses will not be renovated due

to a lack of money. Furthermore, the crisis has halted the cash flow from the sale of old houses and the letting of houses. To accelerate the renovation of houses owned by housing corporations, the following measures are required in the short term (FNV and SNM, 2009):

- The existing regulations with regard to guarantees for loans for housing corporations should be extended on the condition that the investment leads to energy savings.
- The period of exemption from double conveyance tax under one-year "green" conditions should be much longer. Projects that are currently being built in the letting sector could then later still be brought to market as private property.
- Employment: 20,000 jobs in the construction and installation sector up to 2011.

Solar energy

Holland Solar calculates that in order to achieve 75 GW of installed solar energy in 2050, a viable commercial sector will need to be developed that offers employment to 60,000 people (ETB, 2008).

Livable cities and better public transport

Investments in cities attract businesses and people into them. Investments in new living concepts, public transport and cycling infrastructure contribute to this. Furthermore, about €11 billion worth of such investment stimulus leads to approximately 44,000 jobs in the construction sector, including land-based, road and water-related construction. This would be of particular help to these sectors, which are already feeling the effects of the crisis.

The suggested measures are:

- An extra investment stimulus for 80,000 houses in inner city areas, restructuring of 4,000 company premises, bicycle sheds and bicycle track networks. This will require a government investment of €6 billion over the next four years. The measures could create a total of 37,000 jobs in the construction sector.
- New and innovative forms of public transport such as light rail/trams and "high value" bus projects could give public transport in cities a boost. This requires investments in new infrastructure, stops and stations.
- For the coming four years, an investment of €5 billion is required. The number of extra jobs that will be created during this period amounts to about 7,000 jobs in the land-based, road and water-related construction sectors.

Railway infrastructure

Railways contribute to the improved accessibility of the Netherlands and the cities. An efficient railway system also attracts international businesses to the Netherlands. In order to further improve the railway system, the following measures are necessary: four tracks in the cities and the outskirts of cities, introduction of a new safety system, introduction of a voltage of 3,000 V and (connection to) international high-speed train lines. The extra investments amount to about €10 billion for the coming four years and should be drawn from the "infrastructure fund". This measure will enable the creation of 13,000 jobs in the land-based, road and water-related construction sectors and supply companies. In 2020, up to 1 Mton of CO_2 emissions can be avoided if large investments are made, and this also offers employees a cheaper alternative to the price per kilometre arrangement. Switching the rail network over to 3000 V and introducing the new safety system will call for the innovative power of the Dutch companies.

Electric vehicles

The Netherlands is a major supplier to the automotive sector. The country can further expand this position by investing now in the car of the future: the electric car. Further innovation will be needed in the battery industry, to deliver affordable long-life batteries. Also, innovation in infrastructure (power supply) will be required before electric vehicles can be used by the general public. Electric vehicles benefit the environment because there are no emissions of CO_2 and other polluting substances. Oil imports will decrease as the demand for petrol and diesel will diminish. Extra jobs will be created in the automotive industry and its supply industries, the energy industry and the installation sector, leading to about 1,000 new jobs.

Green VAT rate on environmentally friendly goods and services

Reduced VAT rates on environmentally friendly goods and services benefit both the economy and the environment. Ecologically sound goods and services become cheaper, which makes them more attractive for investment. A reduction in the VAT rate on environmentally friendly goods and services from 19 per cent to 6 per cent and from 6 per cent to zero per cent will increase demand for these services and goods. Services that should be considered are: insulation of buildings, energy consultants, public transport, transportation of goods by rail, shared car use, acoustic insulation and decontamination of polluted soil. This measure would provide a stimulus to the sectors in the Dutch economy that are being hit by the recession (FNV and

SNM, 2009). A lower labour tax combined with a higher energy or carbon tax would increase employment by nearly 0.1 per cent per year. This equals 6,000–7,000 extra jobs each year in the Netherlands (ILO, 2009).

Regional solutions

In the northern part of the Netherlands (Groningen-Friesland-Drente provinces), the possibility exists of linking the chemical industry with agriculture and energy production and supply. A coherent plan for these sectors called the "Energy Agri Cluster (EAC)" will provide up to 1,200 extra jobs. The plan includes a multifuel electricity generation plant (instead of a coal-fired plant as was planned before), carbon capture and storage in empty gas fields, development of bio-ethanol, bio-refining, blue energy (from salt to sweet water), expanding R&D jobs and the already existing knowledge infrastructure of "Energy Valley", smart grids and smart heating systems. For a region where unemployment is the highest in the Netherlands, such a regional development plan makes a lot of sense. Over a long period (8–10 years) there will be an additional 800 or more jobs in construction (Bergsma et al., 2006).

The issue of building a new nuclear plant to replace the only existing plant in the Netherlands (in Zeeland province) or constructing a second plant next to the first one is regularly discussed. The advantage of low CO_2 emissions is an argument much used by proponents of nuclear power in the climate debate. In Green4sure, nuclear power is considered not to be an option because it is not a renewable form of energy supply and has the still unsolved problem of nuclear waste. For these reasons, nuclear power is considered unsustainable. The employment effects of a new nuclear plant have been estimated, and the finding is that during a construction period of five years, on average 1,500 jobs are created. For operation and maintenance, 150 extra jobs will be created. Since nuclear power is very capital-intensive and labour-extensive, contrary to for example wind power which is labour-intensive, employment benefits are low. Also, it is anticipated that nuclear construction would hardly benefit Dutch companies, as it is expected that it would be carried out by experienced foreign companies such as France's Areva (Schepers and de Jong, 2009).

Gender aspects

In the United Kingdom, a group of organizations launched the "Women's Manifesto on Climate Change", in which they suggested that the responsibility for emissions sometimes seems to be linked to the division of work according to gender, economic power and men's and women's different consumption and recreation habits. The survey that led to the publication

showed that 80 per cent of the women interviewed were concerned about climate change. The Manifesto asks the British government to take environmental mitigation and protection measures in such a way as to ensure gender equality and recognize the existing inequality, in both developed and developing countries (UNDP, 2009).

The majority of new, green jobs are expected to be in the construction, manufacturing, energy production and engineering fields, where women are significantly under-represented. As a result, the green economy may unintentionally exclude women. Government and union action is required to raise the proportion of green jobs filled by women and to ensure the quality of those jobs. Steps should be taken to increase the number of women who are:

1. Employed – through anti-discrimination laws and family-friendly mandates;
2. Recruited for non-traditional jobs – through quotas and targeted schemes;
3. Trained in green jobs skills – through specialized apprenticeship and training initiatives;
4. Paid equitably – by reducing gender-based job segmentation and wage gaps;
5. Organized – through increasing the union membership of women in potential green sectors.

A combination of traditional and innovative strategies is needed, so that women as well as men can benefit from the green economy. This involves a paradigm shift to link the environmental and social consciousness of women with the wide range of jobs, including manual labour and technical positions, expected to emerge from the shift to a green economy (Sustainlabour, 2009).

Analogously to the findings of Sustainlabour, it is mostly men who occupy technical jobs in construction, manufacturing or (renewable) energy in the Netherlands. As they are more affected by the recession, they are also the skilled potential workforce for jobs that can be created. A sound mitigation policy should therefore envisage both how to transfer already skilled men into new green jobs and how to train, recruit and employ unskilled women in new green jobs.

Conclusion and recommendations for trade unions

Unemployment is rising in the Netherlands, especially for people with low or medium technical skills. On the other hand, there are many job opportunities for these people in renewable energy, energy savings in buildings (refurbishments), better public transport, infrastructure, electrical vehicles and other investments deriving from a solid mitigation policy. This paper brings these trends together.

Unemployment among this category of workers rose from 51,000 to 72,000, an increase of 42 per cent between 2009 and 2010 as compared to 3 per cent in care sectors (CBS, 2010). Instead of forcing people into completely different sectors, opportunities are open to employ people in new technical green jobs. By doing so, the government can already accomplish a just transition, although the workers affected by the crisis are not the same as those affected by climate change policy. A coherent mitigation policy and investments in green development are necessary. Green4sure measures such as the allocation of carbon budgets to all energy users can form the basis for this. The government measure that offers the option for industries hit by the crisis to employ staff for 50 per cent of the time and use the unemployment fund for the other 50 per cent is a way of helping industries to survive, but at the same time it may be maintaining unsustainable forms of production and consumption and holding back innovation and the transition to a greener economy.

The green energy plan Green4sure could create 40,000 extra jobs by 2030. The most effective means of job creation are improving energy efficiency and increasing energy savings. This coincides with a sound mitigation policy that puts energy savings and improving energy efficiency at the top of the so-called energy ladder ("trias energetica"). The focus should be on measures corresponding to these priorities. Energy savings in buildings and the renovation of housing can create 25,000 new jobs. Investments in livable cities and better public transport as well as improved railway infrastructure can create another 30,000 to 40,000 jobs. Extra investments in renewables will create new employment. Investments in offshore wind energy can create another 5,000 jobs. Altogether, this would mean around 100,000 extra jobs from green policy (about 1.4 per cent of total employment). Developing a solar industry can even create tens of thousands of jobs. Greening taxation is a simple but effective way to increase employment.

Clear political choices are necessary to achieve sustainable energy use, extending into a sustainable, green economy. The necessary steps include: development of a single technology from research to demonstration and consistent government support; facilitation of a shift towards green investments; and development of a strong home market for clean energy technology applications. Based on these criteria, a political choice for investment in energy savings in buildings and houses, offshore wind power and better public transport seems logical for the Netherlands. Also, investments in electrical vehicles and the necessary infrastructure (a smart grid) seem a good choice for a small and densely populated country.

The Netherlands is not an isolated country. It is very much integrated into the world economy. International competition does influence industries. So far, this has discouraged energy-intensive industries from starting to use renewable energy. However, experiences such as those in the northern part of the Netherlands show that industries can reinforce each other by

cooperating, and that making the transition towards a sustainable regional economy collectively can benefit all industries. The potential for a green economy may vary widely between regions. It is wise to look at the regional differences and facilitate regional climate policy, in order to make full use of regional potential.

Due to the under-representation of women in technical jobs such as manufacturing, construction, energy and installation sectors, the move towards a green economy may unintentionally exclude women. This should be prevented through training and recruitment of women for green jobs.

There is no doubt that our current energy use and our current economy are not sustainable. The only discussion is about how to achieve a more sustainable energy supply and economy, and which transition path is needed or is the most desired. The sad thing about the energy transition discussion in the Netherlands is that employment does not play a role in it. Apart from Green4sure, unions have been absent from the energy transition discussion. Sustainable development is still not core business for Dutch unions. Employment is, but the link between sustainable development and employment is missing. And yet, unions have long experience of "job-to-job transfers" in relation to company restructuring, mergers or other cases where people have faced redundancy. This experience is very useful if we consider the shift towards a greener economy as a form of large-scale restructuring of industries. Trade unions should make the link between sustainable development and employment visible, turning employment into a core criterion in climate change and mitigation policy. Hopefully, this paper will help to fill this gap.

References

Bergsma, G.C.; Croezen, H.J.; Blom, M.J.; Rooijers, F.J. 2006. *Het Energie Agri Cluster (EAC) voor het transitie alternatief, in het kader van het Zuiderzeelijn project* (Delft, CE Delft). Available at: http://www.ce.nl/?go=home.downloadPub&id=390&file=06_8217_13.pdf&PHPSESSID=1332148f0ff30abb9640737ebd5e6314

Blom M.J.; Leguijt, C.; Rooijers, F.J. 2009. *Visie op een groot aandeel hernieuwbare elektriciteit* (Delft, CE Delft). Available at: http://www.ce.nl/publicatie/visie_op_realisering_groot_aandeel_duurzame_elektriciteit/856

—; Wienhoven, M. 2007. "Werkgelegenheidseffecten Green4sure", in *Green4sure, het groene energieplan*.

CBS (Statistics Netherlands). 2010. *Employment statistics 2009* (The Hague). Available at: www.cbs.nl

—. 2009. *Milieurekeningen, 2008* (The Hague). Available at: www.cbs.nl

—. 2007. *Milieubalans 2006* (The Hague). Available at: www.cbs.nl

CE Delft. 2009. *Inkomenseffecten klimaatbeleid EnergieAgenda* (Delft). Available at: http://www.ce.nl

CRA (Charles River Associates). 2002. *Employment effects of electric energy conservation* (Boston, MA). Available at: http://www.crai.com

EC (European Commission). 2005. *Doing more with less. Green paper on energy efficiency.* COM(2005) 265 final (Brussels). Available at: http://ec.europa.eu/energy/efficiency/doc/2005_06_green_paper_book_en.pdf

ETB (Energy Transition Board). 2008. *Sustainable energy in a new economic era. How can we make our energy supply reliable, affordable and climate-neutral?* Available at: www.creatieve-energie.nl

ETUC (European Trade Union Confederation). 2009. *The climate change, the industrial policies and the ways out of the crisis.* Executive Committee resolution, Stockholm. Available at: http://www.etuc.org/a/6594

FNV (Federatie Nederlandse Vakbeweging); SNM (Stichting Natuur en Milieu). 2009. *Sociale en groene investeringsagenda* (Amsterdam and Utrecht). Available at: http://www.snm.nl/pdf/140.202.01_sociale_en_groene_investeringsagenda.pdf

Greenpeace. 2006. *Energy revolution, a sustainable pathway to a clean energy future for the Netherlands.* Available at: http://www.greenpeace.org/international/en/publications/reports/energy-revolution-a-sustainab/

—; EREC (European Renewable Energy Council). 2009. *Working for the climate; renewable energy and the green job [r]evolution* (Amsterdam) Available at: http://www.greenpeace.org/international/en/publications/reports/working-for-the-climate/

HBS (Hans Böckler Foundation). 2006. *The Energy Saving Fund for Germany* (Dusseldorf).

Hoppe, T. 2009. *CO_2-reductie in bestaande woningbouw.* (Twente, University of Twente). Available at: http://doc.utwente.nl/68963/

ILO (International Labour Organization). 2009. "Green policies and jobs: a double dividend?", Chapter 7 in *World of Work Report 2009: The Global Jobs Crisis and Beyond* (Geneva). Available at: http://www.ilo.org/global/What_we_do/Publications/WorkingPaper/lang–en/docName–WCMS_119186/index.htm

Irrek, W.; Thomas, S. 2006. *Der EnergieSparFonds für Deutschland* (Dusseldorf, Hans-Böckler-Stiftung). Available at: http://www.wupperinst.org/uploads/tx_wiprojekt/EnergieSparFonds.pdf

Ministerie van Economische Zaken. 2008. *Energierapport 2008* (The Hague). Available at: http://www.rijksoverheid.nl/documenten-en-publicaties/kamerstukken/2008/06/18/energierapport-2008.html

Morthorst, P.E. 2006. "Opponent Note to Renewable energies – environmental benefits, economic growth and job creation", in A.J. Reinhard, C. Rasmussen and H. Saxe (eds): *Green Roads to Growth: Proceedings of Expert and Policy Maker Forums* (Copenhagen, Environmental Assessment Institute).

Mutze, C.; Mast, E. 2007: "Offshore windenergie en werkgelegenheid in Nederland", in *Windnieuws* (Utrecht, Organisatie voor Duurzame Energie), No. 6, pp. 8–9.

Nieto Sáinz, J. 2008. *Employment estimates for the renewable energy industry.* Available at: http://old.global-unions.org/pdf/ohsewpA_Events399GoodCase.EN.pdf

Pernick, R.; Wilder, C.; Guantlett, D.; Winnie, T. 2009. *Clean tech job trends.* Clean Edge, Inc. Available at: http://www.cleanedge.com.

Pfaffenberger, W.; Jahn, K.; Djourdjin, M. 2006. *Renewable energies – environmental benefits economic growth and job creation*, Case study paper, published in Saxe & Rasmussen (2006), Bremer Energie Institut, Bremen, pp. 424–89.

Rooijers, F.; Boon, B.; Faber, J. 2007. *Green4sure, A Green Energy Plan* (Delft). Available at: www.green4sure.nl

Schepers, B.L.; de Jong, F.L. 2009. *Werkgelegenheid door kernenergie* (Delft, CE Delft). Available at: http://www.ce.nl/publicatie/werkgelegenheid_door_kernenergie_/945

SEOR (Sociaal-Economisch Onderzoek Rotterdam). 2006. *Werk, kennis en innovatie: effecten van een duurzaam energiescenario* (Rotterdam). Available at: http://www.greenpeace.nl/raw/content/reports/werk-kennis-en-innovatie-eff.pdf

SER (Sociaal-Economische Raad). 2005. *Milieu als kans.* Advies 05/13 (The Hague). Available at: http://www.ser.nl/~/media/DB_Adviezen/2000_2009/2005/b24088%20pdf.ashx

SNM (Stichting Natuur en Milieu). 2009. *Zeekracht, Deltaplan voor duurzame energie van de Noordzee* (Utrecht). Available at: http://www.snm.nl/pdf/nm_zeekracht.pdf

Sustainlabour. 2009. *Green jobs and women workers, employment, equity, equality* (Madrid). Available at: http://www.sustainlabour.org/dmdocuments/en255_2009.pdf

—; UNEP (United Nations Environment Programme). 2008. *Climate change, its consequences on employment and trade union action. A training manual for workers and trade unions* (Madrid and Nairobi). Available at: http://www.unep.org/labour_environment/PDFs/training/CC-FULL-EN.pdf

UNDP (United Nations Development Programme). 2009. *Resource guide on Gender and Climate Change* (New York). Available at: http://www.un.org/womenwatch/downloads/Resource_Guide_English_FINAL.pdf

UNEP (United Nations Environment Programme). 2007. *Labour and the environment; a natural synergy (*Nairobi). Available at: http://www.unep.org/labour_environment/pdfs/unep-labour-env-synergy.pdf

—. 2008. *Green jobs: Towards decent work in a sustainable low-carbon world* (Nairobi). Green jobs initiative by UNEP, ILO, IOE, and ITUC. Available at: http://www.unep.org/labour_environment/PDFs/Greenjobs/UNEP-Green-Jobs-Report.pdf

United Federation of Danish Workers 3F. 2009. *Green jobs* (Copenhagen). Available at: http://www.unep.org/labour_environment/pdfs/unep-labour-env-synergy.pdf

van den Berg, W.; van der Slot, A. 2009. *Clean Economy, Living Plane. Building the Dutch clean energy technology industry* (Zeist, WWF-Netherlands). Available at: http://assets.wnf.nl/downloads/wnf___dutch_clean_technology_nov__09.pdf

International
Journal
of Labour
Research

2010
Vol. 2
Issue 2

BlueGreen Alliance: Building a coalition for a green future in the United States

David Foster
Executive Director,
BlueGreen Alliance

In October 1948, a temperature inversion trapped the fumes from a US Steel smelter in the Mon Valley community of Donora, Pennsylvania, a mill town about 30 miles south of Pittsburgh. The resulting environmental disaster in which 20 residents were killed and 6,000 made ill, was a seminal event for both the modern environmental movement and the United Steelworkers, the union based in Pittsburgh that was chartered just six years earlier to represent the nation's steel workers.

The Donora disaster led to the United Steelworkers' (USW) subsequent embrace of environmental issues, which was the underpinning for the founding, on 7 June 2006, of a strategic alliance between North America's largest private-sector manufacturing union and the Sierra Club, the nation's oldest and largest grassroots environmental organization. The decision to forge this alliance originated with the organizations' shared history of supporting environmental protections like the Clean Air Act. But this new, strategic, "BlueGreen Alliance", which would advance the job-creating possibilities of investments in environmental protection, was sparked by the accelerating pace of globalization and the seismic social and economic shifts accompanying it. Both organizations realized meaningful improvement in the economic well-being of the world's population was dependent on sustainable management of our world and its resources.

Environmental and economic sustainability had become the yin and yang of globalization. Increased trade allowed illegally logged forest products from countries with few environmental or labour standards to flood the United States market – damaging important carbon sinks in countries like Indonesia while costing American jobs and undermining US environmental regulations. The offshoring of steel production to countries like China resulted in the United States importing steel that was 2.5 times more carbon-intensive than steel produced in the United States.

The BlueGreen Alliance (BGA) was formed on the basis of the understanding that our critical trade, global warming and workers' rights issues were interconnected and required the creation of a broad alliance between these historically divergent movements to make progress on any one of them. The new strategic alliance grew rapidly and significantly. BGA now unites nine major American unions – manufacturing workers, janitors, public sector and health-care workers, labourers, teachers, utility workers, transit operators, and auto workers – and two of America's largest environmental organizations with nearly 9 million members and supporters, in a historic alliance to create good jobs, a clean environment and a green economy.

This growing sentiment in the American trade union movement is best summarized by the conclusion of USW's 1990 statement on environmental policy: "In the long run, the real choice is not jobs or environment. It's both or neither."

The roots of the BlueGreen Alliance

In one way, the decision to form a "blue-green alliance" was an easy one for the USW as it represents workers in the dirtiest and most dangerous industries, including steel, aluminium, copper and lead smelting, chemicals and mining – all industries well known for occupational diseases – which led to an intense interest in occupational safety and health.

As the Donora disaster demonstrated, occupational health and safety issues extended beyond the plant gates. At its 1949 convention, the union discussed Donora and the prevention of future disasters. In 1963, the USW supported passage of the Clean Air Act, one of the first great environmental reforms of the twentieth century. In 1969, USW held its first national legislative conference on air pollution. The only other union actively engaged at the time was the Oil, Chemical and Atomic Workers (OCAW), whose members were also exposed to significant health risks on the job.

Support for subsequent environmental legislation came easier for the USW than for other industrial unions. Lead, arsenic, asbestos and uranium were all substances that USW members were familiar with in the workplace. Regulating them in the community made perfect sense to union members who experienced first-hand the devastating effects of high blood lead levels, or the incidence of lung cancer among uranium miners. In 1969, USW President I.W. Abel described the union's allegiance to its members' communities this way: "We refuse to be the buffer between positive pollution control activity by the community and resistance by industry." The USW, along with the OCAW, actively supported the Clean Water Act of 1974 and other environmental achievements of that decade.

In the 1990s, during the term of its first Canadian International President, Lynn Williams, the USW created an executive board committee on environmental issues. Its policy statement was presented to 3,000 delegates in Toronto for a full afternoon's debate. As part of that discussion, Stephen Lewis, former Canadian Ambassador to the United Nations and Chairman of the 1988 International Conference on Climate Change, spoke to the delegates and asked: "How do you involve the developing world, overrun by the phenomenon of poverty, in a worldwide collaboration to save the planet?"

Sixteen years later, Lewis' question haunts us with the evidence of the world's failure to act. The stagnating wages of American workers, the growth of inequality in the global economy and the increasing economic dislocation triggered by the consequences of global warming are hallmarks of a global economy that is neither economically nor environmentally sustainable. Over 12,000 USW members and retirees were directly affected by Hurricanes Katrina and Rita, losing jobs, homes, or their lives. In the forests of western Canada, the pine bark beetle infestation, caused by rising temperatures, is decimating the nation's timber supply, leading to the collapse of pulp mill communities, again directly affecting the livelihood of USW members.

The 1990 USW Convention also had as its backdrop the US Senate debate over amendments to the Clean Air Act. The amendments were vigorously opposed by the US steel industry because, it claimed, passage of these amendments would provoke wholesale closure of coke ovens and force American steel producers to purchase coke – a necessary steel ingredient – from overseas.

The USW withstood intense pressure from industry with its continued support for these critical environmental policies. This was, in part, because coke-oven workers suffered lung cancer rates two-and-a-half times higher than other mill workers and kidney cancer rates seven-and-a-half times higher than the general public.

At the 1990 Convention, a local union president at US Steel's Clairton, Pennsylvania, coke facility spoke bitterly about the threatened closure of his plant and the union leadership's commitment to environmental principles at the expense of jobs. But the union's historic linkage of environmental issues with health and safety concerns was persuasive to the delegates, and the policy statement passed overwhelmingly.

The epilogue to the debate about the Clean Air Act amendments was a surge in capital investments in new coke-oven technology, as well as tens of millions spent on cleaning up facilities and the initiation of new work practices, which meant that five years after the amendments passed, domestic coke production was at 98 per cent of pre-Act levels. Ten years later, during the global steel crisis of 1999–2001, it was clear that investments in cleaning up the coke ovens had also made them more productive and energy efficient, proving the union's contention that environmental investments actually preserved jobs. And when global demand for coke soared 450 per cent in 2002, those US steel companies that controlled their own coke supply were at a competitive advantage. US Steel's Clairton Works is still operating today.

The most notable aspect of the USW's 1990 policy statement was its recognition that global warming was the most important environmental issue facing the union:

> It may be the single greatest problem we face. Some have compared its possible consequences to the aftermath of nuclear war. And some form of it may be inevitable...The problem is global warming, a gradual rise in the temperature of the Earth itself, caused by gases we are pumping into the atmosphere. A temperature rise of just 4°C could melt the polar ice caps, flooding huge areas. Changing weather patterns could turn forests to grasslands, grasslands to deserts. Coastal cities would be submerged, major agricultural regions would be devastated, the weather would turn more violent. (USW, 2006)

Globalization and the environmental debate

Expanding globalization deepened the relationship between the USW and the environmental movement. The emergence of China in the 1990s as an economic powerhouse, the widespread migration of manufacturing jobs out of North America, and the increasing concentration of the global ownership of industry put growing pressure on industrial unions. In the tyre industry, the top nine firms controlled over 80 per cent of the world's production. In steel, petroleum, paper and forest products, chemicals and non-ferrous metals – key USW industries – the top four firms all controlled in excess of 50 per cent of world production.

These same forces contributed to weakening government enforcement of environmental regulations. In one celebrated case, the Chapter 11 provisions of the North American Free Trade Agreement led to the repeal of MTBE regulations (a highly toxic gasoline additive) in the state of California. Citing global competition, industry after industry called on the Bush Administration to ease environmental regulations and permit access to federal lands and oil, gas and mineral deposits. Between 2000 and 2007, over 400 federal environmental laws and regulations were repealed.

Industrial unions responded to globalization with consolidations of their own. The USW merged with the United Rubber Workers, the Aluminum, Brick and Glass Workers, the American Flint Glass Workers Union, and the Paper, Allied-Industrial, and Chemical and Energy Workers (PACE). A series of bitter labour disputes, sparked by global corporate takeovers, pushed the USW into the frontlines of the fight for global labour rights. Strikes and lockouts that spilled across borders included Ravenswood Aluminum, National Steel Pellet, Bridgestone/Firestone, Titan Tire, Kaiser Aluminum, Kennecott/RTZ, and many others. A 2005 analysis of the USW's District 11 membership showed that 83 per cent of the District's members worked for companies that were directly involved in global manufacturing, employing workers in like occupations in multiple countries.

Plunged full force into the global economy, the USW concentrated throughout the 1990s on trade reform as its signature public policy issue, hoping to stabilize its membership base by levelling the playing field on which its employers competed. The union fought on two fronts, advocating for a new model of trade agreements, and using existing trade laws to levy tariffs and set quotas in specific industries.

Starting with its effort to defeat the US/Canada Free Trade Agreement and proceeding to the North American Free Trade Agreement, Permanent Normalization of Trade Relations with China, the World Trade Organization, the Free Trade Area of the Americas and Central American Free Trade Agreement, the USW sought to suspend the multilateral trade agreement model and revert to bilateral agreements with enforceable

labour and environmental standards. This approach was resisted by USW-represented industries which opposed social clauses.

In specific industries, the union joined in filing trade complaints with the affected companies before the International Trade Commission, seeking tariffs or quotas where either unfair trade practices or substantial damage could be proven. In many cases, these actions were directed at single products and companies, such as the USW/Alcoa complaint against a South African aluminum plate producer.

The most significant of these joint trade actions was the Section 301 petition filed by the steel industry and the USW in 2001, leading to the issuance of both tariffs and quotas for an 18-month recovery period by the Bush Administration. The USW's recovery programme for the industry also included several measures not supported by the industry, such as federal loan guarantees and retiree health insurance protection. The Sierra Club and the Union of Concerned Scientists and Friends of the Earth joined with the USW in pushing the Steel Recovery Act, believing that a financially healthy US steel industry would raise the level of environmental standards in the global economy.

The World Trade Organization (WTO) debate in particular led to a closer relationship between the union and its environmental allies. In 1992, some environmental organizations, although notably not the Sierra Club, dropped their opposition to NAFTA when labour and environmental side agreements were added to the treaty. When the side agreements later proved to be ineffectual, as the USW and Sierra Club had predicted, these organizations again opposed the WTO model. Enforceable labour and environmental standards, contained within the trade agreements themselves, became a joint USW and Sierra Club mantra.

The USW and Sierra Club also teamed up increasingly during the 1990s on corporate campaigns. One of the distinguishing features of global manufacturing companies was their resistance to both labour and environmental regulations. Companies with bad labour relations records were almost always guilty of evading environmental standards as well.

As globalization made corporations more powerful, the USW reacted by expanding its collective bargaining agenda, negotiating over such corporate decision-making issues as capital investment allocation, the right to participate in decisions to buy and sell companies, power to name members of the board of directors, executive compensation, and the paying of dividends. The union focused as much on achieving corporate responsibility mechanisms as winning economic justice. When significant strikes and lockouts occurred, they almost always had environmental themes as well as economic demands. In the five-year-long dispute with Rocky Mountain Steel and the three-year lockout at AK Steel, the USW raised air and water quality concerns in coalition with the Sierra Club and other community organizations. The AK Steel actions resulted in a settlement to clean up AK's Middletown, Ohio, facility.

From mining companies like ASARCO and RTZ, to tyre companies like Titan, environmental compliance became a key measure of USW employers' overall corporate responsibility.

Policy initiatives such as the Good Corporate Citizenship Clause (GCCC), pursued by the USW, the Sierra Club, and the Northwest Energy Coalition at the Bonneville Power Administration during the Kaiser lockout of 1998–2000 symbolized the growing linkage between labour rights and environmental compliance. The GCCC, adopted by then-US Secretary of Energy Bill Richardson, required that any company purchasing electricity directly from the federal government would receive preferential power rates only if it complied with all labour and environmental laws. At the time, Kaiser had been charged with Unfair Labour Practices by the National Labour Relations Board.

Meanwhile, the loss of the 2004 presidential election elevated the USW/Sierra Club collaboration to a qualitatively different level. Republican President George W. Bush defeated Democrat Senator John Kerry by 3 million votes and, for the first time in a decade, the labour household vote started to shrink, from 26 per cent of the electorate in 2000 to 24 per cent in 2004.

In January 2005, the USW and Sierra Club called a day-long summit in Washington, DC between leaders of several major environmental organizations and a representative leadership group of the union. That historic summit, co-chaired by USW International President Leo W. Gerard and Sierra Club Executive Director Carl Pope, declared that the labour and environmental movements in the United States could no longer afford to act in isolation. Each movement's twentieth century accomplishments were at risk. Strategic cooperation was a necessity.

A steering committee for the BlueGreen effort was constituted with leaders from the USW, Sierra Club, Natural Resources Defense Council, Union of Concerned Scientists, and US Public Interest Research Group. The steering committee's mandate was to develop a strategic partnership between the USW and the environmental movement. Throughout 2005, the group strategized, and in June 2006 formally launched the new BlueGreen Alliance.

The failure of previous AFL-CIO efforts to develop a consensus on environmental issues led the USW to believe that the development of a strategic coalition between the two movements could be best facilitated by a single manufacturing union taking the lead, establishing the infrastructure and overarching message and then inviting other labour organizations to join. This approach specifically rejected settling for a "least common denominator," opting instead for direct engagement on issues like global warming that had stymied earlier labour efforts.

Interestingly, the USW's recent mergers, particularly with PACE, a union of 260,000 members, resulted in a membership with a wider range of views on environmental issues than existed at the time of the 2005 summit.

In order to expand input on the union's decision to form a strategic alliance with the environmental movement, the USW's Environmental Policy Committee conducted hearings with its members in both the United States and Canada. These listening sessions, along with subsequent polling and focus groups of USW members, confirmed that support for environmental issues generally ran very strongly throughout the union. Overall, almost 70 per cent of the union's members believed in environmental regulation, while only 27 per cent believed they were a burden that cost jobs.

A growing consensus

This unique alliance of labour unions and environmental organizations gained momentum as the United States – and the world economy – sank into the Great Recession. Investing in clean energy, including the production of renewable energy equipment, energy efficiency building retrofits, the expansion of broadband, cleaner transportation systems and "smart grid" power transmission, would create jobs while simultaneously reducing greenhouse gas emissions and the nation's dependence on foreign oil. Under proposed comprehensive legislation in the US House of Representatives nearly 2 million jobs would be created building the infrastructure for the clean energy economy.

While somewhere near 20 per cent of America's construction workers are on the bench, tackling climate change will create jobs weatherizing homes and retrofitting commercial buildings. It will create jobs producing the component parts for clean energy and advanced vehicle technologies. It will create jobs building the twenty-first century broadband network and expanding the smart grid to ensure the efficient transmission of renewable energy. We can make our schools cleaner and expand our transit infrastructure, creating jobs along the way.

In October 2008, the Natural Resources Defense Council – representing 1.3 million members and supporters – and the Communications Workers of America joined the BlueGreen Alliance. In December 2008, the Service Employees International Union, which represents more than 2 million janitors, health-care and public service workers, and the Laborers' International Union of North America – the nation's largest construction union – also joined. Subsequently, the Utility Workers Union of America, the American Federation of Teachers, the Amalgamated Transit Union, the Sheet Metal Workers' International Association and, most recently, the United Auto Workers joined as well.

At their 2007 Constitutional Convention, the Utility Workers Union – which represents workers in the electric, gas, nuclear, renewable energy, and water industries – passed a resolution dedicated to "Good Jobs and Energy Independence." The resolution stated:

> [T]he trade-off between a clean environment and jobs is a false choice. Global warming threatens the future itself, necessitating public investment in basic science, research and development, and deployment of shared public infrastructure. Global climate change must be addressed in a manner that assures affordable energy supplies, and that encourages economic growth while sustaining and creating good jobs...

The resolution later concluded:

> [T]he Utility Workers Union of America supports the creation of a cleaner, greener and stronger America by reducing our dependence on foreign oil and investing in energy independent technology. Encouraging innovation, investing in our members and infrastructure, and providing American consumers with broader choices will provide the tools to help move America towards real energy security for the 21st century... (UWUA, 2007)

In 2008, the Service Employees International Union (SEIU) passed a resolution on jobs and the environment, arguing that "working people already suffer disproportionate effects from bad environmental conditions – from high asthma rates among our children, to contaminated air, land and water in our neighborhoods, to the increasingly high prices that we pay to heat our homes and fuel our cars", and further stating: "We must reduce the emissions that poison our communities and contribute to climate change. Continued inaction will add to deepening economic crisis and to the degradation of the environment and food supplies, and will intensify conflict for resources around the world." The union resolved "to work closely with unions, environmental groups, community organizations, elected officials, and other allies around the world to address this crisis in a way that improves the quality of life for working people and provides protections for workers and their communities." (SEIU, 2008)

In 2009, the American Federation of Teachers (AFT) resolved to "partner with environmentalists, labor unions, social justice and faith-based organizations, government, students and others to make certain our country creates good green jobs – including the green jobs of our members in education , government and healthcare." (AFT, 2009)

Advancing the clean energy economy – and creating good, green jobs across the world

As the debate in the United States continues over the solutions to climate change, the BlueGreen Alliance has become a key voice advocating for the job-creating potential of environmental investments. It has forcefully made the case, representing a consensus of American workers and environmental advocates during the economic downturn that the most effective strategy

for responding to the global unemployment crisis is through sustained, long-term investments in climate change solutions. Only in this way can millions of permanent jobs be created.

As globalization impacted the American economy – and as jobs and industries moved to other countries in search of lower wages and fewer environmental regulations – US labour unions often found themselves fighting rearguard actions. In contrast, the clean energy economy provides a global opportunity for job creation, economic development, and environmental improvement in all economic systems and at all levels of development, whether in industrialized, emerging or lesser developed countries.

The BlueGreen Alliance works across all economic sectors to expand the number and quality of jobs in the clean energy economy, whether in manufacturing, the service sector, education, or construction. In order to accomplish this, BGA advocates policies on the federal and state level that encourage environmental and economic sustainability – creating good, green jobs while protecting the environment for future generations.

The labour and environmental partners of the BlueGreen Alliance have adopted a common set of climate change principles and are working to pass comprehensive climate and clean energy legislation that establishes an economy-wide cap on carbon emissions with significant reductions of at least 80 per cent by 2050, with meaningful reductions by 2020. In addition, such legislation must include a Renewable Electricity Standard (RES) and Energy Efficiency Resource Standard (EERS) to spur the development of a clean energy assembly line and the retrofit of America's homes and businesses, provide safeguards for energy-intensive, trade-exposed industries so that they can compete in the global economy, and ensure the creation of quality jobs and economic opportunity for all workers and all communities.

In order to expand the number of good jobs in the green economy, BGA supports passage of critical legislation to ensure the right of American workers to form unions and engage in collective bargaining. It also works to pass effective global trade agreements that include enforceable labour, environmental and human rights standards that lift up economies world-wide.

Recognizing that most environmental disasters start with an unsafe workplace, the BlueGreen Alliance also works to increase safety on the job through improvements to America's occupational health and safety laws. Recent disasters – including the BP oil rig explosion that killed 11 people, the Massey Upper Big Branch coal mine explosion in West Virginia that killed 29, and the Tesoro oil refinery explosion that killed seven in Anacortes, Washington – demonstrated the importance of improving worker protection on the job as a key component of environmental protection.

In addition, the BlueGreen Alliance is working to reform the laws regulating toxic chemicals in the United States. Of the more than 80,000 chemicals produced and used in the US, only 200 have been tested and just five regulated under the 1976 Toxic Substances Control Act. Legislation to

modernize this law would put the burden of proving safety on chemicals' producers and provide the US Environmental Protection Agency with more power to regulate these chemicals.

The Alliance also supports investments in America's clean transportation infrastructure, including roads, bridges, tunnels, rail, transit, intercity bus, freight systems, and safe biking and walking options because cleaner, safer, more efficient transportation options will also create millions of jobs.

Finally, the BlueGreen Alliance supports an international agreement to reduce global emissions that includes measures to ensure a just transition to a global clean energy economy, including worker training and social and labour protections so that the green economy will truly lead to good, sustainable jobs and improved livelihoods.

Such an international agreement must ensure transparency, verification and accountability by including strong provisions to regularly assess and hold accountable countries for progress towards their commitments to reduce greenhouse gases. Provisions should be included that fairly promote the transfer of clean energy technology to lesser developed countries to create a new model of economic development. Effective mechanisms should also be included to ensure reductions in emissions from degradation and deforestation (REDD).

In the United States, the Alliance works to broaden the support for the clean energy economy through its education and outreach programmes. These include its Labour Climate Project, which educates and trains union members throughout the country about the job-creating potential of clean energy investments. On an annual basis, BGA convenes the Good Jobs, Green Jobs National Conference, which brings together thousands of green economy stakeholders to share ideas and strategies for building a green economy in the United States. The Green Jobs Advocacy Day puts hundreds of "citizen lobbyists" in touch with their elected representatives.

In the last year, the BlueGreen Alliance has initiated programmes that provide technical assistance to manufacturers and job-training opportunities to workers and employers through its Clean Energy Manufacturing Center and GreenPOWER training program. The latter is a Department of Labor-funded programme, through the BlueGreen Alliance Foundation, that trains workers to increase energy efficiency in the work place and reduce waste in manufacturing processes. The programme trains both unemployed workers to make them more employable and currently employed workers to make their businesses more efficient.

Today, the BlueGreen Alliance partners represent over 9 million Americans. The Alliance is neither a partnership of convenience, nor one of accident. Instead, it represents the convergence of two important social movements at a time when the economic forces of globalization need – for the benefit of all humanity – to be regulated and given a structure that will make the clean energy economy of the future fairer than the fossil fuel economy it is replacing.

References

AFT (American Federation of Teachers). Available at: http://www.aft.org/issues/economy/green-jobs/.

SEIU (Service Employees International Union). Available at: http://www.seiu.org/a/ourunion/service-employees-international-union-resolution-on-jobs-and-the-environment.php.

USW (United Steelworkers of America). *Securing our Children's world, Our Union and the Environment*, available at: http://assets.usw.org/resources/hse/Resources/securingourchildrensworld.pdf.

UWUA (Utility Workers Union of America). Available at: http://www.uwua.net/who-we-are/2007-constitutional-convention-resolutions.html.

International
Journal
of Labour
Research

2010
Vol. 2
Issue 2

The greening of the offshore energy sector in the North Sea

Miguel Esteban
Waseda University,
Department of Civil Engineering

David Leary
Faculty of Law,
University of New South Wales

Qi Zhang
Agya Utama
Keiichi Ishihara
Kyoto University,
Energy Engineering Department

Introduction

The idea that humanity has reached or will soon reach a peak in oil production has prompted a debate about future energy sources. This has been compounded by the fears that serious climate change will result from increased concentrations of greenhouse gas emissions in the atmosphere. The development and diffusion of new technologies is seen as essential to achieve reductions in these greenhouse gases, as recognized by the United Nations Intergovernmental Panel on Climate Change (IPCC) and reflected in the 1992 United Nations Framework Convention on Climate Change (UNFCCC).

While the authors agree entirely with the need to reduce greenhouse gas emissions, this paper argues that it is not only important to think about where the energy will come from, but also how to make a transition from traditional energy sources such as fossil fuels to new renewable sources of energy. In particular, and due to the constraints placed by many of the traditional types of renewable energy on land, the authors argue that offshore renewables could generate a significant amount of electricity in areas generally less sensitive to human concerns.

In particular, this paper will focus on the case of the United Kingdom and the North Sea, and how the offshore oil and gas sector could be transformed into a renewable energy industry. The main phase of exploration and exploitation of the North Sea began with the introduction of the United Kingdom Continental Shelf Act in May 1964 and led to major discoveries and production rate increases during the 1970s and 1980s. Production peaked in 1999 with an extraction of 950,000m^3 (6 million barrels) of oil per day. Natural gas production was nearly 280×109 m^3 (10 trillion cubic feet) in 2001 and continues to increase, although British gas overall production is also in sharp decline (British Petroleum, 2009). Despite this, the North Sea is actually responsible for 40 per cent of the total offshore oil production for non-OPEC and former Soviet Union countries, and offshore resources account for 50 per cent of the total oil production of these countries (Energy Watch Group, 2007).

In the United Kingdom, the oil and gas sector employs around 34,000 people directly, with a considerable number of others employed indirectly through supply chains – a total of around 350,000 jobs, 230,000 of which are within the wider supply chain and another 89,000 supported by the economic activity induced by employees' spending, according to the Oil and Gas UK 2009 Economic Report. This same report estimates that the oil and gas export sector employs a further 100,000 people. The continuing decline in oil production will destroy many of these existing jobs in the United Kingdom, and may force many workers to seek jobs in other industries or countries. However, as global oil production either has peaked or will soon peak, it appears unlikely that these jobs can be retained for a prolonged period of time.

Nevertheless, the loss of these jobs in the United Kingdom will have a detrimental effect on the economy of the country, especially in some areas of Northern England and Scotland, and will result in the loss of valuable expertise in offshore construction and operations. This expertise, however, would place the United Kingdom in a favourable position to take advantage of the boom in offshore renewable energy, and some evidence of how the expertise of the offshore oil and gas practices have started to help the wind industry has already started to appear. For example, recently two large wind turbines (5 Megawatts (MW)) were installed 45 meters deep in water, a first for the offshore wind industry, where the previous offshore oil and gas experience of the company responsible played a key part in the execution of such a difficult project (SeaEnergy Renewables, 2010).

According to the European Wind Energy Association (2009), the importance and future potential of the offshore renewable industry (particularly wind energy) to the United Kingdom economy is already reflected in the number of companies present in the sector, including some of the largest wind engineering and consultancy companies. The wind energy industry is believed to have already generated around 4,000 to 4,800 jobs, with an installed capacity of 882MW at the end of 2009 (ibid). Currently there are plans for blade manufacturing to resume in the United Kingdom (Macalister, 2010). In fact, the British wind power industry has estimated that eventually 70,000 green-collar jobs could be created from the £100 billion of private investment required under the Round Three offshore licensing (ibid).

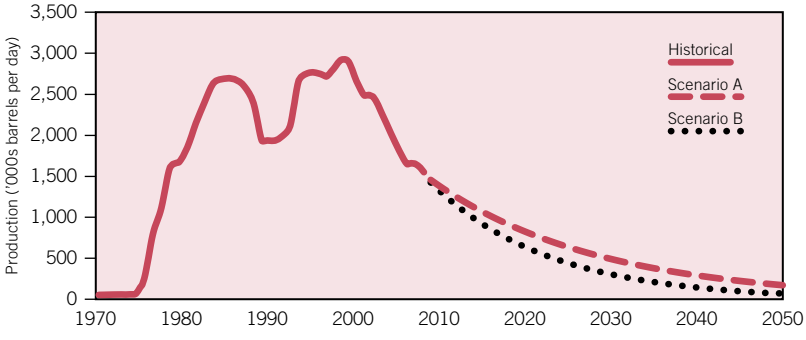
However, offshore renewables are not only confined to wind energy. Recently a new generation of ocean energy devices, capable of extracting energy from the waves and tides, has entered the pre-commercial stage, with the first units being installed in the United Kingdom and Portugal (SeaGen and the Pelamis, respectively). According to Pelc and Fujita (2002), this sector has the potential to make a significant contribution to supply electricity to regions located close to the sea, though this source of renewable energy has so far not been utilised on a significant scale. The United Kingdom could thus potentially extract energy from sea areas using at least three different sources: wind, tides and waves. In this paper, we combine these three into one term, "offshore renewable energy", as they all share the common constraint of having to work in difficult offshore environments. A fourth type of technology, called Ocean Thermal Energy Conversion (OTEC) also holds significant potential for countries located in tropical regions, but is less appropriate for the cold seas around the United Kingdom. All of these technologies offer important environmental and economic benefits compared to other types of electricity production, as they generally have smaller visual impact (offshore wind turbines are located far enough at sea so that they are often not as noticeable), virtually zero CO_2 emissions and minimal impact on local biodiversity as compared to other technologies.

One purpose of this paper is to analyse the transition that could be made from traditional extractive oil and gas industries to that of a renewable offshore industry in the United Kingdom. To do so, the potential of the offshore energy sector to produce electricity will be assessed with the view to maintain the number of people employed in the offshore energy industry over time. The distribution of current jobs in the sector will be also assessed, highlighting the need for appropriate training schemes to be put in place, and some current efforts in the area will be showcased. Maintaining employment in the offshore energy sector would allow the United Kingdom to retain an important pool of talent not necessarily available in other countries. This could provide a significant future asset to its economy as the corner-stone of an "export" services renewable industry similar to that enjoyed by Denmark in the wind industry. A basic evaluation of the potential offshore markets in other countries will be undertaken to illustrate the export opportunities available to the United Kingdom. The countries studied will be divided into two broad groups, one made up of countries which are in a situation similar to that of the United Kingdom, such as Mexico, Gabon and Indonesia, where oil production is declining and which would need to find alternative jobs for workers in this sector; and others where energy consumption is increasing dramatically and where new jobs would be created anyway, such as India, Brazil and China.

Decline in North Sea oil production

The North Sea has been the source of most of the United Kingdom's oil for the last decades, though data from BP show how oil production reached a peak in 1999 and has been in decline ever since, as shown in figure 1 (British Petroleum, 2009). This decline in oil production is often referred to as oil depletion, and it occurs in the second half of the production curve of an oil field,

Figure 1. Historical production of United Kingdom's North Sea Oil and depletion scenarios, 1970–2050



Source: British Petroleum (2009).

as explained by Hubbert's peak theory (1957). This theory makes predictions of production rates based on prior discovery rates and anticipated production rates, approximating the production curves of non-renewing resources to a bell curve. Thus, when an oil field is completely drilled out production goes into exponential decline, with production levels declining quite rapidly at the start and eventually levelling off (see figure 1). According to British Petroleum (2009) in the North Sea the rate of decline after 1999 has averaged at around 7 per cent. In spite of this, the present work will consider the effects of two different oil depletion scenarios, with Scenario A showing an average annual decline of 5 per cent and Scenario B 7 per cent, as shown in figure 1.

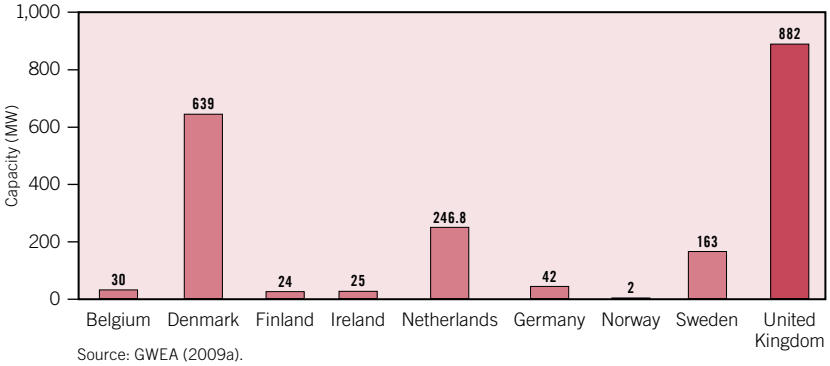
Offshore wind and ocean energy in the United Kingdom

Currently the United Kingdom's oil and gas sector directly provides jobs to around 34,000 people, with many more indirectly employed through supply chains. As the oil reserves start to diminish these jobs will slowly disappear, which will have a detrimental effect on the economy and result in the loss of valuable expertise in offshore construction and operations. However, offshore renewable energy systems have the potential to absorb a great deal of the jobs that would otherwise be lost in the offshore oil industry, and in the process at least partly satisfy the country's electricity demand.

Offshore wind

By the end of 2008 in Europe there was more than 2.053 GW of offshore wind capacity installed, as shown in figure 2, with several new large offshore projects planned in the near future (GWEA, 2009a). Figure 2 shows

Figure 2. Offshore installed wind capacity in Europe, 2009



Source: GWEA (2009a).

that the United Kingdom has currently more installed capacity than any other country (BWEA, 2007). In fact, the rate of installation is expected to expand considerably in the coming years, going from an annual installation rate of 194MW in 2008 to over 400MW in 2009, and to an order of 800 to 1,000 MW per annum for the period 2010 to 2014 (BWEA, 2007). Eventually, it is believed that the United Kingdom's seas could provide enough extra wind energy to power the equivalent of 19 million homes by having an extra 25GW of electricity generation capacity in addition to the 8GW of wind power already built or planned offshore, which would be enough to power every household in the country, more than a quarter of its electricity needs and generate up to 70,000 new jobs (*The Guardian*, 2009).

Ocean energy

The twenty-first century has seen the emergence of a new generation of ocean energy technologies, many of which had reached the pre-commercial phase of development in 2009. These technologies use a variety of conversion mechanisms to obtain energy from the ocean (Soerensen and Weinstein, 2009), and are potentially a very promising source of energy especially on west-facing coasts in either hemisphere with latitudes between 40° and 60° (see for example Scruggs and Jacob, 2009, or Cornett, 2008). In the United Kingdom, the Carbon Trust estimated the extent of the economically viable offshore resource at 55 TWh per year, about 14 per cent of current national demand (Scruggs and Jacob, 2009).

The first major ocean energy installation built was a tidal barrage at La Rance, France in 1966, and is still in operation today. In the United Kingdom, tidal barrages, such as the one proposed for the River Severn, are currently being reappraised, although opposition to schemes such as the Severn Barrage appear to make it unlikely that the project will ever be constructed (Owen, 2008). The new generation of ocean energy devices, however, are generally devoid of the problems surrounding tidal barrages, and in the last couple of years many of these devices have moved from prototype stage to installation of the first showcase commercial farms. The first of these have just recently come into operation, with the Pelamis project (which has had its first commercial wave farm installed in Portugal) and SeaGen (in Northern Ireland) having completed installation at the end of the summer of 2008 (Leary and Esteban, 2009). SeaGen, for example, could be compared to an underwater wind turbine, and its rotors operate for up to 18–20 hours per day, producing energy equivalent to that used by 1,000 homes (Westwood, 2008). A number of other devices have completed prototype testing and are awaiting planning permission, such as the WaveDragon, currently awaiting environmental consent to construct and deploy a full-scale 7MW commercial demonstration unit in Pembrokeshire, Wales (WaveDragon, 2009).

There are currently a number of other projects and prototypes undergoing full scale testing. The European Marine Energy Centre (EMEC), for example, has four grid-connected berths for wave and five for tidal devices, all of which are either in use or booked (Bryden, 2009) or awaiting for support installations to be constructed (such as the WaveHub).

Offshore renewable energy scenario for the North Sea

To understand the implications of a shift from fossil fuels to renewables for the United Kingdom economy, it is necessary to develop a scenario showing the amount of electricity that could be generated if job equilibrium was maintained in the offshore industry. This would essentially mean calculating what could be achieved if each job lost in the oil and gas industry was automatically replaced by a job in the renewable sector (either in the installation and manufacturing or the operations and maintenance of the increasing number of installed devices).

Employment factors

The employment factor can be defined as the number of people that is required to install, manufacture and maintain each MW of installed capacity. This concept is crucial to estimate the amount of installed capacity that could be installed in the future, and authors such as Rutovitz and Atherton (2009) give some typical employment factors for the present day offshore and ocean energy. However, general advances in technology and methodology will probably reduce these factors in the future, and hence it is necessary to use decline factors (or learning adjustment rates) to calculate the future employment factors. These decline factors work by reducing the employment factor by a given percentage each year, to take into account the reduction in job requirements to produce each MW of capacity as the technologies mature. Although Rutovitz and Atherton (2009) make a difference between offshore wind and ocean energy (see table 1), it is probable that the factors given for ocean energy are too optimistic. They give references to reports from the early 2000 and for a study on the Wave Dragon unit, an advanced prototype device

Table 1. Employment factors for offshore wind and ocean energy

	Installation and manufacturing (person years/MW)	Operation and maintenance (jobs/MW)	Decline rates in job factors (%)		
			2010–2020	2020–2030	2030–2050
Offshore wind	28.8	0.48	3.9	1.5	0.0
Ocean energy	10.0	0.32	7.8	7.8	N/A

Source: Rutovitz and Atherton (2009).

that is still to enter commercial production. Considering the natural similarities between the installation and maintenance of offshore wind and ocean energy (difficult marine environment, poor weather, the fact that technologies such as SeaGen require similar monopole installations as offshore wind structures, etc.) it is more realistic to use similar factors for both technologies. As offshore wind is the more advanced technology, it is thus natural to adopt the factors for this technology also for ocean energy. The factors given in Rutovitz and Atherton (2009) are only up to 2030, and after this date the present study assumes that the learning factor will be zero per cent, which would result in a conservative estimate of what could be achieved.

In the case of the oil and gas industry, it is assumed that the number of jobs required to extract each unit of volume of fossil fuel will remain constant, and hence that employment will also follow a decline proportional to the depletion rates of each scenario. The current study does not include the people employed in the wider supply chains of either the oil and gas or renewable sector.

Capacity factors

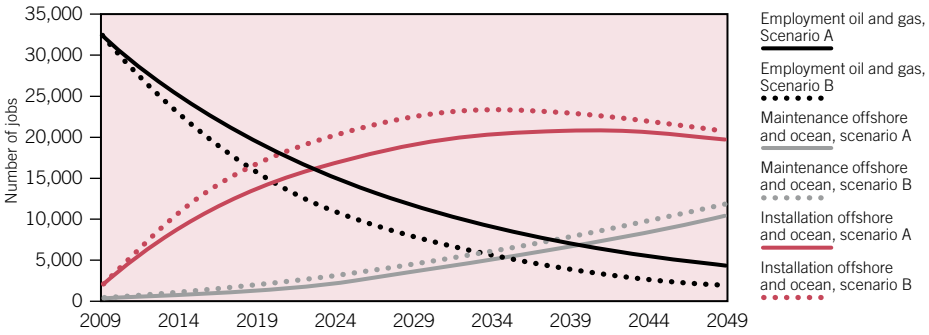
To estimate future electricity production it is necessary also to make assumptions about the level of the average capacity factor of each renewable source. Renewable energy suffers from the problem that it cannot produce electricity all the time, as the driving force behind it varies according to weather conditions. The capacity factor is thus defined as the ratio of the actual output over the maximum theoretical output during a certain period of time. Different capacity factors are offered by a variety of different studies. Lemming et al. (2008) assume a capacity factor for offshore wind of 37.5 per cent until 2050, as they expect the higher production of new turbines to moderate the lower availability of good wind sites. However, according to the Department of Energy and Climate Change of the United Kingdom Government (2009), the average for offshore wind for the last five years was only 27.2 per cent. For the case of tidal barrages the load factor is much lower, typically around 23 per cent, according to Breeze (2005). Some other authors, however, claim that modern ocean energy devices can achieve much higher capacity factors than tidal barrages, in the range of 37–40 per cent for wave and for 40–50 per cent for tidal flows (see Soerensen and Naef, 2005, or New Zealand Electricity Commission, 2005). However, all of these figures should be treated with caution, as there is yet no definitive evidence for them since there are no tidal or wave devices in the water that can give a reliable estimate of the capacity factor. For this reason, the present paper uses a rather more conservative value for the capacity factor of the ocean energy, and for the sake of simplification it was made the same as the one used for offshore wind, or 27.2 per cent.

Scenario results

Figure 3 shows the number of people employed for each of the North Sea depletion scenarios for the renewable and fossil fuel sectors. According to these projections, by 2050 the oil and gas industry will have only between 1,600 and 4,000 employees left, but the offshore renewable sector would be employing 10,000 to 12,000 people in maintenance and 19,000 to 20,000 people in the installation of new devices. These scenarios suggest that there should be a rapid expansion in the installation of offshore units in the coming years, as the number of jobs in the sector would expand dramatically following the initial rapid decline in oil production.

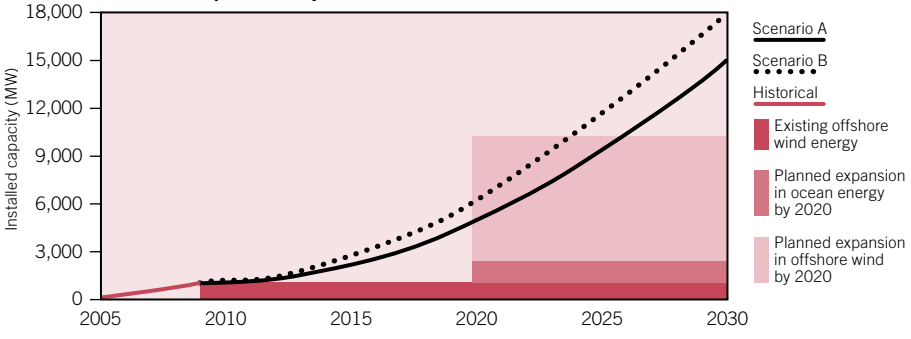
The scenarios show how by 2030 between 14.5 and 17.8 GW of offshore energy capacity could be installed (see figure 4), increasing to 39.5 and 45.3 GW by 2050 (which would produce between 93 and 107 TWh per year for scenarios A and B respectively, as shown in figure 5). Figure 4 also suggests that these scenarios are quite realistic as current plans for installation of

Figure 3. Employment levels in the offshore industry for Scenarios A and B



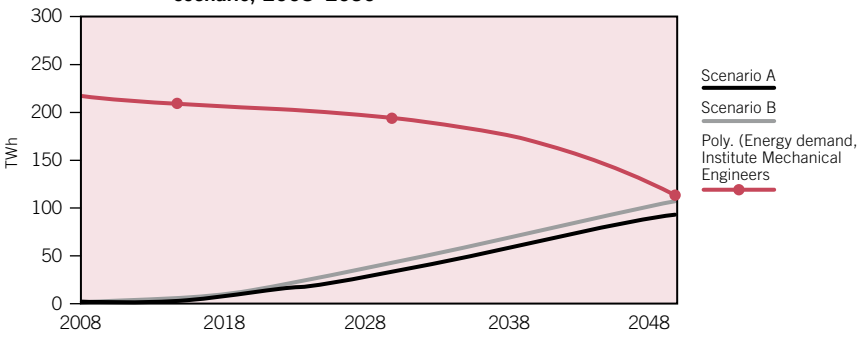
Source: Authors' calculations.

Figure 4. Installed capacity of both offshore wind and ocean energy for Scenarios A and B, showing also current planned expansions by 2020



Source: Authors' calculations.

Figure 5. Electricity production and electricity demand scenario, 2008–2050



Source: Authors' calculations.

offshore and ocean energy already would result in much higher installed capacities by 2020 (see BWEA, 2010 for offshore projects, and BBC, 2010 for ocean energy). It should be kept in mind, however, that these are the current plans for the sector, and that they include many offshore wind farms in construction and planning, as well as areas recently leased to companies around the Pentland Firth and the Orkneys (that could have a capacity for 1.2 GW of energy, to be installed by 2020, according to the BBC, 2010). It is possible that in the next ten years, other projects will be proposed and executed and that even more renewables could be installed, though it is difficult to foresee that at present.

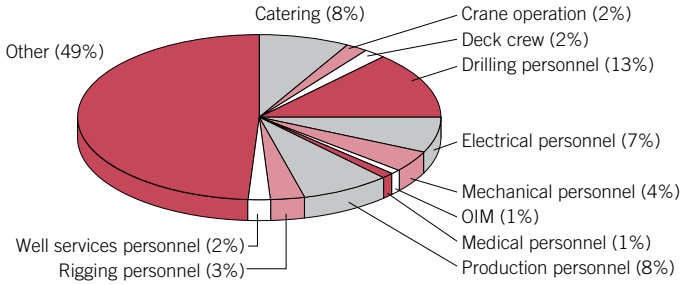
The 2050 scenarios shown would mean that between 42 and 49 per cent of the electricity consumption in the United Kingdom in 2006 (according to the Institution of Mechanical Engineers (IME) UK 2050 Energy Plan) could be provided by offshore renewables. There are a number of studies that estimate the future level of electricity consumption in the country, each yielding different results depending on their assumptions. The IME's future energy use scenarios, for example, show a gradual decrease in electricity consumption, reaching 111 TWh in 2050 (a reduction of 48 per cent over 2006 levels), a similar figure to that achieved by scenario B in the present research. This would be achieved by improvements in heating systems and insulation, reducing industrial demand and making efficiency improvement throughout all sectors). It is difficult, however, to compare the results of the current study with those of the IME as the energy supply of that study includes generation of electricity for the transport sector, assumed to be composed almost entirely of electric vehicles (IME, 2009). Nevertheless, it appears possible that by 2050 offshore renewables could supply a large percentage of the electricity needs, provided that adequate government policies are put in place.

The need for retraining and an active government support policy

The Oil & Gas UK 2007 UKOMCS Workforce Demographics Report (2007) highlights how, despite frequent concerns that the industry had an ageing workforce, the current average age of the workforce in the offshore oil and gas industry remains 41 years. Although a large amount of the expertise can probably be reused by the renewable industry, the nature of the new jobs will not always necessarily be the same as the current ones. This report provides data on the distribution of the jobs of the individuals who spend over 25 nights offshore, as shown in figure 6. It appears that many of the present offshore personnel could successfully make the transition to the renewable sector, such as those of mechanical or electrical personnel, areas which would probably increase in importance due to the large maintenance requirements of wind turbines, for example. Other jobs, such as drilling personnel, would disappear completely and would require retraining, which highlights the need for unions and the government to act together and establish training schemes to assist these workers. Some efforts to develop a network of industry-based skills in the wind sector, including a European industry qualification standard, have already started to take place. The Windskill programme by the wind energy industry, which includes the offshore wind sector, has created European Qualification Profiles, which were already tested in a range of pilot training sessions at various European locations during 2009. Such qualifications are of key importance to the development of the sector, and labour unions should attempt to push government for the wider implementation of training schemes based on this program.

Crucially, the opportunity to retrain a large section of the population comes at a period of relative dysfunction in the operation of the world economy, with many people advocating a "Green New Deal" as a solution to the current triple economic, environmental and energy crisis affecting most

Figure 6. Distribution of jobs* in offshore oil and gas industry in the United Kingdom, 2007



*For workers who spend over 25 nights offshore a year.

Source: Oil & Gas UK (2007).

countries. This has been echoed by politicians in a number of countries, including President Obama in his 2008 nomination speech, pledging the creation of 5 million new green jobs (Feldman, 2010).

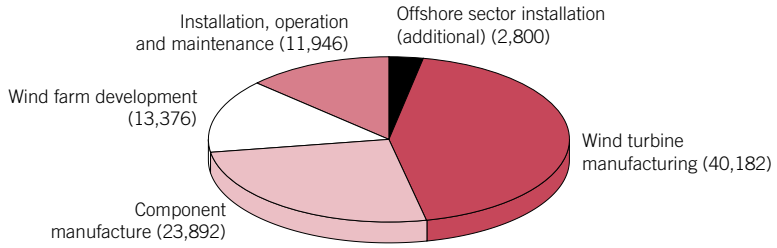
In the case of the offshore industry in the United Kingdom, however, the need is not so much to create new jobs as to be able to effectively make a transition between an existing fossil fuel based industry and an emerging renewable energy industry. In this respect, trade unions can actually play a key role in maintaining jobs by organizing strategic campaigns, entering into coalitions with green businesses, sitting on committees with politicians and forming community alliances (ibid.).

Nevertheless, the nature of the jobs "retained" by this transformation would change slightly, and it is inevitable that the number of nights spent offshore would probably be greatly diminished (as the offshore renewable industry is based within a few kilometres of land, making it feasible to travel to the devices on a daily basis). It is worth remembering, however, that many of the jobs already created by the wind industry are highly skilled positions with high pay, providing employment opportunities in a number of fields (Renner, 2001). The industry requires people trained in different branches of meteorology; mechanical, structural, coastal and electrical engineers to design and build the devices; workers to form the advanced composite and metal parts; quality control personnel, computer specialists, and mechanics and technicians for the maintenance operations. In fact, wind energy is more labour intensive than coal or nuclear (ibid.), despite the fact that it is currently rapidly approaching grid-parity, essentially because of the lack of need for the purchase of fuel. For example, in Germany in 2001, wind contributed 2–3 per cent of the country's total electricity generation, while supporting about 35,000 jobs in manufacturing, installing, and operating wind machines, corresponding to 33 per cent share for nuclear (with 38,000 jobs) and 26 per cent coal-fired power plants (80,000 jobs) according to Renner (2001). By 2008, the number of direct jobs in the wind industry had increased slightly to 38,000, while producing around 7 per cent of the country's electricity (EWEA, 2009). It is also important to note that the job quality provided by the wind industry is much higher than that of the coal sector, as this sector drastically reduces the requirement for hazardous jobs in the mining industry.

The number of indirect jobs

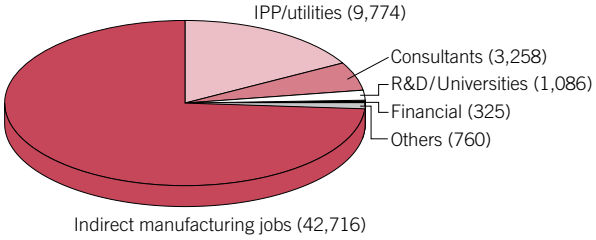
It is important to remember that restructuring would not only affect the number of direct jobs, but that other areas like component manufacturing (such as the manufacture of towers and foundations) could also be successfully reconverted, as these areas can draw on experience in the manufacturing of oil rigs (Global Climate Network, 2010). The actual turbines, however, are likely to be imported from overseas, as the United Kingdom currently

Figure 7. Distribution of direct employment in the wind industry in Europe, 2007



Source: EWEA (2009).

Figure 8. Distribution of indirect employment in the wind industry in Europe, 2007



Source: EWEA (2009).

lacks any expertise in the area, though there are some hopes that this may change and that some factories might move in the country (ibid.). Figures 7 and 8 show the distribution of direct and indirect jobs in the wind energy in Europe as a whole (EWEA, 2009), giving an indication of the relative importance of the manufacturing of components and turbines related to the total employment in the sector. It should be noted, however, that the figures for the offshore sector are slightly different to these, as additional personnel is needed to install these structures at sea (as highlighted in figure 7).

Besides these jobs, a large number of indirect jobs are also shown in figure 8, relating mostly to manufacturing jobs in the larger supply chain, but also to additional required work by the utilities and other R&D and financial jobs. Figures 7 and 8 also show the relatively high quality of the jobs in the sector, especially when compared with the coal industry, where a large number of jobs is based on the extraction and transportation of raw materials.

Recommendations for trade unions, policy implications and discussion

In February 2003, the United Kingdom Government laid out in an Energy White Paper its energy policy to create a low carbon economy of the future. Three key strategies were at the core of this new policy: tackling climate

change, securing the country's energy supplies when fossil fuels start to run out, and updating its energy infrastructure (BWEA, 2009). In this paper, we have highlighted the often overlooked fact that oil depletion will have a deep impact on the labour market and society of some countries. It is thus highly advisable to promote renewable energy not only for the sake of the environment, but to ensure that sustainable jobs will be created which will not disappear after the oil and gas resources are gone. In the case of the United Kingdom, these jobs constitute a pool of talent that has taken decades to build. In the same way the country's oil and gas sector is now able to generate revenues in other countries through the export of its services (around 100,000 jobs, according to Oil & Gas UK, 2009), building an export offshore renewable industry could constitute one of the future corner-stones of the British economy.

Cost of offshore renewable energy

One of the main problems that offshore renewable energy faces in many countries is that it has to compete with subsidized fossil fuel energy sectors Hence, it is imperative that the offshore energy industry should be given greater financial assistance from governments during its early stages of development. As with all forms of renewable energy, the main challenge is to bring the cost of producing electricity down to something that approaches the rates produced by other generating sources. At present, coal power is one of the cheapest ways of producing energy, at around US$0.05 per kWh, although its true cost has been estimated to be US$0.08 if the CO_2 had to be captured and stored underground, or if a carbon tax of $30 per tonne was to be imposed on coal power generation (MIT, 2007). The average generation costs in the United Kingdom for offshore wind is around 5.5 pence per kWh (BWEA, 2009) – around US$0.11, depending on the exchange rate. Although the price of offshore energy normally follows a typical technology learning curve, and has indeed been following for years (ibid), the future cost of offshore wind capacity is a matter of debate due to uncertainties in the price of steel, which accounts for about 90 per cent of the turbine. Nevertheless, the cost of offshore wind is expected to decrease by approximately 15 per cent by 2015 (Morthorst, Auer and Garrad, 2009).

It is quite difficult to ascertain the current cost of ocean energy as this information is naturally not readily released by the leading companies in the industry. However, according to Teske (2008) the cost of energy from initial tidal stream farms has been estimated in the range of US$0.15-0.55 per kWh for tidal and wave energy farms and US$0.11-0.22 per kWh for tidal streams. These are expected to decrease to US$0.10-0.25 per kWh by 2020, with the technology reaching "grid-parity" by around 2025 (see for example Soerensen and Naef, 2008; Esteban and Leary, 2009).

Offshore renewable industry promotion

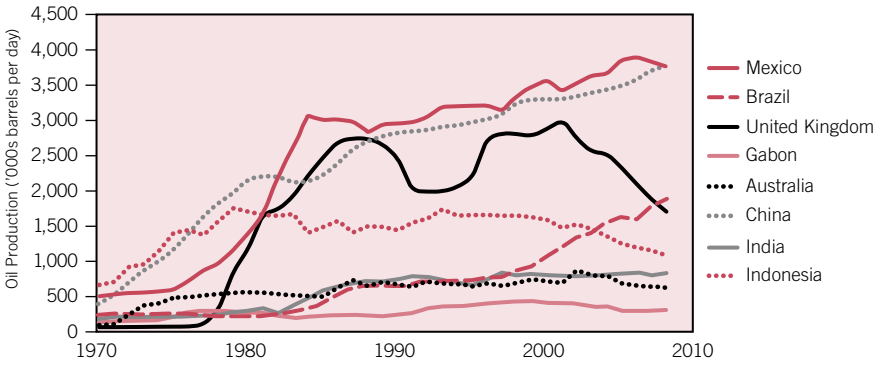
While these technologies develop it is imperative that policies be put in place to cover the difference in cost between traditional and renewable energy sources. In the United Kingdom these already exist in the form of Renewable Obligation Certificates (ROCs), which amount to around €0.11-0.16/kWh in England and €0.265-0.278/kWh in Scotland. Another significant problem that offshore renewables face is a lack of adequate grid connections, as these are expensive and often the best areas for energy production are not adequately positioned with respect to the national grid. Nevertheless, some efforts are being made, such as the European Marine Energy Centre (EMEC) already established in the Orkneys, with a capacity of 20MW. A number of other initiatives are under way, like the construction of the wave Hub by the South West Regional Development Agency (South West RDA, 2009), which will be able to connect up to 20 MW of offshore devices to the grid when it is finished in the summer of 2010. It has been calculated that the Wave Hub could create 1,800 jobs and inject £560 million in the country's economy over 25 years (South West RDA, 2009). Moreover, the Government has provided considerable funding to other initiatives, such as the 2006 Marine Energy Accelerator or the 2004 Marine Energy Challenge (Huertas-Olivares et al., 2008), and a variety of other supportive frameworks have been launched by the Welsh and Scottish regional governments and also in Ireland.

Despite these developments, critics have expressed concern at the relative inaction of the British Government in promoting renewable energy, especially when compared to other European countries. However, the Government has recently launched its Marine Renewables Proving Fund which allows wave and tidal energy developers to bid for US$36 million in new grants (Macalister, 2010). In the 2009 budget, £525 million was also promised in the way of ROCs and an extra £4 billion of new capital was made available from the European Investment Bank (EIB), much of it to protect investment in offshore wind (ibid). Labour unions should play an active role in ensuring that the government continues the promotion of renewable technologies, to ensure that this source of sustainable jobs can continue into the future.

The offshore sector and developing countries

The problems and challenges highlighted previously are not exclusive to the United Kingdom and there are "strong indications that world oil production is near peak", with the average size of new discoveries falling decreasing dramatically since the 1960's (Energy Watch Group, 2007). A considerable number of countries are believed to be past their peak oil production, as shown in figure 9, and thus be also in need to find alternative employment

Figure 9. Oil production for selected countries, 2009



Source: British Petroleum (2009).

for energy sector workers (this will be further discussed in some detail in this section). However, a second group of countries (especially India, China and Brazil) could also provide potentially interesting markets for the United Kingdom offshore expertise, due to their rapidly expanding economies and the energy needs associated with it.

Mexico

Annual production has dropped or failed to increase each year since 2004, as can be seen in figure 9 (British Petroleum, 2009), and in the first quarter of 2009 oil production was down to 3.667 million barrels per day, down 7.8 per cent from a year earlier. The offshore oil field of Cantarell, the world's biggest, has reached a plateau for some years and started to decline in 2005, going from 2 Mb/d in January 2006 to 1.5 Mb/d in December 2006. Mexico could thus find itself in a situation similar to that of the United Kingdom, with a large pool of offshore expertise but declining production. The potential for the offshore renewable sector in Mexico, however, is not so clear. The wave energy potential does not seem to be so great around Mexico. Offshore wind could prove a far better option, as some areas appear to have good potential for offshore wind (National Renewable Energy Laboratory, 2010).

Brazil

The case of Brazil is somewhat different to that of Mexico as the country is rapidly expanding its oil production capacity with the development of major deepwater oil fields (Energy Watch Group, 2007). A considerable amount of onshore wind power is also being installed. However, it is not clear at this stage why a country with such vast lands, low population density and

an abundance of other renewable sources (onshore wind, biofuels or hydropower) would choose to turn to the comparatively more expensive offshore renewables. If it chose to do so, the machinery and expertise which is currently expanding in this country due to deepwater oil exploration would surely help in the development of offshore wind.

People's Republic of China, Taiwan (China) and Hong Kong (China)

The case of China is somewhat different to the other countries mentioned so far in this study, in that the offshore oil industry does not play a significant role in the economy of the country. However, it is emerging as a significant market in offshore wind (GWEC, 2009b), motivated mainly by its huge thirst for energy in general. In this case the main driver for the uptake of offshore energy would be to strengthen energy security, develop high salary jobs and increase the employment opportunities in highly populated coastal areas. Offshore energy, in the case of China, also has the advantage of being located close to the population centers, in contrast with onshore energy, which is often located far from the main cities. The offshore wind power resource has been estimated at 200GW, almost 10 times the total (onshore) installed wind capacity at present, indicating the huge capacity that this sector would have for generating jobs (Zhau, 2010).

The first offshore wind farm in the Asia-Pacific is currently being constructed in Shanghai, composed of 34 wind-driven generators with a total installed capacity of 102 MW and is scheduled for completion by the time

Table 2. List of major offshore wind projects in People's Republic of China, Taiwan (China) and Hong Kong (China)

Place	Capacity (MW)	Date	Company	Place	References
Taiwan, Zhang Hua	Total plan: 600	Finished by 2025	SeaEnergy (United Kingdom) and TGC (Taiwan)	West coast, distance: 2.5~10km depth: 30m	Wind Power in China (2010)
Weihai, Shandong	First Period: 10, total plan: 1000	In plan	ZhongHaiYou		Wind Power in China (2010)
Hong Kong	200	In construction	CLP, BMT	in South Eastern waters of the HKSAR	Hong Kong Wind Farm (2009)
Shanghai, East sea, Bridge (First offshore wind in Asia)	Total: 102 (34 × 3MW)	First set starts from 2009	Datang Power, Guandong Nuclear Power,	East Sea Bridge	China-Britain Business Council (2009), Fenglifadian (2010)
Jiangsu, Rudong Project	3500 (in plan)	First set starts from 2009	Guodian Power		Zhixin et al. (2009), Rudong (2010)
Ningde Fujian	2000 (in plan)	Not clear	Fujian Mindong Power		Fujian (2010)

of the 2010 World Fair. A further four large scale wind farms are also being considered for the Fengxian, Nannhui and Hengsha districts of Shanghai with an expected 1 GW of installed capacity planned by 2020 (China-Britain Business Council, 2009). Plans for 1,000 MW offshore wind farms in Zheijiang Province and Jiangsu Province are also under way (Zhixin et al., 2009). Likewise in Hong Kong CLP Power Hong Kong Limited and Wind Prospect are in the early stages of development of a proposed 200 MW wind farm in south-eastern waters off Hong Kong that will provide approximately 1 per cent of Hong Kong's energy needs and take two years to build (Hong Kong Offshore Wind Farm, 2009). A list of some major offshore wind projects in China can be found in table 2.

With regards to ocean energy, China started to build a number of barrages around the 1960s, as part of policies from 1958 that emphasized energy independence as a key route to poverty alleviation. As a result, the Chinese government set itself an ambitious plan to construct tidal barrages, though only 11 of these were actually constructed, and only four actually ever produced electricity (Tan, 2009). More recently, there has been some renewed interest in these schemes, and in late 2004 the Chinese Government planned once more to build a tidal power station near the mouth of the Yalu River.

Gabon and Indonesia

There are a number of other developing countries that have past their peak oil, such as Gabon and Indonesia, as can be seen from figure 9. Gabon, for example, currently produces a substantial amount of its oil from offshore platforms (Encyclopaedia of Earth, 2010). To the authors' knowledge, however, the potential for offshore renewable in these countries has still not been studied in detail, though there is evidence that both countries could develop Ocean Thermal Energy Conversion (OTEC) plants (Ikegami, Achiruddin and Abdullah, 2009). These plants must be located in an environment where the warm surface seawater must differ about 20°C from the cold deep water that is no more than about 1,000 meters below the surface, and the shore must be located within 25km of the ocean region where the temperature difference occurs. This is normally found in areas between latitudes 20° north and south of the equator, as shown in figure 10. Within the group of oil-producing developing countries, Gabon and Indonesia are considered to have a good potential for this technology (Ikegami, Achiruddin and Abdullah, 2009). Although tropical cyclones often disrupt OTEC activities (a major hurdle to the development of OTEC), both these countries are also crucially outside typhoon-prone areas due to their proximity to the equator.

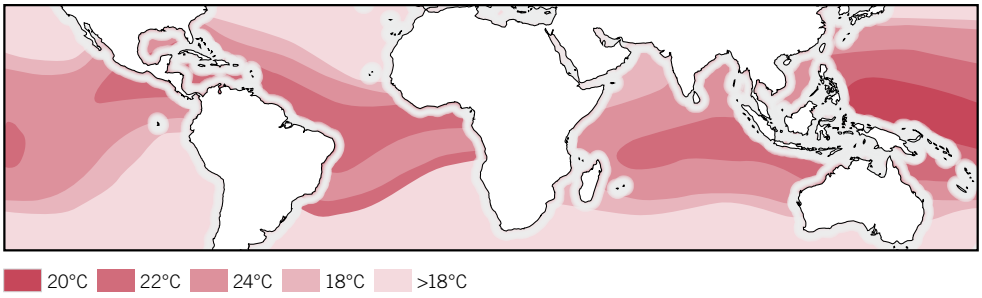
The resource potential for OTEC in Indonesia has been estimated to be able to produce enough electricity for the whole of the country (Ikegami, Achiruddin and Abdullah, 2009). However, for both the case of Gabon and

Indonesia, the driving factor to motivate an increased uptake in renewable energy would be little different than in some of the other countries described in this study. Indonesia, for one, can generally be considered to be self-sufficient in energy, and although the country is a net importer or oil, gas and coal are still exported in large quantities. This situation, however, could change in the future, and electricity-generating capacity is expected to increase from 21GW nowadays to 415.6GW by 2050 (Utama and Ishihara, 2009), at a time when the oil production will decrease dramatically. This in itself would be a major challenge, and the fact that the country is comprised of over 17,000 islands would stretch the limits of any centralized electricity system. As the country has a decentralized system of government, the best cost option would be to also decentralize power generation, and offshore energy devices would thus be of great value to such a system where each island would produce its own electricity (Utama and Ishihara, 2009).

India

As can be seen from figure 10, India also has considerable potential for the development of OTEC energy, and some trial plants have already been built in this country, such as a 1MW OTEC and a 100t/d of fresh water desalination plant (Ikegami, Achiruddin and Abdullah, 2009).

Figure 10. OTEC energy potential, 2009



Source: Ikegami, Achiruddin and Abdullah (2009).

Conclusions

The present combination of greenhouse-gas induced global warming, post-financial crisis economic problems and the pursuit of energy security in a world of peak oil stress the need to move to a renewable-based economy. In particular, a number of countries such as the United Kingdom, Indonesia and Mexico will face increasing economic difficulties as the extraction of

oil continues to decrease, which will result in the loss of many jobs in these sectors. The present paper argues that, especially in the case of the United Kingdom, it would make sense to prepare the conversion of the oil and gas offshore industry into a renewable one, protecting the large pool of expertise that has been slowly built over decades.

The foreseeable decline of the traditional offshore industry will undoubtedly place a number of pressures on the society and economy of the country, especially for the northern part of England and Scotland, a clear policy geared towards a gradual transition would most certainly help maintain the expertise, the jobs and social cohesion. The role of labour unions will be crucial to ensure that enough pressure is placed on governments to promote offshore renewable energy, which could provide high-quality sustainable long-term jobs in the area, contributing to the social and economic stability of whole regions of the country. Assuming the number of jobs in offshore areas is to remain stable, and that these jobs slowly shift to the renewable sector as oil dries out, the renewable industry could produce up to 50 per cent of the country's current electricity consumption by 2050. The preservation of jobs would be compatible with the British and Scottish governments' current targets requiring that 20 per cent and 40 per cent of their energy to come from renewables by 2020, respectively (Scottish Executive, 2009). This is also in line with the United Kingdom's aim to cut CO_2 emissions by 60 per cent by 2050, meaning that 30-40 per cent of the electricity production would have to come from renewables by this time. Indeed, if other conservation measures were put into place, it is even conceivable that self-sufficiency in electricity could even be achieved.

References

BBC. 2010. "'Milestone' for wave energy plans", 16 Mar., available at: http://news.bbc.co.uk/2/hi/8564662.stm (accessed 15 Apr. 2010).

Breeze, P. A. 2005. *Power Generation Technologies*, Newness, Oxford, United Kingdom.

British Petroleum. 2009. *Statistical Review of World Energy 2009*, available at: http://www.bp.com/productlanding.do?categoryId=6929&contentId=7044622 (accessed 4 Nov. 2009).

British Wind Energy Agency (BWEA). 2007. *UK Offshore Wind: Staying on Track* – Forecasting offshore wind build for the next five years.

—. 2009. *Wind and the UK's 10% Target,* BWEA Briefing Sheet, available at: http://www.bwea.com/pdf/briefings/target-2005-small.pdf (accessed 11 Nov. 2009).

—. 2010. Offshore Wind Farms, available at: http://www.bwea.com/ukwed/offshore.asp. (accessed 15 Apr. 2010).

Bryden, I. 2009. *Progress towards a Viable UK Marine Renewable Energy*, Paper presented at the Coasts, Marine Structures and Breakwaters Conference, Edinburgh, Scotland, 16–18 Sep.

China–Britain Business Council (CBBC). 2009. *China's Offshore Wind Energy Sector*, available at: http://www.ukrenewables.com/documentation/Offshore-Wind-Power.pdf.

Cornett, A.M. 2008. *A Global Wave Energy Resource Assessment*, Proceedings of the Eighteenth International Offshore and Polar Engineering Conference, 2008, Vancouver, Canada, 6–11 July.

Department of Energy and Climate Change. 2009. United Kingdom Government. Annual tables: "Digest of UK energy statistics" (DUKES), available at: http://www.decc.gov.uk/en/content/cms/statistics/source/renewables/renewables.aspx (accessed 12 Nov. 2009).

Encyclopaedia of Earth. 2010. Available at: http://www.eoearth.org/article/Energy_profile_of_Gabon (accessed 12 Feb. 2010).

Energy Watch Group. 2007. *Crude Oil: the Supply Outlook*, EWG-Series No 3/2007, available at http://www.energywatchgroup.org/fileadmin/global/pdf/EWG_Oilreport_10-2007.pdf (accessed 22 Feb. 2010).

Esteban, M.; Leary, D. 2009. "Recent Developments in Ocean Energy in the Asia-Pacific and Future Growth Potential", Proceedings of International Symposium on Sustainable Energy and Environmental Protection (ISSEEP) 2009 Yogyakarta, Indonesia, 23–26 Sep.

European Wind Energy Association (EWEA). 2009. *Wind at Work*, Brussels. Available at: http://www.windfacts.eu.

Feldman, J. M. 2010. *Investment in Decent Green Jobs: The Case of Rail-Based Mass Transit Climate Change, Impacts on Employment and the Labour Market – Responses to the Challenges*, Seminar of the Global Union Research Network, International Trade Union House, Brussels, Belgium, 25–26 Mar.

Fenglifadian. 2010. Wind power in China (Chinese only). Available at: http://www.fenglifadian.com/fengchang/409JJ111.html (accessed 25 Feb. 2010).

Fujian. 2010. Available at: http://www.51wind.cn/article/Fujian_Ningde_will_build_large_offshore_wind_power_generation_base.html (accessed 25 Feb. 2010) [in Chinese].

Global Climate Network. 2010. *Low Carbon Jobs in an Inter-Connected Future*, Available at: http://www.globalclimatenetwork.info (accessed 15 Apr. 2010).

Global Wind Energy Council (GWEC). 2009a. Available at: http://www.gwec.net (accessed 22 June 2009).

—. 2009b. Entry on Japan, available at: www.gwec.net/index.php?id=123 (accessed 4 May 2009).

Hong Kong Offshore Wind Farm. 2009. 'Stakeholder Consultation Web site' available at: www.hongkongoffshorewind.com/TheProject.html (accessed 19 June 2009).

Hubbert, M. K. 1957. *Nuclear Energy and the Fossil Fuels, Drilling and Production Practice*, available at: http://www.hubbertpeak.com/hubbert/1956/1956.pdf (accessed 11 Nov. 2009).

Huertas-Olivares, C.; Soerensen, H.C.; Rousseau, N.; Villate, J.L.; Lopez, J.R.; Sarmento, A.; Russell, I.; Neumann, F. 2008. *First outcome of the WAVEPLAM project: Assessment of Non-technological barriers and Best practices*. Second International Conference on Ocean Energy (ICOE), 15–17 Oct., Brest, France.

Ikegami, Y.; Achiruddin, D.; Abdullah, K. 2009. *Possibility Study of OTEC & DOWA in Indonesia*, Proc of the International Symposium on Sustainable Energy and Environmental Protection (ISSEEP), Yogyakarta, Indonesia, 23–26 Sep.

Institution of Mechanical Engineers. 2009. *UK 2050 Energy plan*, available at: http://www.imeche.org/about/keythemes/environment/Climate+Change/Copenhagen+Conference/UNITED KINGDOM+2050+Energy+Plan (accessed 12 Nov. 2009).

Leary, D.; Esteban, M. 2009. "Climate change and renewable energy from the ocean and tides: calming the sea of regulatory uncertainty", in *International Journal of Marine and Coastal Law* 24, pp. 617–651.

Lemming, J.; Morthorst, P.E.; Clausen, N.E.; Jensen, P.H. 2008. "Contribution to the Chapter on Wind Power", in *Energy Perspectives*, International Energy Agency.

Macalister, T. 2010. "Siemens to build UK wind turbine plant", in *The Guardian*, available at: http://www.guardian.co.uk, 29 Mar. (accessed 19 Apr. 2010).

Massachusetts Institute of Technology (MIT). 2007. *The Future of Coal*, Massachusetts Institute of Technology Report, available at: http://mit.edu/coal/ (accessed 28 Apr. 2009).

Morthorst, P.E.; Auer, H.; Garrad, A. 2009. "The Economics of Wind Power", in D. Iuga (ed.) *Wind Energy – The Facts*, European Wind Energy Association, Visby, Sweden. Available at: http://www.wind-energy-the-facts.org/en/home--about-the-project.html

National Renewable Energy Laboratory. 2010. Available at: http://www.nrel.gov/wind (accessed 22 Feb. 2010).

New Zealand Electricity Commission. 2005. *An Appraisal of New and Renewable Generation Technologies as Transmission Upgrade Alternatives*, available at: http://www.electricitycommission.govt.nz/pdfs/opdev/transmis/pdfsgeneral/Akl-alt-stg2-AppendixB.pdf.

Oil & Gas UK. 2007. *UKCS Workforce Demographics Report*.

—. 2009. *Employment and the supply chain*, Economic Report, No. 6, available at: http://www.oilandgasuk.co.uk/issues/economic/econ09/p28-35.pdf (accessed 10 Nov. 2009).

Owen, E. 2008. "Environment Agency boss opposes Severn Barrage", in *New Civil Engineering Journal*, No. 1, p. 5.

Pelc, R.; Fujita, R.M. 2002. "Renewable energy from the ocean", in *Marine Policy*, 26, p. 471.

Press Association. 2009. "Offshore wind farms could meet a quarter of the UK's electricity needs", in *The Guardian*, 25 June, available at: http://www.guardian.co.uk/environment/2009/jun/25/offshore-wind-uk-homes.

Renner, M. 2001. "Going to Work for Wind Power", in *World Watch Magazine*, Jan.–Feb., available at: http:// www.worldwatch.org/node/495 (accessed 19 Apr. 2010).

Rudong, 2010. Available at: http://www.51wind.cn/article/Rudong_14_billion_to_build_wind_power_generation_sea_Three_Gorges.html (accessed 25 Feb. 2010).

Rutovitz, J.; Atherton, A. 2009. *Energy sector jobs to 2030: A global analysis*, prepared for Greenpeace International by the Institute for Sustainable Futures, University of Technology, Sydney.

Scottish Executive. 2009. *Scotland's Renewable Energy Potential: Realising the 2020 target*, available at: http://www.scotland.gov.uk/Resource/Doc/54357/0013233.pdf (accessed 17 Nov. 2009).

Scruggs, J.; Jacob, P, 2009. "Harvesting Ocean Wave Energy", in *Science*, 323, p. 1176.

SeaEnergy Renewables Website. http://www.seaenergy-plc.com (accessed 19 Apr. 2010).

Soerensen, H.C.; Naef, S. 2008. *Report on Technical Specification of Reference Technologies (wave and tidal power plant),* NEEDS Project Report (New Energy Externalities Development for Sustainability), available at: http://www.needs-project.org (accessed 19 Apr. 2009).

—; Weinstein, A. 2008. *Ocean Energy*, Position paper for IPCC Proceeding of IPCC Scoping Meeting on Renewable Energy Sources, 2008, Lubeck, Germany, available at: http://www.needs-project.org (accessed 29 Apr 2009).

South West RDA. 2009. *Wave Hub construction underway*, available at: http://www.southwestrda.org.uk/2009/11/12/wave-hub-construction-underway (accessed 17 Nov. 2009).

Tan, M. 2009. *China's Potential on the Renewable Energy Development*, Final report as intern at UNU-IAS. Copy on file with authors.

Teske, S. 2008. *Energy [r]evolution*, European Renewable Energy Council (EREC) and Greenpeace International.

United Nations Framework Convention on Climate Change (UNFCCC). 1998. *Kyoto Protocol,* available at: http://unfccc.int/resource/docs/convkp/kpeng.pdf (retrieved 11 Nov. 2009).

Utama, A.; Ishihara, K. N. 2009. *2050 ASEAN electricity demand: Income-electricity causality test as a reference information*, First international symposium: Kyoto University on Global COE Program "Energy Science in the Age of Global Warming – Toward CO_2 Zero-emission", 20–22 Aug., Kyoto, Japan.

Wave Dragon Website. 2009. Available at: http://www.wavedragon.net/ (accessed 11 Nov. 2009).

Westwood, A. 2008. "SeaGen installation moves forward", in *Renewable Energy Focus*, Vol. 9, Issue 3, pp. 26–27.

Wikipedia, *Wind Power*, available at: http://en.wikipedia.org/wiki/Wind_power (accessed 22 Feb. 2010).

Windskill Website. 2010. Available at: http://www.windskill.net (accessed 19 Apr. 2010).

Zhau, X. 2010. *The Development of Modern Power System and Power System Technology*, presented at APPEEC 2010 Conference, China, 28–31 May.

Zhixin, W.; Chuanwen, J.; Qian, A.; Chengmin, W. 2009. "The key technology of offshore wind farm and its new development in China", in *Renewable and Sustainable Energy Reviews*, Vol. 13, pp. 216–222.

International
Journal
of Labour
Research

2010
Vol. 2
Issue 2

The foundations for extending green jobs

The case of the rail-based mass transit sector in North America

Jonathan Michael Feldman
Stockholm University

This paper will explore some of the conditions necessary for promoting domestic manufacturing in rail-based mass transit. Rail-based mass transit is one of the least polluting means of moving large numbers of people rapidly and is thus a key part of any green economy. I will examine the strengths and weaknesses of different regional or national production networks involving transit suppliers, trade unions, transit agencies and other governmental and non-governmental actors. I focus on five key factors that potentially contribute to or influence whether or not a region develops rail-based mass transit manufacturing. These factors help explain the actions by or institutional designs of the state, corporations, and trade unions and how these influence manufacturing outcomes.

I will examine production networks in the United States and Canada. By "production networks" I mean the capacities marshalled by elements of a corporatist coalition linking corporations, the state and trade unions. These production networks relate to: (a) smaller scale rail producers based in Milwaukee, Wisconsin, and (b) the rail-based mass transit manufacturing capacity of the Bombardier (and its predecessor firms), with a focus on Ontario. I will show how key factors illustrate why Ontario's production network was superior to Wisconsin's, and how the Canadian system's capacity to support these mass transit rail producers was superior to that found in the United States. My review of development states in East Asia provides a benchmark which illustrates limits to both the American and Canadian development models.

Theory

Contemporary theories of geography discuss two potentially competing tendencies in explaining location of firms and regional growth patterns. On the one hand, some theories emphasize *centrifugal* forces. Given the nature of the product cycle and emerging new global markets, many industries will begin within a home nation and then expand more operations overseas to access markets, R&D, and personnel. Other theories emphasize *centripetal* forces. For instance, certain products and services tied to government procurement will often have a high domestic content. The local state is similar to what geography David Harvey describes as "fixed capital", i.e. not so footloose or likely to move operations overseas (Harvey, 2006).

The key factors that I will show contribute to successfully anchored domestic production include: (a) a system that promotes the use of state resources on a civilian development path through incentives or constraints; (b) protectionist policies and industrial policy supports; (c) a "managerial equation" linking knowledge, power, and engineering resources through development pairs utilizing user competence; (d) the existence of a diversified strategy and resource base; and (e) the relative strength and strategies of local

trade union and social movements. Some of these variables are explained by other factors beyond the scope of this paper. In addition, these five key factors can influence one another in a complicated causal chain that requires more detailed historical analysis.

Civilian development incentives or constraints on the state to promote manufacturing

Different states will prioritize different sectors. The national state may be more or less oriented to promoting a military – as opposed to a civilian – oriented manufacturing capacity. State building projects can be tied to either the expansion of military or civilian economic power (Feldman, 1998; Melman, 2001).

The "development state" found in regions like East Asia – the Republic of Korea, Taiwan (China) and Singapore – indicates one way various constraints or incentives push the state to promote civilian industrial policy. The cases I will study either lack or possess some elements of such a state within them. I am therefore interested in specific strategies or designs common to development states known to promote industrial success but which may or may not be present in these cases. One key factor is that East Asian development states that are "corporatist states" have been based on a foundation of "institutionalized government–business cooperation". These states are based on "close cooperation and interaction among politicians, bureaucrats, and business elites". This tripartite cooperation is sometimes found in corporatist regimes in the West. Yet, the development states also operated under unique conditions that constrain the "transferability" or "replicability" of this model to "alternative national contexts". For example, "the single-minded adherence to growth and competitiveness at the expense of other objectives, the unusual degree of bureaucratic autonomy and capacity, and the equally unique and unusual degree of public–private cooperation" are considered "extremely difficult to emulate" (Öniş, 1991, pp. 118–120).

Nevertheless, some key elements similar to these constraints, specific objective conditions and resulting strategies were partially replicated outside of the East Asian states in part because of corporatist coordination. I will now list some of the key strategies used to support manufacturing in development states.

First, the East Asian development states have supported *national champions*. They have achieved superior levels of growth because of "very high levels of investment, more investment in certain key industries than would have occurred in the absence of government intervention, and exposure of many industries to international competition in foreign markets, though not in domestic markets". One way to sustain a champion is through the creation by the state of "a stable and predictable environment within which...

corporations [can] undertake long-term risks". This includes systems where "the state has managed to limit the number of firms allowed to enter an industry" through industrial licensing policies. In other words, the state "deliberately accelerated the process of industrial concentration as a basis for successful competition in international markets" (Öniş, 1991, pp. 111–112).

A second component of this strategy is the extraction of concessions by the state from assisted companies that support performance or domestic anchoring. And third, the state-brokered collaborations with foreign suppliers of technical know-how. In the Republic of Korea, for instance, "technology has been acquired through investing in foreign licensing and technical assistance" (ibid., p. 113). In Japan's development, "foreign companies were required to transfer technology" (Chang, 2008, p. 59). Thus "one of the elements in the success of Japanese firms has been the capacity to absorb and refine technological developments that originated elsewhere" (Best, 1990, p. 185).

Protectionist policies and industrial policy supports

An important comparison can be made between the "development state" on the one hand and the "entrepreneurial state" on the other. The former is characterized by policies that typically promote domestically anchored firms. The latter is characterized by policies that encourage business development that is locally based, but not necessarily involving local businesses (Eisinger, 1988). The entrepreneurial state emerged against the appeal of global trade flows, the power of transnational corporations (TNCs) and a change in ideology towards denationalized enterprises. As some nations faced contracted conditions at home or developed relatively successful export markets, academics, farmers, business leaders or workers attached to these markets began to question protectionism or lobbied to promote free trade. At the same time, foreign TNCs gained greater domestic lobbying power to place limits on free trade. Domestic-based TNCs also sought freedom from protectionist constraints in order to promote outsourcing of production (Aaronson, 2001; Faux, 2006; Greider, 1997).

The key industrial policy factors influencing the growth of the rail-based mass transit industry include: (a) the size and stability of the mass transit market; (b) the existence of local content provisions favoring domestic producers; and (c) a system that provides financial incentives for mass transit production (Feldman, 1998 and 2009).

The greater the size of the national transit market, the greater the chances that transit suppliers will be able to sustain fixed costs. Generally speaking, "a nation's firms are likely to gain competitive advantage in global segments that represent a large or highly visible share of home demand but account for a less significant share in other nations". A nation can gain a competitive advantage in those "industries or industry segments where the

home demand gives local firms a clearer or earlier picture of buyer needs than foreign rivals can have". These home advantages can occur "if home buyers *pressure* local firms to innovate faster and achieve more sophisticated competitive advantages compared to foreign rivals" (Porter, 1990, pp. 86–87). In the rail-based mass transit industry, the key purchaser is usually the local state financed in part by the national government. Yet, the competencies or role of the local state transit agency can be differentiated, as discussed below (Feldman, 1998).

Trade protection can help stabilize markets. The United States together with "many other countries" including Germany, Sweden, France, Finland, Austria, Japan, Taiwan (China) and the Republic of Korea "grew rapidly behind protective barriers" (Chang, 2008, p. 55). Countries supporting import substitution and having manufacturing experience helped generate "mid-tech exports such as steel, cement, petrochemicals, automobiles, truck parts, TVs, and tires". One pattern was that "an industry would start selling in the domestic market and then, with enough experience, would sell overseas" (Amsden, 2007, p. 13).

The existence of a development pair and the "managerial equation"

A "development pair" can be defined as "a tightly linked long-term user–producer relation formed around several joint development projects between a manufacturing firm and a government customer" (Fridlund, 2000, p. 147). These pairs are subject to a larger set of relations influencing regions, and the firms embedded within them, which explain how growth is based on integrating knowledge (or competence), power (or resources), and the capacities of innovating engineers. The integrative element of the equation can break down at the level of the firm or region (Feldman, 1998 and 2007). One way the "managerial equation" integrates these three kinds of capacities is by linking decision-making and responsibility as well as innovation and finance, links that were broken historically by the rise of absentee owners and financial capitalists distant from the concerns of production (Veblen, 1965 and 1967).

Turning to the "power" or resource element in the managerial equation, larger firms with greater capacities often depend on follow-on contracts that sustain them as incumbent producers (Kurth, 1972). Demand for a product is a key resource and the political organization of this demand relates to power considerations. If a firm is not an incumbent in a specific industry, if follow-on contracts in mass transit are lacking, or if a firm is a follow-on producer for markets that are irrelevant to or more profitable than mass transit, the incentives for entering or remaining in mass transit markets will be limited (Feldman, 1998).

The "knowledge" element of the equation is partially based on the principle that more sophisticated purchasers can generate more competent firms. Differences in the consumption "competence" of a mass transit agency as a procurement agent have been shown to contribute to success and failure in mass transit innovation projects (Feldman, 1998; Porter, 1990).

Diversified strategy and resource base

The contribution of the third element of the managerial equation, engineering resources, partially depends on the extent to which production is tied to research and development (R&D) and how innovative potential is organized. Companies benefiting from national or local industrial or R&D policies supporting their industrial sector can gain a comparative advantage, but not all firms will be equally equipped to profit from such policies: "government policy will fail if it remains the only source of national competitive advantage" (Porter, 1990, p. 128). A firm's competitive advantage is based on "distinctive processes (ways of coordinating and combining), shaped by the firm's (specific) asset positions (such as the firm's portfolio of difficult-to-trade knowledge assets and complementary assets), and the evolution path(s) it has adopted or inherited" (Teece, Pisano and Shuen, 1997, p. 509).

One key issue is that the mass transit manufacturing sector has been affected by the microelectronics revolution which has made transportation firms platforms for software, advanced electronic controls and subject to advanced manufacturing processes. Companies that lacked certain electronic capacities and advanced systems integration capacities fell behind. In contrast, in some regions mass transit producers were simply low-technology and weak in R&D assembly operations lacking advanced innovation or production capacities (Feldman, 2009). In other words, the architecture of certain firms will shape their capacity to enter or maintain a presence in the mass transit production sector. So, for example, larger and more diversified firms have greater capacities to "devote resources to fast-growing industries" (Fligstein, 2001, p. 91). Some transit suppliers may remain profitable by capturing specialized niches, particularly if they have low overheads or can produce in batches (Feldman, 2009).

The local strength and strategies of trade and social movements

One view is that trade union actions taken at the local scale in response to de-industrialization can be a viable strategy for addressing the problems associated with globalization. Workers can play a significant role in shaping a region's underlying economic and industrial structure in addition to

Table 1. Key factors promoting domestically anchored and successful rail producers

Factor	Potential measures
Incentives or constraints promoting civilian manufacturing development state strategies	The state has a strong incentive or faces a constraint that encourages it to promote civilian manufacturing strategies
Protectionist policies and industrial policy supports	The national state limits foreign suppliers, encourages local content or provides significant financial aid to national champions
Development pair and extension of user competence	Local transit agencies support local firms through "follow on" contracts or knowledge transfer
Diversified strategy and resource base	The local firm is in multiple markets, it has an internal R&D capacity, and has complemented its local capacities with collaborations
Labour strength and power extension strategies	Labour unions are represented at a plant and use political power, electoral means and coalitions to promote national champions

corporations and the state (Herod, 2001, pp. 50–53). In contrast, some question the degree to which such local actions are sufficient: some oppositional "movements...are generally better at organizing in and dominating 'their' places than at commanding place" (Harvey, 1996, p. 324).

Among the factors that increase the political capacities of trade unions are their abilities to forge alliances with other groups. Unions can further extend their power by creating new coalitions to offset their weaknesses based on capital mobility in the global era. A key factor is "external solidarity, both with other unions and with the community and other social groups" (Lévesque and Murray, 2002, p. 39). Corporations are viewed as a key potential ally within coalitions to promote "green jobs" like mass transit (Jones, 2008). Yet, corporate partners can differ radically between those who are more or less mobile and more or less anchored in the local economy, e.g. in their relations to state procurement agencies.

In table 1, I have summarized the five principal factors which I argue are more likely to promote a successful and domestically anchored rail-based mass transit manufacturing industry. Companies and regions benefiting from the presence of these factors will do better than those lacking the presence or operation of these factors.

Industrial policy regimes compared

The industrial policies of both the United States and Canada are associated with various strengths and weaknesses that have influenced their ability to manufacture trains locally. The United States used to contain a wide variety of mass transit train suppliers including firms like Pullman, St Louis Car Company, and Budd and in the post-Viet Nam drawdown attracted defence firms like Rohr and Boeing Vertol. Today, the US market

still has major locomotive producers like General Electric and EMD, but smaller to medium-sized producers are not uniformly successful as a group. These include companies like the successful Oregon Iron Works and the less successful Super Steel Company profiled below.

In Canada, Bombardier has become a very successful producer on a global scale, although its mass transit operations are headquartered in Berlin, Germany. Nevertheless, the company is not always regarded as a "German" firm within Germany, according to some industry insiders. Bombardier's contemporary Canadian rail operations represent the consolidation of three primary railroad producers.

One part of Bombardier's operations is the outgrowth of their recreation snowmobile operations and is centered in their La Pocatière plant in Quebec. The second part to Bombardier's production capability was based on Hawker Siddeley Canada's operations, which had already established itself in the rail car business with another large factory in Thunder Bay. At one point this line of companies was controlled by the Canadian Car and Foundry. Production has been ramping up to meet a Toronto subway car order. The third part was built upon the Urban Transit Development Corporation which was owned by the Ontario government and located in Kingston, Ontario.[1]

The United States and industrial policy

At the national level, military (or "defence") as opposed to civilian interests have dominated the industrial policy agenda. At the firm level, when former defence suppliers like Boeing Vertol tried to produce subways they were technically successful but the incentive system based on profits attached to making military helicopters was far superior to the mercurial mass transit market (Feldman, 1988; Melman, 2001).

Hats Kageyama, a manager at the Sojitz Corporation of America, a leading Japanese trading company in United States mass transit markets, explains some of the underlying problems of that country's system. The home markets of the Japanese and Europeans provided advantages in supporting the price and quality of the foreign suppliers' products. In contrast to other regions, United States suppliers of rolling stock were part of a qualitatively different market:

> The U.S. market is unique, because here a railway car is treated like a consumption item, like an automobile. As opposed to a railcar in Japan, a railcar in Canada, or a railcar in Europe... [where] they're treated not just on price. Whereas in this country, the lower the better... In America, there's

1. Phone interview with David L. Jeanes, President of Transport Action Canada, 5 March 2010.

> no established domestic market that would protect the carbuilder's business like in Japan, or like in Europe or like in Canada. In other words, Canadian... European... or Japanese carbuilders are all protected, but not in the [US].[2]

The United States Government lacks policies to create national champions in mass transit and to restrict the number of suppliers, although certain policies by the Department of Transportation (DOT) provide R&D advantages for American-owned firms and require domestic content in rolling stock. The DOT also has helped the Oregon Iron Works' United Streetcar, LLC Company through R&D policies and initiatives to finance streetcar projects (Feldman, 2009).

Members of the United States Congress became concerned by the mid-1970s about "how much success foreign manufacturers were having in US heavy industries markets", particularly in supplies for transportation systems. In 1978 a Buy America provision "established a preference for products produced, mined, or manufactured in the United States" (TCRP, 2010, p. 5). Presently, a piece of rolling stock can qualify as a domestic product fundable by the United States Government if: "1) the cost of its components produced in the United States...exceed 60 percent of the cost of all its components, and 2) final assembly [takes] place in the United States" (ibid., p. 17).

Canada and industrial policy

In the early 1980s, one author argued that "compared to Japan and Europe, Canada seems a relative novice in the area of industrial policy" (Jenkin, 1983, p. 24). Yet, in contrast to the United States, Canadian firms were on the periphery of the global military economy and Canada's defence firms "are not necessarily among the largest Canadian firms" (Pepall and Shapiro, 1989, pp. 277–278).

In the 1960s and 1970s, a debate emerged as to how Canada could move beyond an economy partially limited by small-scale branch plants serving Canadian markets and unable to achieve the "operational scale, technological sophistication, or managerial mandates to compete internationally". One approach was to promote national champions and the other approach relied upon open markets and microeconomic policies that aided greater competitiveness or economic adjustment (Hale, 2008, p. 727).

During the Administration of Prime Minister Pierre Trudeau (1968–1979 and 1980–1984), national policy in Canada supported the development of companies like Bombardier as "globally competitive 'national champions'"

2. Interview with Hats Kageyama, Vice President Sales and Marketing General Machinery Deparment, Sojitz Corporation of America, New York, NY, 5 September 2006.

(Clarkson, 2002, p. 205). Brian Mulroney, the Canadian Prime Minister from 1984 to 1993, "wanted to help build major Quebec-based companies and Bombardier was right at the top of the list". As a result, he transferred ownership of the two companies to Bombardier. He also put the full resources of the Export Development Canada (EDC) behind Bombardier. His administration also started a programme, called "The Canada Fund", which was used to provide subsidies for research and development, marketing and production. The primary beneficiary of this programme was Bombardier. In sum, there were a number of policies either developed and or promoted by the Conservatives "that helped Bombardier really move to the next level, move beyond simply being a manufacturer of snowmobiles".[3]

Civilian industrial policy was central to the company's success: "Bombardier excelled in being able to exploit every government initiative – whether it was federal or provincial – that existed". The reason was "the nature of industries in which Bombardier competed". In the rail and aerospace industries, success depended "on exploiting every cent of government assistance" because their competitors overseas were heavily tied to government supports. There was "not a level playing field in those two sectors". Industrial policy became a necessary condition for success: "No matter how good your management was, unless you...had a high degree of government support in many different forms, you just could not compete." When Bombardier was launching its rail business, European rail producers were either owned by the government or heavily subsidized by the government.[4] Nevertheless, Bombardier was far more committed to developing its aircraft industry, especially in light of fierce competition with Brazil, than in making trains.[5]

The future of trade policy

The fact that procurement policies at the provincial and municipal level were not bound by the procurement provisions of international trade agreements has been a key factor to promote local production of rail-based transport equipment. However, this has been put into question by a recent attempt by conservatives to break local procurement of subways in Toronto and seek to bring local procurement under the disciplines of trade agreements.

The attempt to break local procurement of subways in Toronto led to an effective campaign by unions in Ontario to embarrass the province

3. Phone interview with Fred Lazar, Associate Professor of Economics, York University, Toronto, Ontario, Canada, 25 February 2010.

4. Ibid.

5. Phone interview with Anthony Perl, Professor and Director, Urban Studies Program, Simon Fraser University, 6 May 2010.

government regarding the risks to which it had subjected the local economy (see below), after which the province supported a 25 per cent Canadian content minimum. The city of Montreal, for its part, has adopted the United States standard of 60 per cent local content.[6]

Recent trade fights have led conservatives to further deepen open markets. Stockwell Day, when Canada's international trade minister, tried to push "Canada's provinces – which also hold power over local governments – to formally agree to open their purchasing to foreign companies" (Austen, 2009). Later, a draft text of the proposed Canada–European Union Economic and Trade Agreement (CETA) was revealed to contain language weakening Canada's industrial policy system: "Controversial provisions... would [notably] stop municipal governments from implementing local or ethical procurement strategies" (Council of Canadians, 2010).

The case of Milwaukee's rail manufacturers

Milwaukee used to be an important centre for facilities for the remanufacturing, rehabilitation, or new builds such as the Cold Spring Shops of the Milwaukee Electric Lines (a local railroad) and the major repair shops of The Milwaukee Road (a transcontinental railroad).[7] Today, Milwaukee is moving ahead to build a new light rail system, a project largely conceived of as a transit service. Yet, in 1992 a study argued that light rail transit investments could be "strategically deployed to stimulate reindustrialization and the development of a Milwaukee-based mass transit industry" and an important contributor to "the export base of the local economy" (Levine, 1992, p. 54).

The following section reviews the development of the rail-based mass transit manufacturing industry in the Milwaukee area. This case illustrates the regression of manufacturing capacities and a relatively weak system to sustain manufacturing and innovation capacities in rail.

The Milwaukee Rail Car Corporation

Robert J. Bauman, presently an Alderman in Milwaukee, helped start the Milwaukee Rail Car Corporation in 1983 with the intention of becoming "a domestic manufacturer of railcar equipment across the spectrum from [light rail] transit to heavy rail inner city". In the early 1980s, the company had the facilities, workforce, the industrial and supplier infrastructure to do

6. Phone interview with John Cartwright, President of Toronto and York Region Labour Council, Ontario, Canada, 21 May 2010.

7. Email communications from Stephen Karlson, Associate Professor of Economics, Northern Illinois University, Dekalb, IL, 3 and 14 June 2010.

that, and yet it folded in 1987. It tried to break out from "a small job shop, custom rebuilder of rail cars into a manufacturing operation", a conversion which required "a quantum leap in terms of scale and capital requirements". The company found it very difficult to secure the necessary capital: "the venture capital community, the finance community, the banking community in the City of Milwaukee didn't see a market – didn't see an economic demand for the products we were proposing to build. Ironically, we got much more interest from financial institutions in places like New York than our own backyard".[8]

The Super Steel Products Corporation

The Super Steel Products Corporation, founded in 1923, has had more success in the railroad business (a market it began to focus on in 1966) than the Milwaukee Rail Car Corporation (Decker, 2006; Super Steel Products Corporation, 2010). In 2007, the company had about US$100 million in annual sales and employed 800 persons, 600 in Milwaukee (Content, 2008; Journal Sentinel, 2007). By March 2010, the company employed only 250 persons and was heading for receivership (Biztimes.com, 2010). The company was more diversified than the Milwaukee Rail Car Corporation, but still vulnerable to assorted problems related to demand, supply, and the "managerial equation".

One problem faced by Super Steel was that it was somewhat specialized and dedicated to a rail sector vulnerable to weak domestic demand: "a significant percentage of [its] business was tied up in railcar assembly". It could go "from boom to bust over one contract cycle". The market is dependent on political decisions often outside the control of the supplier firm. This problem has made railcar manufacturing a very risky business for many firms: "they're capital intensive businesses, you require large facilities, you require large investment in plant and equipment and they're relatively labor intensive operations because there's a lot of handwork with railcar assembly". As a form of batch production, railcar manufacturing "is more similar to building a building than building an automobile".[9] An indicator of Super Steel's rail dependency is that one facility in Milwaukee "has the interior capacity to hold up to 50 completed passenger railroad cars" (Super Steel, 2010). In 2006, about 70 per cent of the company's work was in the rail industry, with a significant portion of that "in freight locomotives, both domestically and for export" (Decker, 2006).

8. Phone interview with Robert J. Bauman, Alderman, City of Milwaukee, Wisconsin, United States, on 14 May and email communication on 18 May 2010.
9. Ibid.

The firm's vulnerabilities were apparent during the early part of the recession. In December 2008, the company announced that it would close a factory in Glenville, New York. Super Steel said closure was based on "the dramatic downturn in the global and national economies and a steep decline in orders". The company's diversification within the rail business provided an insufficient level of protection. The company then explained that during the last few months in 2008 it saw "dramatic and unprecedented reductions and cancellations of orders" by their "customers in freight locomotive, transit and transportation sectors" (Content, 2008).

Super Steel began as a metal fabricating company with basic welding, metal working and machining capability. As assembly contracts became available, they evolved as part of a kind of satellite to the larger railroad environment based in Chicago. For example, they later became a successful subcontractor and systems integrator for Japanese prime contractors to assemble cars for Metra in Chicago. The company then became more vertically integrated and also developed a rail system to ship the car to Chicago.[10]

Super Steel is involved in multiple markets including manufacturing for the industrial, construction and agricultural markets (Biztimes.com, 2010). Railcar production was not its sole business segment so Super Steel was less vulnerable than the Milwaukee Railcar Corporation to transit market size and fluctuations. Super Steel's business plan was not based on producing a highly vertically integrated product line involving new railcars for the transit market:

> Their first foray into the rail industry was actually building car bodies for the Electromotive Division, diesel locomotives. So they never saw the locomotive. They just built the car body and shipped it via highway to La Grange, Illinois, which is where Electromotive historically had its main manufacturing facility.

They fit the car body onto the diesel locomotive frame, truck and prime mover to provide a finished product. Super Steel only made part of a locomotive and initially even lacked tracks "because they were just building the bodies for the locomotives". As a supplier to locomotive manufacturer EMD, they were always supplying parts of systems and never did much R&D, although they performed some field and applied engineering. However, the company never developed an extensive internal research and development capacity; instead, they used systems, parts, designs and applications provided by other firms (Decker, 2006). The company's engineering capabilities do include three dimensional modelling, virtual product development, and the

10. Phone interview with Robert J. Bauman, Alderman, City of Milwaukee, Wisconsin, United States, on 14 May and email communication on 18 May 2010.

capacity to design and build tools used in their manufacturing work (Super Steel, 2010). The company gained technical capacities by cooperating with Japanese producers, but this supply side boost was not strong enough to overcome recessionary pressures.[11] The company was trying to diversify into new markets in 2006 (Decker, 2006), but this planning was insufficient in helping it avoid lay-offs and contraction after the recession and problems with a specific contract.

As a general principle, neither the Milwaukee Rail Car Corporation nor Super Steel could benefit from a tripartite alliance with trade unions and a local transit provider in rail production because of the absence of both subway and light rail systems in Milwaukee. Super Steel never produced for the local Wisconsin market, but has received support from local government because they were a significant employer not because of their product line's market.[12] The City of Milwaukee "helped Super Steel with millions of dollars worth of financing over the last thirty years".[13]

The ability to involve labour was further complicated at Super Steel in 1995 when the International Brotherhood of Boilermakers Local 1993 lost a representation vote at Super Steel. The workers at the plant had "voted for the union representation by a slim margin", although after that the union was unable to negotiate for a contract. An August 1995 decertification vote was supported by both the union and the company in a test of power at that plant, but unions lost. This vote was the "sixth time in 10 years that Super Steel workers had voted on some type of union representation" (Joshi, 1995). In sum, the Boilermakers had "a couple of elections there, won them, but could not get a contract".[14] The lack of a partnership between management and labour in Milwaukee was largely based on business elite opposition to the interests of trade unions, African-Americans or progressives.[15] The former CEO argues that a paternalistic system of close labour–management cooperation helped his firm. He argues that "ultimately it's your performance that wins...but it certainly doesn't hurt to have those advocates" such as trade unions.[16]

11. Phone interview with Keith Trafton, Former CEO Super Steel Corporation, Milwaukee, Wisconsin, United States, 15 June 2010.

12. Phone interview with Robert J. Bauman, Alderman, City of Milwaukee, Wisconsin, United States, on 14 May and email communication on 18 May 2010.

13. Phone interview with Jim Scherer, Vice President, Milwaukee Economic Development Corporation, Milwaukee, Wisconsin, United States.

14. Email communication with Tracy Buck, Assistant to the Director of Administrative Affairs of the International President, International Brotherhood of Boilermakers, Kansas City, Kansas, 11 June 2010.

15. Phone interview with Frank Emspak, Professor Emeritus, Wisconsin School for Workers, Madison, Wisconsin, United States, 10 June 2010.

16. Phone interview with Keith Trafton, Former CEO Super Steel Corporation, Milwaukee, Wisconsin, United States, 15 June 2010.

Bombardier and its predecessor firms in Ontario

Bombardier has been a relatively successful producer in Canada, with two major production facilities (and supporting design capacities) based in the country. When looking at data just for Bombardier's transportation division, we learn that they had 34,200 employees in fiscal year 2009, with about 6,500 or 19 per cent of personnel located in North America. In contrast, only 10 per cent of revenues of CAN$9.8 billion came from North America in fiscal year 2009 (Bombardier, 2009).

Development pair and extension of user competence

One basic approach in North America has been for transit agencies to work with a supplier, build a long-standing relationship with them and negotiate with that supplier around new specifications for successive train models. There has been an historical relationship between Bombardier or its predecessor firms and the Toronto Transit Commission (TTC) in Thunder Bay and Kingston, Ontario. All of TTC's cars were built in Ontario in the two locations, creating "a long-standing relationship with those facilities". As a result, normally that relationship would not be questioned, i.e. "you would continue if you were satisfied with the product and negotiate with them for the next batch of vehicles". Under the TTC Chairmanship of Howard Moscoe, this kind of follow-on procedure was implemented and corresponded to standard practices in many other parts of the world.[17]

Bombardier acquired the Thunder Bay railroad production facilities from a company that at one point was owned by Hawker Siddeley. One of the keys to the latter's success was that it had "a solid client, which was the City of Toronto". Politicians in Ontario wanted to create work and business for the northern manufacturing facility of Thunder Bay which, like Toronto, was located in the Province of Ontario. The Toronto Transit Commission and GO-Transit (Government of Ontario) were two key local customers. They both did not use consultants because "people working transit agencies were good engineers", unlike the situation often found in the United States. For many such agencies "would die without consultants in a day or two".[18] The TTC has a great deal of in-house expertise and a substantive engineering staff. In fact, they have production lines in which they rebuilt their own buses every 15 years. Some buses have been on the road for 45 years, having

17. Phone interview with John Cartwright, President of Toronto and York Region Labour Council, Ontario, Canada, 21 May 2010.

18. Phone interview with Joe Lewalski, former engineering Manager, Hawker-Siddeley Canada, Carson City, Nevada, United States, on 6 July and email communication on 11 July 2010.

had "two rebuilds". They do not have the capacity to manufacture, but to rebuild.[19] The design and engineering capacities of Hawker Siddeley were also complemented by the Toronto Transit Commission and Ontario's Transit Development Corporation when making the four-axle CLRV-1 (Sullivan, 1981, p. 81).

The origins of the TTC's decision to purchase local, Ontario-produced Bombardier products at the Thunder Bay facility through a sole source contract can be traced to a tripartite arrangement linking government, unions and the firm. Bombardier's Thunder Bay facility was in serious trouble in the mid-1990s. This led to a bailout plan involving the Ontario government, Bombardier and the CAW-Canada (the Canadian Auto Workers). The Ontario government was run by Bob Rae of the New Democratic Party (NDP). The CAW convinced the Rae government to bail out the facility. The government committed themselves "to source any product that they required for TTC through that Thunder Bay operation to keep it viable".[20,21] The ability of Can-Car, a predecessor to Bombardier in Thunder Bay, Ontario, to exploit "follow on" contracts can be seen in the history of TTC's contracts with this company. From 1965 to 1999, the Can-Car company (which once owned Thunder Bay) produced 1,608 transit cars worth CAN$1,410 million (Burkowski, 1995, p. 171).

Diversified strategy and resource base

The Hawker-Siddeley and Can Car operations that were centred in Thunder Bay, Ontario were eventually acquired by Bombardier as it became a larger, global-scale manufacturer of rail-based mass transportation equipment. Bombardier's capacity to do that and sustain the larger corporate entity that contained mass transportation was partially based on the way it acquired or extended its capacities through diversification.

The Quebec Pension Fund and a Quebec government business development fund both provided "low-cost capital" to Bombardier (Levine, 1992; MacDonald, 2001). While Bombardier has been successful and received government assistance, Bombardier's historian points out that "it is not just a matter of getting aid, but of what kind of organization is in place to put it to work" (MacDonald, 2001, p. xxxiii).

19. Phone interview with Howard Moscoe, Councillor, City of Toronto, Canada, 2 June 2010.

20. Phone interview with Robert Chernecki, Assistant to the President, Canadian Auto Workers Union, 27 October 2006.

21. Even after the NDP lost power, the CAW continued to effectively mobilize and gained leverage in decisions by various levels of government (see below).

The Bombardier Company began when Joseph-Armand Bombardier invented a motorized vehicle that could overcome the transit problems created by harsh winter conditions in rural Quebec. He used his small workshop in Valcourt, Quebec to invent the tracked snowmobile in 1936. As weather conditions fluctuated and government policies were launched to more systematically clear snow from roads, Bombardier was forced to diversify into various products related to farm, industrial and military transport devices. Other government regulations either restricted snowmobile production or the locations where these vehicles could be used (Debresson, 1989; Goritschnig et al., 2003).

Acquisitions were key to building and extending in house capacities. In 1973, Bombardier was forced to diversify because the North American snowmobile market collapsed. The company had acquired "substantial financial resources" and "leverage from prior successes" so that it decided "to become a transport equipment multinational". This success was furthered via acquisitions including first Worthington, "one of the largest locomotive manufacturers". This base was then used to support a licence for "French urban transit technology" which the company improved upon and re-exported (Debresson, 1989, p. 9).

When Bombardier competed to win an order for Montreal subway cars in 1974, its principal competitor was Vickers Ltd., a British firm that had supplied subway trains to the system in 1963. At the time of the competition, Bombardier had gained some capacities in mass transit based on its acquisition of the Austrian firm Lohnerwerke GmbH. These capacities were complemented by acquiring the licence of CIMT-Lorraine, a French manufacturer that had supplied Vickers with designs to make the original Montreal subway cars. Vickers let the license lapse to avoid royalty fees and used its in-house designs. Vickers' decision gave Bombardier an advantage as Montreal could benefit from standardization because the service and repair tasks on the old and newer French-designed trains would be the same. The licence acquisition decision also explains how Bombardier could avoid some of the key bottlenecks in breaking into this new market: "A main benefit to Bombardier was not having to invest in expensive research to develop new designs, allowing it to get product out faster and keep costs down". The team that prepared the bid included "technical specialists" from CIMT and Bombardier employees who used their knowledge from snowmobile manufacturing to cost out everything in detail to make sure that a competitive bid did not prevent the company from making a profit. Bombardier won the Montreal bid and had lower costs (about CAN$2 million less) after making adjustments for a coupling mechanism that Vickers did not originally submit in its losing bid but needed to in order to meet Montreal specifications (MacDonald, 2001, pp. 46–48).

Labour strength and power extension strategies

Robert Chernecki, a leading figure in the CAW, explains how the Canadian labour movement developed a strategy for resisting imports and outsourcing in the transportation sector. The CAW has fought against globalization "since we lost the auto pact in the auto sector, since the passage of WTO and NAFTA, we've been on the ground fighting this". The municipal councils are comprised of local community residents and the CAW has supported an electoral campaign to gain control over the public economy through local city councils: "We have encouraged our people to run for those positions and a lot of them are. They are getting on city councils and watching these procurements and insuring that if we're going to spend taxpayer dollars, we're going to put people to work here". A continuing problem is that millions of dollars in procurements have been awarded on a wide range of products and services to outside the local community.

The CAW organized rallies in front of City Hall in support of the Bombardier procurement in both Toronto and Thunder Bay. They launched a lobbying effort, called "the made in Canada solution", that lasted several weeks. It involved radio advertisements, opinion pieces in newspapers, T-shirts, buttons and a special publication. The effort began by trying to get Thunder Bay residents "to fight for jobs in their own community". The CAW met with the mayor, city council and chamber of commerce there. Resolutions were presented to the city council and chamber of commerce. The CAW organized community meetings of local citizens as well. After a period of inertia, the mayor and political leadership got behind the initiative. The chamber of commerce produced a study, "Made in Thunder Bay", which supported Bombardier and local content.[22]

The Toronto organizing drive had the strategic advantage of preceding local city council elections. On the day of the City Council vote on the TTC contract, a union rally joined CAW with other unions including the Steelworkers, the Teachers Union and UNITE. Jane Pitfield, who was running for mayor, opposed Toronto's sole source contract with Bombardier. She later lost to David Miller (57 per cent to 32 per cent). The CAW brought the issue up with its "parliament" which involves a meeting of 600 to 700 delegates who meet every three months. These represent the 260,000 or so members in the union (or which about 100,000 are concentrated in Ontario, especially in Toronto). The leadership wrote, emailed and lobbied Ontario and federal parliamentarians to support local procurement and job retention in Canada.

22. Phone interview with Robert Chernecki, Assistant to the President, Canadian Auto Workers Union, 27 October 2006.

The subway contract was funded by the federal government, the provincial government and the municipality. These three levels of government had input about how the work was done and where it was done. Chernecki argues: "The issue clearly was are we going to allow taxpayer dollars – provincial, federal and municipal – to put work offshore and people stood up to that test". A letter written by Dalton McGuinty, Ontario's Premier, to Toronto Mayor David Miller was "critical" because it helped counter the arguments by conservatives that the sole source decision violated WTO rules and other agreements or laws. Buzz Hargrove, CAW President since 1992, "secured that letter on behalf of this fight". The TTC and the City Council "took this pretty seriously" and it led to an agreement to continue the sole source arrangement with Bombardier.

Conclusions

The Milwaukee-based American companies profiled in this study either dissolved or were being reorganized after a bankruptcy. They have not been as successful as their Canadian-based counterparts. Super Steel is likely to emerge as a successful mid-sized assembler, but will not ever reach the scale of a transnational in the absence of stronger industrial policies.[23] The Canadian firm Bombardier emerged as a national champion, although part of a transnational corporation with much activity outside Canada, and still maintains two significant plants in Thunder Bay, Ontario and in Montreal, Quebec.

In Canada, the military economy captured far less attention from national leaders than civilian industrial policy, particularly as the greatest threats to the integrity of the nation came from internal factors rather than external threats.

At the national level, industrial policy measures associated with procurement and protection have been weaker in Canada than in the United States, especially in light of recent controversies. Nevertheless, at the local state level, Bombardier and its predecessor firms found local procurement champions which Milwaukee-based firms lacked. In the late 1960s to early 1990s, various Canadian industrial policies (such as financial support) to help Bombardier or the rail sector were far more successful than their American counterparts. While Milwaukee clearly borders the large Chicago metropolitan region, the local transit agency in Milwaukee did not support the markets for these firms.

23. It is important to note that success in manufacturing often should be defined at higher production network or system level and the lower project level, rather than at the firm level. This paper explores the firm and system levels, but does not explore in detail how firms succeeded or failed in specific mass transit projects (see Feldman, 1998).

The Toronto Transit Commission provided demand and supply side supports which Milwaukee's transit agency did not provide for the firms profiled.

In Bombardier's case, a relatively diversified firm was possible based on past success in non-transit related markets. The resource base of the firm was greater than that found in the two Milwaukee firms profiled, enabling the firm to be more successful in diversification. Both of these firms rested so heavily on rail-based transit markets that they became vulnerable to the boom and bust cycle of mass transit and the effects of the global recession.

In Milwaukee, the labour union lost representation at Super Steel, so it could hardly play a role during that period as a key cooperative foundation for expanding or retaining the company's market share. A history of labour conflict and racial divisions there contrasts with the leverage unions in Ontario have gained based on a corporatist coalition linking the transit agency, provincial manufacturers, and labour unions and supported by the New Democratic Party and local politicians advocating local procurement. This explains why Ontario has been able to retain jobs created in part by the factors elaborated above.

References

Aaronson, Susan Ariel. 2001. *Taking Trade to the Streets: The Lost History of Public Efforts to Shape Globalization* (Ann Arbor, MI, University of Michigan Press).

Amsden, Alice H. 2007. *Escape from Empire: The Developing World's Journey Through Heaven and Hell* (Cambridge, MA, MIT Press).

Austen, Ian. 2009. "To the North, Grumbling Over Trade", in *The New York Times*, 8 Aug.

Baugh, Robert. 2010. "Economic Reality and Alarmist Rhetoric: Getting Real About Buy America", in *One Issue, Two Voices*, Canada Institute, Woodrow Wilson International Centre for Scholars, Washington, DC, Issue 12, pp. 3–8, April.

Best, Michael. 1990. *The New Competition*: *Institutions of Industrial Restructuring*. (Cambridge, MA, Harvard University Press).

BizTimes.com. 2010. "More Financial News: Buyers emerge for manufacturing companies in receivership", Milwaukee and Southeastern Wisconsin Business News, 16 Mar. Available at: http://www.biztimes.com/money/2010/3/16/ (accessed 29 May 2010).

Bombardier. 2009. *2008-09 Annual Report* (Montreal).

Burkowski, Gordon. 1995. *Can-Car: A History 1912–1992*. (Thunder Bay, Ontario, Bombardier Inc.).

Chang, Ha-Joon. 2008. *The Myth of Free Trade and the Secret History of Capitalism* (New York, Bloomsbury Press).

Clarkson, Stephen. 2002. *Uncle Sam and US: Globalization, Neoconservatism and the Canadian State* (Toronto, University of Toronto Press).

Content, Thomas. 2008. "Milwaukee's Super Steel to close N.Y. plant, cut 175 jobs", in *Journal Sentinel*, 1 Dec. Available at: http://www.jsonline.com/business/35331524.html. Accessed 14 June 2010.

Council of Canadians. 2010. "Trade Justice Network releases secret draft of Canada-European Union free trade agreement, makes demands of Canadian and European governments", Media release, Ottawa, Ontario, 19 Apr.

Debresson, Chris. 1989. "Breeding Innovation Clusters: A Source of Dynamic Development", in *World Development*, Vol. 17, No. 1, pp. 1–16.

Decker, Eric. 2006. "Super Steel is on track for growth", in *BizTimes.com*, Milwaukee and Southeastern Wisconsin Business News, 18 August. Available at: http://www.biztimes.com/news/2006/8/18/super-steel-is-on-track-for-growth. Accessed 14 June 2010.

Journal Sentinel, "Editorial: Milwaukee needs to hit the sweet spot", in *Journal Sentinel*, 24 June 2007. Available at: http://www.jsonline.com/news/opinion/29442379.html (accessed 14 June 2010).

Eisinger, Peter K. 1988. *The Rise of the Entrepreneurial State: State and Local Economic Development Policy in the United States* (Madison, University of Wisconsin Press).

Faux, Jeff. 2006. *The Global Class War: How America's Bipartisan Elite Lost Our Future and What It Will Take to Win It Back* (Hoboken, NJ, John Wiley & Sons, Inc.).

Feldman, Jonathan M. 1998. "The Conversion of Defense Engineers' Skills: Explaining Success and Failure Through Customer-Based Learning, Teaming and Managerial Integration", in Gerald I. Susman and Sean O'Keefe (eds): *The Defense Industry in the Post-Cold War Era: Corporate Strategy and Public Policy Perspectives* (Oxford, Elsevier Science), pp. 281–318.

—. 2007. "The Managerial Equation and Innovation Platforms: The Case of Linköping and Berzelius Science Park", in *European Planning Studies*, Vol. 15, No. 8, pp. 1027–1045.

—. 2009. "From Mass Transit to New Manufacturing", in *The American Prospect*, Apr., pp. A12–A16.

Fligstein, Neil. 2001. *The Architecture of Markets: An Economic Sociology of Twenty-First-Century Capitalist Societies* (Princeton, NJ, Princeton University Press).

Fridlund, Mats. 1993. *The 'development pair' as a link between systems growth and industrial innovation: Cooperation between the Swedish State Power Board and the ASES company*, Working papers from the Department of History of Science and Technology 93/9 (Stockholm, Department of History of Science and Technology, Royal Institute of Technology).

—. 2000. "Procuring Products and Power: Developing International Competitiveness in Swedish Electrotechnology and Electric Power", in Charles Edquist, Leif Hommen and Lena Tsipouri (eds): *Public Technology Procurement and Innovation* (Dordrecht, Kluwer Academic Publishers Group).

Goritschnig, Gienther; Isikveren, Askin T.; Lamothe, Michel; Munger, Eric. 2003. *The Evolution of Civil Aircraft Design at Bombardier: An Historical Perspective*, Paper 158, Canadian Aeronautics and Space Institute Aircraft Design and Development Symposium, Montreal, Canada, Apr.

Greider, William. 1997. *One World Ready Or Not: The Manic Logic of Global Capitalis* (London, Allen Lane, Penguin Books).

Hale, Geoffrey. 2008. "The Dog That Hasn't Barked: The Political Economy of Contemporary Debates on Canadian Foreign Investment Policies", in *Canadian Journal of Political Science*, Vol. 41, No. 3, pp. 719–747.

—. 2010. "The 'Buy American' Controversy: A Case Study in Canada-US Trade Relations", discussion paper, *Portal for North America* (Waterloo, Canada), Centre for International Governance Innovation.

Harvey, David. 1996. *Justice, Nature and the Geography of Difference* (Cambridge, MA, Blackwell Publishers Inc.).

—. 2006. *The Limits to Capital* (New York, Verso Books).

Herod, Andrew. 2001. *Labor Geographies: Workers and the Landscapes of Capitalism* (New York, The Guilford Press).

Jenkin, Michael. 1983. *The Challenge of Diversity: Industrial Policy in the Canadian Federation*. Background Study Number 50, Aug. (Ottawa, Science Council of Canada).

Jones, Van (with Ariane Conrad). 2008. *The Green Collar Economy: How One Solution Can Fix Our Two Biggest Problems* (New York, HarperOne).

Joshi, Pradnya. 1995. "Union loses vote at Super Steel", in *Milwaukee Journal Sentinel*, 11 Aug., p. 2D.

Kurth, James R. 1972. "The Political Economy of Weapons Procurement: The Follow-on Imperative", in *The American Economic Review*, Vol. 62, No. 1–2, pp. 304–311.

Lévesque, Christian; Murray, Gregor. 2002. "Local versus Global: Activating Local Union Power in the Global Economy", in *Labor Studies Journal*, Vol. 27, No. 3, pp. 39–65.

Levine, Marc V. 1992. *Light Rail in Milwaukee: An Analysis of the Potential Impact on Economic Development* (Milwaukee, WI, Center for Economic Development, University of Wisconsin-Milwaukee).

MacDonald, Larry. 2001. *The Bombardier Story: Planes, Trains and Snowmobiles* (Toronto, John Wiley & Sons).

Melman, Seymour. 2001. *After Capitalism: From Managerialism to Workplace Democracy* (New York, Alfred A. Knopf).

O'Connor, James. 1973. *The Fiscal Crisis of the State* (New York, St Martin's Press).

Öniş, Ziya. 1991. "The Logic of the Developmental State", in *Comparative Politics*, Vol. 24, No. 1, pp. 109–126.

Pepall, Lynne M.; Shapiro, D. M. 1989. "The Military-Industrial Complex in Canada", in *Canadian Public Policy*, Vol. 15, No. 3, pp. 265–284.

Porter, Michael E. 1990. *The Competitive Advantage of Nations* (New York, The Free Press).

Schatzberg, Eric. 1993. "The Mechanization of Urban Transit in the United States: Electricity and Its Competitors", in William Aspray (ed.): *Technological Competitiveness: Contemporary and Historical Perspectives on Electrical, Electronics, and Computer Industries* (Piscataway, NJ, Institute of Electrical and Electronics Engineers), pp. 225–242.

Sullivan, Brian E. 1980. "Light Rail Transit in Canada", in *Transportation*, Vol. 9, No. 1, pp. 75–82.

Super Steel Products Corporation. 2010. Company website. Available at: http://www.supersteel.com/. Accessed 29 May 2010.

Teece, David T.; Pisano, G.; Shuen, A. 1997. "Dynamic Capabilities and Strategic Management", in *Strategic Management Journal*, Vol. 18, No. 7, pp. 509–533.

Transit Cooperative Research Program (TCRP). 2010. "Guide to Federal Buy America Requirements—2009 Supplement", *Legal Research Digest 31* (Washington, DC, Federal Transit Administration), Mar.

Veblen, Thorstein. 1965. *The Engineers and the Price System* (New York, Augustus M. Kelley).

—. 1967. *Absentee Ownership and Business Enterprise in Recent Times: The Case of America* (Boston, Beacon Press).

International
Journal
of Labour
Research

2010
Vol. 2
Issue 2

Supporting a just transition: The role of international labour standards

Lene Olsen
Bureau for Workers' Activities,
International Labour Office

International
Journal
of Labour
Research
2010
Vol. 2
Issue 2

The founding of the International Labour Organization (ILO) in 1919 was motivated by three concerns. One was humanitarian or social in nature: working conditions in industry were generally deplorable; workers were often exploited with no consideration for their health, their family lives and their advancement. Another concern was political: there was a growing fear that if working conditions did not improve, this would create social unrest and even revolution, as had just happened in Russia. Finally, the third motivation was economic: to create an international social floor that would ensure that industries and countries that improved working conditions would not find themselves penalized vis-à-vis their competitors.

Had the ILO been founded today, it is likely one would find a fourth motivation, namely that of environmental preservation, given the increasing concern with regard to climate change. Indeed, by all accounts, the transition to a low-carbon society will have an enormous impact on our societies, and on how our economies are organized. If the transition is not governed properly, it will lead to economic deprivation and could lead to social unrest.

However, to say there is an additional concern is not to say the previous concerns have become irrelevant. To the contrary, they are still as valid as they were 90 years ago. If the big policy challenge today is how to make the transition to a carbon-efficient society socially sustainable – a "just transition" for all, it remains true that this will take place in a context where half of the global workforce still lives on less than two US dollars a day; where one-third of the global workforce is either unemployed or under-employed; and where half of the world's population does not have any sort of social security. Women are especially vulnerable, owing to their high numbers in unpaid, low-paid, part-time, frequently interrupted, or informal economy work.

The question is therefore how those conditions can be improved while making the transition to a so-called "green" society. The notion of "a just transition" is in reality nothing new, but a concept that builds very much on that of sustainable development known decades ago. The problem is that even though much has been said and written about sustainability, it seems that only the economic part has received the attention it deserves. The environmental concern has been very much neglected until recently, and the social dimension even more so. Today we see a growing interest in the environmental dimension, but no progress will likely be realized until the social dimension receives the attention it deserves.

In order to promote sustainable development that is socially just, environmentally friendly, and economically efficient, emphasis must be placed on governance and management changes to better service decent lives of millions of people.

In a resolution on climate change to the Second World Congress in June 2010, the International Trade Union Confederation (ITUC) promoted an integrated approach to sustainable development through a just transition where social progress, environmental protection, and economic needs are

brought into a framework of democratic governance, where labour and other human rights are respected, and gender equality achieved (ITUC, 2010).

The ITUC proposed six enabling conditions for a just transition to happen, namely:

1. Investment
2. Research and early assessment
3. Consultation and social dialogue
4. Education and training
5. Social protection and security
6. Economic diversification

In this article, we will examine how international labour standards relate to "a just transition" and how they can support and strengthen its enabling conditions.

Since 1919, the ILO has maintained and developed a system of international labour standards as an essential component in the international framework for ensuring that the growth of the global economy provides benefits to all. In view of the fact that many of the economic recovery strategies include environmental and "green" concerns, it is timely to look at how international labour standards can support a just transition to a sustainable, low-carbon future.

Investment

Both public and private investment and reorientation of financial resources are needed to move towards a low-carbon future that can decrease the negative consequences of climate change. The European Trade Union Confederation (ETUC) predicts that countries are likely to face annual costs

Make green opportunities real

Major investments are needed to develop long-term sustainable industrial policies, aimed at retaining and creating decent and "green"/sustainable jobs, "greening" all workplaces, developing, and deploying technology.

Example: The Observatoire Français de Conjoncture Economique has announced that 500,000 green jobs will be created in France by 2020 as a result of the implementation of the "Grenelle de l'Environnement", in sectors such as renewable energies, recycling, clean transport, and energy efficiency in buildings. In Japan, employment in environmental industries is expected to double to 2.8 million people by 2020.

Source: ITUC (2009).

of around €100 billion to mitigate their greenhouse gas emissions and adapt to the impacts of climate change by 2020 (ETUC, 2009).

Despite the economic crisis, investment in "green" production and products has continued to grow globally. Taking energy as an example, a report by the United Nations Environment Programme (UNEP, 2010) shows that new private and public sector investments in core clean energy increased by 53 per cent in China in 2009. For the first time, private sector green energy investments in Asia and Oceania, some US$40.8 billion in 2009, exceeded that in the Americas, at US$32.3 billion. Europe is still the region of the world with the largest share of global financial investment in clean energy – but only just with US$43.7 billion, down from US$48.4 billion in 2008. The report also shows that countries with policies encouraging renewable energy investment have played a critical role. This is important, and must be followed up with linkages between investment, growth and productivity on the one hand, and employment, labour market and social policies on the other. The estimated 3 million people directly employed in the renewable energy industries have to benefit from decent working conditions.

The development of long-term sustainable industrial policies to "green" the economy will require investment with a focus on equity as well as government intervention.

While investing in a "green" future, governments should take into account all three pillars of sustainable development when procuring goods, services or works at all stages of the purchasing process. Through the adoption of the principles of sustainable development in their public procurement procedures, public authorities can provide the industry with incentives to develop new and better technologies, encourage sustainable patterns of behaviour and decent work for all. The international labour standard, namely the Labour Clauses (Public Contracts) Convention, 1949 (No. 94), is very important in relation to sustainable public procurement practices.

The rationale behind the adoption of Convention No. 94 is that public authorities should seek to ensure the observance of socially acceptable standards in work performed for the public account. Fair labour clauses in public contracts can play a useful role in attaining and maintaining a high standard of social protection at the national level. In addition, such clauses may have inter-State effects, to the extent that countries insert labour clauses in contracts for procurement from foreign sources, or condition grants or loans that finance local public procurement upon the effective maintenance of certain labour conditions in the execution of the resulting public contracts (ILO, 2008a).

Convention No. 94 covers three main subjects:

i. the types of public contracts that should contain labour clauses;

ii. the content of labour clauses and the means for determining such content at the national level; and

iii. the methods for enforcing the terms of labour clauses.

In the Report of the Committee of Experts on the Application of Conventions and Recommendations to the International Labour Conference in June 2010 (ILO, 2010b), the Committee considers that "the Labour Clauses (Public Contracts) Convention, 1949 (No. 94), is highly relevant and offers a sound answer to the risk of pay inequalities which is exacerbated in times of crisis." It recalls that "Convention No. 94 is about good governance and addresses socially responsible public procurement by requiring bidders/contractors to align themselves with wages, hours of work and other conditions of labour not less favourable than those established for work of the same character in the trade or industry concerned in the district where the work is carried on, as determined by collective agreement, arbitration award or by national laws or regulations." As many public stimulus packages include green investment measures, Convention No. 94 is one of the relevant ILO instruments in the context of the global economic and social crisis that can help ensure that these investments generate jobs with decent pay and working conditions.

In 1949, Convention No. 94 was adopted with a view to ensuring that substantial public investment in public works, and the purchase of goods and services did not have a depressing effect working conditions elsewhere in the economy. As was noted at that time, the influence of (labour) clauses depends upon the depth of the government's involvement in economic affairs, either as a purchaser of supplies and equipment, or as an investor in public works.

Today, public investment via public contracts in "green" services and products is increasing in both developed and developing countries. The risks remains essentially the same, namely that the winning tender may well be the one which pays the lowest wages; fails to provide safety equipment or coverage for accidents; and which has the largest proportion of informal workers, for whom no tax or social security is paid, and who in practice are not covered by any legal or social protection. There is a legitimate concern that international competition, especially in the presence of multinational companies with large and efficient infrastructures, pushes bidding enterprises to compress labour costs, which most often results in reduced wages, longer hours, and poorer working conditions such as inadequate sanitation, accommodation and eating facilities. Indeed, the observations made 60 years ago are even more valid today, taking also into account modern public authorities' outsourcing of public and support services via contract, and financial investment in public-private partnerships which today provide the types of public goods and services provided in the past through public contracting (ILO, 2008a).

The need for harmonization and standard-setting at the international level is important to safeguard not only the environmental, but especially the social dimension of investments. Convention No. 94 is the only multilateral Convention setting out a universal labour standard in the area of public contracting and has an important role to play in this regard.

Labour Clauses (Public Contracts) Convention, 1949 (No. 94)

- Ratified by 60 countries (as at 13 September 2010)
- General Survey of the Convention in 2008

Source: ILOLEX database.

Research and early assessment

Research on the impact and consequences of climate change has exploded in the last few years. However, not all aspects are equally covered. The environmental impact has of course been widely documented: the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) in 2007 is a case in point. The Stern report followed up with an economic analysis of the situation.

More recently, the social dimension, including employment issues, has started to be studied in detail. The 2008 report *Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World* by the ILO, UNEP, ITUC and IOE was groundbreaking in this respect. The European Trade Union Institute (ETUI) has also carried out a Europe-wide study on the employment impact of mitigation measures on various industrial sectors. These two reports were important in the sense that they documented the potential for job creation in various economic sectors.

However, there is still a lot of research to be carried out under the social dimension of climate change, especially in relation to how this dimension is linked to the economic and environmental issues. Table 1 gives an idea of several research questions that arise when we look at climate change from a

A sound starting point

Research and early assessment of social and employment impacts are crucial for better preparation for change.

Example: The European Trade Union Confederation (ETUC) undertook a study to find out the potential repercussion on employment of a 40 per cent reduction in the European Union's CO_2 emissions by 2030. The study points to the need for clear and foreseeable climate policies, substantial public investment in research and development, renewable and combined heat and power (CHP) energy, greener public transport systems and renovation of buildings, in addition to well-designed economic instruments taking into account the impact on low-income households and energy intensive industries. A new, in-depth study on climate change, new industrial policies and ways out of the climate and economic crises is now being undertaken.

Source: ITUC (2009).

labour perspective. One of the greatest challenges is to get a holistic view of all the effects – environmental, economic and social – in order to put in place policies that can create sustainable results.

An important issue is stressed in the ILO's *World of Work Report 2009: The global jobs crisis and beyond* (ILO, 2009c) which states that:

> more work is needed to improve understanding of the social impacts of different types of green policies. In particular, the international dimensions need to be better understood. The empirical exercise presented in this chapter assumes that green policies are implemented simultaneously across the countries considered. This implies that all the countries implemented green policies at the same time. Therefore, the effects of green policies (with or without offsetting cuts in labour taxes) implemented by one country in isolation have not been assessed. This is a crucial issue. Indeed, there is concern that green policies might be translated into higher prices and a loss of competitiveness, which could result in jobs being reallocated in those countries that do not enforce stringent environmental standards.

The ILO's Social Policy (Basic Aims and Standards) Convention, 1962 (No. 117), sets forth the general principles that all policies shall be primarily directed to the well-being and development of the population and to the promotion of its desire for social progress. Furthermore, the improvement of standards of living shall be regarded as the principal objective in the planning of economic development. It also provides additional requirements concerning migrant workers, agricultural producers, independent producers and

Table 1. Research on climate change from a labour perspective

	Environmental	Economic	Social	Sustainability
Effects	How are different sectors (agriculture, tourism, transport, etc.) affected?	How are enterprises affected (relocation, closure, etc.)?	How are workers (women and men) affected (unemployment, migration, poverty, etc.)?	What are the impacts on the society as a whole?
Policies	Which policies are put in place and how? What impact will policies designed to combat climate change have on employment in quantitative and qualitative terms by 2030?	Which policies are put in place and how?	Which policies are put in place and how?	Are the different policies linked? How is the policy process governed at local, national, regional and international levels?
Results	What happens to specific sectors when different policies (adaptation, mitigation, etc.) are put in place? What happens to different groups of workers (women, men, migrants, etc.)?	What happens to enterprises when different policies (adaptation, mitigation, etc.) are put in place?	What happens to workers (women and men) when different policies (adaptation, mitigation, etc.) are put in place?	How are the "green jobs" in terms of sustainability?

wage earners, minimum wage fixation and payment of wages, non-discrimination, and education and vocational training (ILO, 2009b).

In relation to policy coherence, the Employment Policy Convention, 1964 (No. 122), is key. Indeed, the International Labour Conference in 2008 identified it as one of the Conventions having the most significance from the viewpoint of governance while adopting the Social Justice Declaration. It has also been considered an important tool to assist countries to address the employment dimension of the economic crisis. The conception of employment policy in this Convention is a broad one, employment policy encompasses not just the programmes typically implemented by ministries of labour, such as active labour market policies and employment services, but should also include efforts to mainstream the objective of full employment in macroeconomic, trade, investment and industrial policies (ILO, 2010d).

Both Conventions No. 117 and No. 122 contain guidelines on how governments can make efforts in mainstreaming both social and economic concerns. There is a need for further research on how countries could actively use these Conventions to establish greater policy coherence with regard to their strategies to come to terms with climate change.

From a technical research point of view, the Labour Statistics Convention, 1985 (No. 160), is useful to ensure that figures on new green sectors and jobs are included in the national labour statistics. Article 1 of this Convention indicates that member States that ratify this Convention undertake that they will regularly collect, compile and publish basic labour statistics, which shall be progressively expanded in accordance with the State's resources to cover the following subjects:

a. economically active population, employment, where relevant unemployment, and where possible visible underemployment;
b. structure and distribution of the economically active population, for detailed analysis and to serve as benchmark data;
c. average earnings and hours of work (hours actually worked or hours paid for) and, where appropriate, time rates of wages and normal hours of work;
d. wage structure and distribution;
e. labour cost;
f. consumer price indices;
g. household expenditure or, where appropriate, family expenditure and, where possible, household income or, where appropriate, family income;
h. occupational injuries and, as far as possible, occupational diseases; and
i. industrial disputes.

All these subjects, including gender-aggregated data, would also be applicable to green jobs and would be important reference material for researchers especially to find out whether these jobs are also decent jobs.

Social Policy (Basic Aims and Standards) Convention, 1962 (No. 117)

- Ratified by 32 countries (as at 13 September 2010)

Employment Policy Convention, 1964 (No. 122)

- Ratified by 103 countries (as at 13 September 2010)
- General survey of the Convention in 2010

Labour Statistics Convention, 1985 (No. 160)

- Ratified by 48 countries (as at 13 September 2010)

Source: ILOLEX database.

Consultation and social dialogue

A just transition is primarily about good governance. It is about applying the right policies in consultation and with the involvement of those concerned. Ideally, involvement must take place from the policy development stage to that of the monitoring of progress. For this to happen women and men have to be able to communicate and share their views freely and in a democratic way.

In this regard, for climate change policies to be socially sustainable, one requirement is that they should be linked to employment and labour market policies and take into account industrial relations. Governments have to involve trade unions in addressing the needs of industries and communities at large in order to ensure that the transition to a carbon friendly future is just and fair to all – that development is sustainable.

There are many reasons why participation is so important. First, because when all parties have their points of view voiced, considered and defended in decision-making bodies dealing with environmental transitions, it would be easier to take into account the different perspectives of economic, social and environmental measures to be taken. Second, this may lessen social resistance

Come and talk!

Governments have to consult with, and encourage institutionalized normal involvement of trade unions, employers, communities, and all groups that need to be part of the transformation. Consultation and respect for human and labour rights form the baseline conditions in order to ensure a smooth and effective transition towards a sustainable society.

Example: Spanish trade unions (CCOO and UGT), government and business organizations have established a platform for tripartite social dialogue on climate change to prevent, avoid or reduce the potentially adverse effects that could result from compliance with the Kyoto Protocol, in particular those related to competitiveness and employment.

Source: ITUC (2009).

to necessary environmental measures because of apprehensions about the social and economic impacts of such policies. Both adaptation and mitigation measures will have an impact on employment – in the form of restructuring, need for training, social protection, etc. Third, because it will also ensure that the costs of change are spread as evenly as possible across society and that the benefits reach those who most need them. Fourth, participation ensures representation at different levels: seats on national policy-making fora, involvement in specific local negotiations, workplace level negotiations, etc. Finally, participation always ensures a higher level of commitment from all the partners involved: the government, and the workers' and employers' organizations. This also leads to better results when it comes to implementation and sustainability of policies (TUC, 2008).

At the 60th anniversary, in 2009, of the Right to Organise and Collective Bargaining Convention, 1949 (No. 98), it was said that that standard had become more relevant than ever to meet the growing needs of the labour market in a globalized environment. The Convention is of fundamental importance for the realization of decent work and social justice throughout the world. Respect for fundamental principles and rights at work are not only essential for human dignity, but also critical to recovery and development. In times of economic crisis, it is vitally important that a culture of social dialogue be established and, in particular, that collective bargaining be promoted as a useful mechanism for engaging in dialogue to address the issue of economic recovery effectively.

Collective bargaining is an important mechanism by which enterprises, in full and meaningful dialogue with workers' organizations, can ensure their sustainability both in times of growth and in times of crisis. Collective bargaining gives representational voice to the workers in a way that enables innovation in decisionmaking and can maximize the impact of crisis responses to the needs of the real economy, while ensuring meaningful protection of workers' rights (ILO, 2010b). Convention No. 98, together with the Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87), is thus the cornerstone for participation in decisionmaking.

In Argentina, the General Confederation of Labour (CGT) has signed a "Framework Environmental Agreement" with the Government that guarantees the participation of workers in policy processes to achieve sustainable development, including climate change issues, as well as the incorporation of environmental clauses in collective agreements (TUC, 2008). Other countries have developed similar agreements and processes to address the climate change agenda.

At the international level, the discussion and signing of International Framework Agreements to improve social and labour performance in multinationals has seen an increase in including environmental issues. A joint study by Sustainlabour, the ETUC and the Global Union Federations (ETUC et al., 2010) shows that out of 72 texts signed, 33 framework agreements

mention the environment (48 per cent) and 22 (31 per cent) include environmental clauses. These references are also improving in quality, not only mentioning the issue but also including elaboration of procedures for its implementation. However, the same study indicates that unions were dissatisfied with the lack of progress on freedom of association or other basic rights. Workers' rights to establish their own independent organizations and to bargain collectively are still denied in many countries. It is important that these rights be respected in order for trade unions and their representatives to be part of the climate change negotiations at all levels: at the workplace, at national, regional and international level (Olsen, 2009). One of the proposals for future action mentioned in the above study is explicit reference to international regulations in International Framework Agreements:

> These tools are important in the context of globalization because they lay the foundations for the establishment of universal basic rights, applicable to all production centres. Labour and the environment are the two major vectors of dumping of multinationals where international regulations tend to all short. Greater references to international environmental Conventions are still necessary, as well as to ILO Conventions on occupational health and safety. (ETUC et al., 2010)

Trade unions should be recognized as an important part of any climate change strategy. Joint union/management committees do exist at all levels in many countries throughout the world. Even though these existing structures were not necessarily set up to deal with climate change issues, they can also be used for this purpose. ILO's Tripartite Consultation (International Labour Standards) Convention, 1976 (No. 144), provides guidelines on how to set up consultative procedures and structures and highlights the participation of governments, workers and employers in this work at national level.

Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87)

- Ratified by 150 countries (as at 13 September 2010)
- General survey of the Convention in 1994

Right to Organise and Collective Bargaining Convention, 1949 (No. 98)

- Ratified by 160 countries (as at 13 September 2010)
- General survey of the Convention in 1994

Tripartite Consultation (International Labour Standards) Convention, 1976 (No. 144)

- Ratified by 125 countries (as at 13 September 2010)
- General survey of the Convention in 2000

Source: ILOLEX database.

Education and training

Education and training are of crucial importance to any changes in the labour market. Implementation of industrial change and transformation will ineluctably depend on how policies on skills are developed and associated with other labour market policies. Examples from more worldwide changes also show that education and training have often played a critical role in transforming and developing societies. Education played an important role during the Industrial Revolution in the nineteenth century (Becker, Hornung and Woessmann, 2010), and it also did and still does play a role in advancing the use of information technology around the world. The "green revolution" and the transition to a more carbon-friendly world will obviously have to consider this. Alarmingly, skills may turn out to be a bottleneck in the greening of economies. What is really at stake is the provision of a complement of skills for a broad range of jobs in order for economies to realize this potential job growth. Lessons from previous experiences of transition suggest that the transition to cleaner energy requires proactive steps to facilitate the adjustment of labour markets to maximize opportunities for new jobs and address potential job losses. Skills development will play a prominent role in both mitigation and adaptation policies (Strietska-Ilina et al., forthcoming).

A joint ILO and Cedefop (the European Centre for the Development of Vocational Training) global research project has investigated skills needs for structural shifts caused by greening the economy, new and changing occupational profiles, and major skills constraints.

The following drivers of skills and occupational change have been identified:

- **Change in natural or built environments**
  Mostly linked to skills to adapt to consequences of climate change and environmental degradation, such as handling climate risks in agriculture, adapting to prolonged dry or rainy seasons, decline in certain sectors due to biodiversity loss (e.g. tourism), or due to deforestation (e.g. woodcarving).

You train the workers, the future gets closer

Changes on the ground require workers to be trained in clean processes and technologies; this is key to absorbing and developing new technologies and for realizing the potential of green investments. Educational leave for workers to acquire new skills may be needed.

Example: The Argentinian construction workers' union, UOCRA, promotes workers' training in the field of renewable energies, providing workers with certified skills for biogas production installations, solar water heaters, solar and wind power installers.

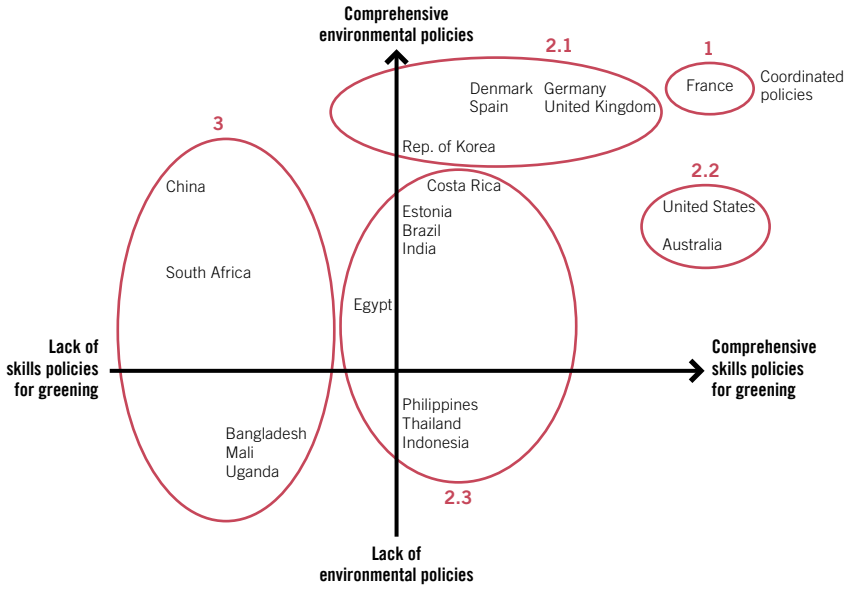
Source: ITUC (2009).

- **Policy and regulations**
  Linked to skills on restrictions in use of certain materials, regulations on production processes and goods, targets in CO_2 emissions reduction, incentives through taxation, etc.
- **Green technology and innovation**
  Linked to skills that are needed to innovate new, clean ways of production, to bring the innovation to the market, but also to adopt new technologies, maintain and repair it.
- **Markets for green industries and consumer habits**
  Skills linked to companies that undertake initiatives beyond compliance with regulations to have a competitive advantage over others. Changing consumer preferences towards pro-environmental behaviour, e.g. good-quality organic food, also drive the market.

Depending on the stage of development of the green agenda in the country, different drivers will have a different weight in skills change and may also be interrelated.

Growing awareness of environmental issues such as climate change moves environmental policies up the political agenda. A country-mapping exercise has revealed different levels of coordination between environmental and skills policies, ranging from comprehensive, well-coordinated policies to fragmented or virtually non-existent ones.

Figure 1. Environmental and skills policies



Source: Strietska-Ilina et al. (forthcoming).

The top-ranking scene is dominated by the EU countries, with France at the lead enjoying coherent and comprehensive environmental and skills development policies. Europe has long been in the forefront of the environmental policy agenda. The United States and Australia perform better in relation to comprehensive skills policies for greening.

As pointed out in the previous section, engagement of the social partners is key in assessing the labour market's skills needs in relation to occupational changes linked to climate change and green jobs.

In regard to policy coherence of environmental issues and skills, it is important to mention the Human Resources Development Convention, 1975 (No. 142), and Recommendation, 2004 (No. 195). The 2010 General Survey on Convention No. 142 reaffirmed the continued validity of the general principles of this Convention and added that Recommendation No. 195 provides guidance on a number of issues that are central to contemporary education and training policy and the system reforms under way in member States.

These issues include: the policy, governance and regulatory framework of training; the increased roles and responsibilities of the social partners; the private sector and civil society in policy formulation and implementation – including investment and the funding of education and training; the provision of lifelong learning and training opportunities for all; the development of policies and mechanisms for targeting learning and training programmes at particular groups with special needs; the development and recognition of "competencies" and prior learning, which form elements of many countries emerging frameworks of national qualifications; and the importance of effective systems of labour market information and career guidance.

The General Survey further states that Article 1, paragraph 2(c), of the Convention requires member States to provide more than access to, and preparation for employment by requiring that vocational guidance and vocational training policies and programmes take account of the mutual relationships between human resources development and other economic, social and cultural objectives. In line with Article 1, paragraph 3, of Convention No. 122, Convention No. 142 encourages governments to adopt an integrated approach to human resources development. The Committee of Experts on the Application of Conventions and Recommendations recalls that, as indicated in individual comments, there should be a coherent and integrated system of human resources development, rather than a piecemeal collection of policies and programmes that may duplicate or negate one another. This is confirmed in Recommendation No. 195, preambular paragraph 3, which recognizes that education, training and lifelong learning should form an integral part of, and be consistent with, comprehensive economic, fiscal, social and labour market policies and programmes that are important for sustainable economic growth and employment creation and social development. Convention No. 142 provides an essential framework for reducing the

mismatch in the level of skills in labour markets. Recommendation No. 195 also recognizes lifelong learning as crucial for both the competitiveness of enterprises and the employability of workers.

When it comes to accessibility of training, especially for workers to acquire new skills on clean processes and technologies, educational leave might be necessary. This should also take into account the family needs of both women and men, for instance be offered at times and locations compatible with family roles. In order for workers to be able to attend such training this will also have to be paid for and supported so as not to be a financial burden on the employees themselves. ILO's Paid Educational Leave Convention, 1974 (No. 140), is useful in this respect. The most recent General Survey of this Convention, conducted in 1991, reiterates that:

> it lays down the obligation of States which ratify to formulate and apply a policy designed to promote, by methods appropriate to national conditions and practice and by stages as necessary, the granting of paid educational leave for the purpose of training at any level, general social and civic education, and trade union education. The policy has to take account of the stage of development and the particular needs of the country and be coordinated with general policies concerning employment, education and training as well as hours of work. Employers and workers organisations and institutions concerned are to be associated with the formulation and application of the policy. The financing is to be on a regular and adequate basis. Leave may not be denied to workers on the ground of race, colour, sex, religion, political opinion, national extraction or social origin. A period of paid educational leave must be assimilated to a period of effective service for the purpose of establishing claims to social benefits and other rights deriving from the employment relation.

It goes on to mention that:

> Vocational guidance and training contribute to greater social equity and promote the full exercise of freedom of choice and equality of access in respect of employment and occupation. In both industrialised and developing countries, human resources development henceforth occupies a vital place in employment policies; and the growing role of the social partners in drawing up and applying these policies can be seen as a guarantee of their effectiveness. The contribution of vocational guidance and training to the objectives of non-discrimination, equal opportunity and treatment, and full, productive and freely chosen employment and the need for the close involvement of employers and workers organisations in these areas are now universally recognised. The fundamental role of International Labour Standards is thus enhanced, especially in the framework of a global strategy to deal with the problems arising from structural adjustment and meet

the need in all countries "to pursue policies that enable adjustment to the changing conditions of an interdependent world economy".

Recognizing the need for environmentally driven skills, a strategic response is needed. Policy-makers, in consultation with the social partners, need to ensure that support for skills and training matches the focus and ambition of their strategies to promote investment in green innovation and infrastructure. In order to allow socially acceptable restructuring – a just transition – governments must ensure that fundamental rights are respected and use the set of international labour standards that the ILO has developed over the years as guidelines in this work.

Paid Educational Leave Convention, 1974 (No. 140)

- Ratified by 34 countries (as at 13 September 2010)

Human Resources Development Convention, 1975 (No. 142)

- Ratified by 67 countries (as at 13 September 2010)

Human Resources Development Recommendation, 2004 (No. 195)

- Recommendations are not ratified by member States as they are non-binding guidelines.

Source: ILOLEX database.

Social protection and security

Wages, together with working time, are the aspect of working conditions that has the most direct and most tangible impact on workers and their families' lives. Since its foundation, the International Labour Organization has placed the question of decent wage levels and fair labour remuneration practices at the centre of its action and has advocated labour standards seeking to guarantee and protect the rights of workers in respect of wages (ILO, 2009a). The Protection of Wages Convention, 1949 (No. 95), provides relevant guidelines on this.

However, as over 210 million people across the globe are currently estimated to be unemployed, an increase of more than 30 million since 2007 (ILO and IMF, 2010), and global coverage of unemployment social security schemes is low and mainly concentrated in higher-income countries, many people do not have an income at all. An ILO report on social security (ILO, 2010c) mentions that of 184 countries studied, statutory unemployment social security schemes exist in only 78 countries (42 per cent), often covering only a minority of their labour force.

When looking at the transition to a more carbon-efficient society, unemployment benefits are an element that will be of particular importance to the labour market and workers, especially in relation to job losses. Statistics

It's also about protection!

Vulnerability may be a source of reluctance to support change. Social protection schemes, including active labour market policies (social security, including social insurance and public employment guarantee schemes, job-creating public works programmes for the unemployed and working poor, income maintenance, and job placement services, among others) are key for ensuring justice in the transition.

Example: The American Clean Energy and Security Act of 2009 contains a dedicated chapter on "Green Jobs and Worker Transition" that would establish a "Climate Change Worker Assistance Fund" to provide income support, healthcare coverage, career counselling, and education and skills' training services to workers who are adversely affected by federal climate change legislation. It also creates a clearinghouse for information and resources on vocational education for jobs in renewable energy, and a "Green Construction Careers Demonstration Project". In addition, economic stimulus legislation provides up to US$1 billion for training for green jobs. Social protection is also needed to address the consequences of climate change and extreme weather events on the poorest and most vulnerable (e.g. the Indian "super cyclone" in Orissa in 1999 led to more than 10,000 deaths, the demolition of millions of dwelling units, damage to over 80 per cent of standing crops, and a loss of about 454,000 head of cattle).

Source: ITUC (2009).

have shown an increase both in new green jobs and in greening existing jobs. However, the transfers between "old" and "new" jobs as well as losses due to closures of "carbon polluting" industries will create unemployment for some workers during various periods and in different regions. Depending on both time of unemployment and geographical appearance of new jobs, the transition period needs to be covered by unemployment benefits in order to sustain livelihood and prevent poverty. Social security is thus one of the conditions for sustainable economic and social development. It is an important factor in sustainable development.

The Social Security (Minimum Standards) Convention, 1952 (No. 102), is of particular importance in this regard. It provides guidelines on how member States can establish social security measures in a number of branches such as basic income in cases of unemployment, illness, injury, old age, invalidity and pregnancy. Some of the consequences of the climate change transition will include disruption of employment and unemployment for many; as such, to facilitate needed measures but also make them "just", certain social security measures such as those called for by various ILO Conventions must be respected. In the case of unemployment, Convention No. 102 can be used as guideline to secure unemployment benefits. It provides for protection when persons who are capable and available for work are not able to obtain suitable employment.

No unemployment benefit scheme, whether partial or full, can work to its full potential unless it is combined with other labour market instruments

that increase employability, such as training and education described in the previous section of this article, and employment services to assist workers and employers in achieving and maintaining optimal employment. Providing employment opportunities must be supplemented by effective organization to help employers to secure the most suitable workers, to help workers to find the most suitable employment, and generally to ensure that, at any given moment, the necessary skills are available and are distributed satisfactorily among the various branches of production and the various areas.

The ILO has two main Conventions dealing specifically with this issue: the Employment Service Convention, 1948 (No. 88), and the Private Employment Agencies Convention, 1997 (No. 181). Convention No. 88 reflects the ideal that public services should ensure, in cooperation where necessary with appropriate public and private bodies, the best possible organization of the employment market as an integral part of the national programme for the achievement and maintenance of full employment and the development and use of productive resources. Convention No. 181, for its part, requires that ratifying States ensure that private employment agencies respect principles on non-discrimination and provides for cooperation between private and public employment services, general principles to protect jobseekers against unethical or inappropriate practices, and protection of workers under subcontracting arrangements and workers recruited from abroad. It also applies to temporary work agencies (ILO, 2009b). The preamble to this Convention recognizes the role which private employment agencies may play in a wellfunctioning labour market and affirms the need to protect workers against abuses, especially those who have been placed in employment outside their home country. It also makes references to Conventions Nos 88 and 122, as well as to the Employment Promotion and Protection against Unemployment Convention, 1988 (No. 168), showing the interrelation between state and private actors in a well functioning labour market.

In its 2010 General Survey concerning employment instruments, the Committee of Experts notes that in the context of the global economic crisis efficient employment services play a key role in maintaining full employment and securing the needs of the workers and enterprises affected. The Committee recalls the statement made by the Officers of the Governing Body in November 2008, which highlighted that in order to achieve this aim, placement services need to be strengthened. The Survey also makes reference to high level international meetings in relation to employment and underlines that public authorities retain the final responsibility for formulating labour market policy:

> In preparing for the London Summit of the G20 leaders in April 2009, a Jobs Conference was held in London (24 March 2009) and, from 29 to 31 March 2009, a Social Summit in Rome. In the London meeting, it was noted that building the capacity of public employment services to deliver

> active labour market policy was viewed by many countries as a key priority. The Rome Social Summit found that active labour market policies combined with well-designed unemployment benefit systems can improve the chances of jobless people re-entering the labour market and prevent long term unemployment. Governments should ensure that such policies are delivered through efficient, modern and well functioning public and, according to national policies, private employment services, which combine payment of benefits with effective job-matching services, as well as providing a way to other labour market help for those who need it. The conclusions of the two meetings were incorporated in paragraph 26 of the G20 Final Communiqué of 2 April 2009, which confirms the role of employment services in implementing active labour market policies focusing on the most vulnerable. In September 2009, the relevance of the conclusions made by the London Jobs Conference and the Rome Social Summit was reaffirmed by the G20 Pittsburgh Summit. (ILO, 2010a)

Furthermore, the Global Jobs Pact, adopted by the ILO's International Labour Conference at its 98th Session in 2009, highlighted the need for private actors to combat prolonged increases in unemployment, deepening poverty and inequality. Guided by the Decent Work Agenda and the commitments made in the 2008 Declaration, the Global Jobs Pact further emphasizes the need to protect workers against abuse. To this end, paragraph 112(ii) of the Global Jobs Pact states that it is necessary to provide resources to public employment services and to enhance their competences to ensure that jobseekers receive adequate support and quality services, and that their rights are respected.

Conventions Nos 88 and 181 provide the necessary institutions for the achievement of full employment, particularly where there is a coordination of efforts. They are particularly important in relation to climate change and a just transition towards a carbon-friendly future.

Protection of Wages Convention, 1949 (No. 95)

- Ratified by 96 countries (as at 13 September 2010)
- General survey of the Convention in 2003

Social Security (Minimum Standards) Convention, 1952 (No. 102)

- Ratified by 46 countries (as at 13 September 2010)

Employment Service Convention, 1948 (No. 88)

- Ratified by 86 countries (as at 13 September 2010)
- General survey of the Convention (Employment instruments) in 2010

Private Employment Agencies Convention, 1997 (No. 181)

- Ratified by 23 countries (as at 13 September 2010)
- General survey of the Convention (Employment Instruments) in 2010

Source: ILOLEX database.

Economic diversification

Economic diversification plans by sector and by location are essential to ensure that effects of adaptation and mitigation policies of climate change do not unduly affect broader social development goals. Challenges lie in reducing unemployment and poverty in a long-term perspective.

Better labour force utilization and economic diversification call for improved systems of labour market information and vocational training, as mentioned earlier in this article. It will also be important to strengthen the ministries of labour by providing officials with greater skills in labour administration and reinforcing institutional self-reliance. This will first and foremost require strengthening of the capacity of the ministries of labour to design and implement labour market policies, and to manage labour market institutions. This includes the continuation and improvement of new labour market information systems, the development of legislative provisions aimed at regulating labour market standards and processes, labour market research and the consultation of business and labour on labour market strategies.

The Labour Administration Convention, 1978 (No. 150), guides ratifying countries on how they should ensure, in a manner appropriate to national conditions, the organization and effective operation in their territory of a system of labour administration, the functions and responsibilities of which are properly coordinated. The labour administration system shall be responsible for the formulation, implementation and supervision of national labour standards; employment and human resources development; studies, research and statistics on labour, and shall provide support for labour relations. Participation by workers and employers and their respective organizations in relation to national labour policy will also be ensured. Labour administration staff shall have the status, the material means and the financial resources necessary for the effective performance of their duties (ILO, 2009b).

One size does not fit all!

Each region and community at risk requires its economic diversification plan – a "free market adaptation" will only lead to suffering and opposition to climate measures.

Example: There is a general tendency to replace rice production by mango in semi-arid Bangladesh. While such a move is correct from an economic and agronomic standpoint, without planning and local consultation there is a risk of social unrest. Mango requires much less work than rice. That is bad news for the one-third of households in the region who depend on their work as daily labourers in agriculture. There is a need for adapting general policies to local conditions in order to introduce truly sustainable policies. Communities need to be consulted and must be able to decide on food/agricultural choices.

Source: ITUC (2009).

In the employment area, the accompanying Recommendation (No. 158) to this Convention defines the means by which an effective employment policy could be put in place. Among the major means listed to this end are: the need to coordinate the activities of the various authorities and bodies which are concerned with particular aspects of employment policy, the establishment of an effective free public employment service, assume power or sharing responsibility for the management of public funds made available for such purposes as countering underemployment and unemployment (ILO, 1997).

Convention No. 150 and Recommendation No. 158 are instruments with dynamic provisions that reflect the major themes and values promoted by the ILO and, in particular, the paramount importance of a tripartite approach to labour administration. Today all member States confront, to various degrees, the unsettling effects of rapid change brought about by globalization of the economy; the increasing influence of market economies; the implementation of structural adjustment programmes; technological innovation; increasing privatization of public enterprises; restructuring of enterprises and dismantling of public monopolies with the associated anti-competitive policies; in addition to the pressure to reduce government spending. These are the circumstances that reinforce the need for tripartite collaboration in developing strategies to adapt to these challenges in a planned and organized manner.

Ratification of Convention No. 150 does not only focus attention on the importance of sound and effective labour administration, but also encourages innovative practices in order to respond appropriately to the demands of our complex and changing economic, technological, social and political, and natural environments.

When looking at climate-sensitive sectors such as agriculture, fisheries and, to some extent, tourism, it is clear that they would need to be prepared for economic diversification in order to be able to protect the millions of workers and their families dependent on these sectors throughout the world, but particularly in the developing world. The most vulnerable industries and settlements will be those in coastal and river flood plains, as well as in areas prone to extreme weather events (especially those where rapid urbanization is occurring) (ITUC, 2007). Sectors dependent on the use of carbon-intensive energy sources such as coal should also be prepared for change. Reducing reliance on vulnerable sectors and increasing economic resilience are at the core of a responsible adaptation policy. These measures could ensure fairness and justice in the transition, preserving the most vulnerable from having to pay for the burden of climate change.

When looking at the agricultural sector in particular, and the urbanization, globalization and climate change which lead to an increase of poverty in rural areas, it is urgent to look into economic diversification in this area and sector. Three-quarters of the world's poor live in rural areas where decent work deficits are typically severe. Conclusions on promoting rural employment for

poverty reduction adopted by the International Labour Conference at its 97th Session in June 2008 describe the rural labour markets as often dysfunctional and characterized by weak labour market institutions, organization and representation. Underemployment is also widespread and incomes are generally low. As mentioned earlier, access to social protection worldwide is limited, but limited to the extreme in rural areas. Workers in rural areas are often vulnerable; in numerous circumstances they are not fully covered by national labour law and, more broadly, their rights are often not realized or enforced. As in urban areas, a large share of economic activity in rural areas tends to be informal. Lack of economic opportunities and under-investment in rural areas, together with poor infrastructure and public services, including education and, in many cases, the prevalence of weak governance and underdeveloped markets are part of the difficulties of working life in rural areas (ILO, 2008).

Economic diversification in rural areas must be based on a coherent and integrated approach to employment promotion and poverty reduction among all relevant government ministries and agencies at all levels of government. Policies also need to recognize diversity of country and regional situations in line with the level of development, resources and institutional capacity, without undermining the importance of labour and environmental standards.

Cooperatives are often a major source of employment in rural areas and can be an important element of local economic development. It is important to ensure an appropriate legal framework in line with the ILO's Promotion of Cooperatives Recommendation, 2002 (No. 193).

Labour Administration Convention, 1978 (No. 150)

- Ratified by 70 countries (as at 13 September 2010)
- General survey of the Convention in 1997

Source: ILOLEX database.

Conclusions and future considerations

In April 2009 UNEP published *Rethinking the Economic Recovery: A Global Green New Deal* (UNEP, 2009), which calls for a package of policy, investment and incentive measures with three fundamental objectives:

- Create employment opportunities and protect vulnerable groups;
- Reduce carbon dependency, ecosystem degradation and water scarcity, so that by 2025 substantial progress is made in limiting global warming and the damages to major ecosystems and their services;
- Further the Millennium Development Goal of ending extreme global poverty by 2015.

UNEP's prescription is illustrative of a growing recognition that environmental and social concerns need to be at the heart of a new economic paradigm. However, this fundamental insight has yet to fully reach the mainstream of policy makers worldwide.

This paper tried to demonstrate the importance of just transition policies to accompany necessary mitigation and adaptation policies. It also sought to document how international labour standards could provide a sound basis for such policies.

When the ILO discussed renewing work on labour standards in the Report of the Director-General to the International Labour Conference in June 1999, it was said that new standards needed to be considered in the wider context of international law, since many other organizations and international conferences have produced treaties on related issues such as the environment and human rights.

Looking at the wider context of international law would not necessarily imply the creation of new standards, but also the adequate use of existing ones. It will be important to look at labour standards as part of policy packages on climate change to ensure a just transition for workers. Standards relevant to the labour market must be taken into account as part of a policy package that incorporates broad social concerns as natural complements to economic measures. This message is reinforced when Conventions are seen to support successful solutions to problems, bringing parties together to achieve a shared goal.

While developing employment policies for green jobs, many of the abovementioned standards can become part of a package that can guide policy makers in this work. In addition to Convention No. 122 on employment policy, such a package should also include Conventions on tripartite consultation, training and education, wages and employment services, to name a few. Depending on specific sectors, standards related to them must also be included.

This article has mentioned just a few of the 188 Conventions and 200 Recommendations developed by the ILO.[1] Many of the other instruments may be relevant for consideration in packages dealing with climate change policies. The numerous standards on health and safety are particularly important in relation to how green jobs can become examples of more secure and decent workplaces. Gender considerations will have to be taken into consideration in all policies related to climate change and green jobs.

It is expected that the majority of green jobs are to be seen in the construction, manufacturing and engineering fields where women are significantly under-represented. As a result, the green economy may unintentionally exclude women (Sustainlabour et al. 2009). Two of the ILO's

1. As at 13 September 2010.

core Conventions deal specifically with discrimination issues: the Equal Remuneration Convention, 1951 (No. 100), and the Discrimination (Employment and Occupation) Convention, 1958 (No. 111); they should be included as guidelines in all policy packages in order to be sure that these concerns are addressed.

Policy coherence at international level is needed to ensure that decisions on climate change measures are consistent with international labour standards. The ILO must do a better job in working together with other multilateral organizations to demonstrate the effectiveness of labour rights standards in practice. Various multilateral agreements covering both the economy and the environmental sphere have an influence on policy design, which do not necessarily take into account the labour impacts of their implementation. Coherence among policies within and across governance levels is a necessary condition to improve both human well-being and environmental concerns. It would be important for the ILO, in cooperation with other multilateral organizations, to identify how Multilateral Environmental Agreements (MEAs) and/or other conventions and treaties related to the environment can be connected with international labour standards in order to develop effective and mutually reinforcing implementation strategies and to achieve common goals.

References

Note: All links last accessed on 13 September 2010.

Becker, S.O.; Hornung, E.; Woessmann, L. 2010. *Being the educational world leader helped Prussia catch up in the Industrial Revolution*, VoxEU.org. Available at: http://www.voxeu.org/index.php?q=node/5006.

ETUC. 2009. *Resolution on Climate Change, New Industrial Policies and the Ways Out of the Crisis*. The Executive Committee of the European Trade Union Confederation (ETUC), Stockholm, 20–21 Oct. 2009. Available at: http://www.etuc.org/a/6594.

—; CES; Sustainlabour; Syndex. 2010. *Occupational Health and Safety and Environmental Clauses in International Framework Agreements: A Study* (Brussels). Available at: http://www.etuc.org/IMG/pdf/Global_Reportversion_finale_anglaise.pdf.

ILO. 1997. *General Survey on Labour Administration* (Geneva).

—. 2008a. *General Survey. Labour Clauses in Public Contracts* (Geneva). Available at: http://www.ilo.org/ilolex/cgilex/pdconv.pl?host=status01&textbase=iloeng&document=227&chapter=25&query=%28C094%29+%40ref&highlight=on&querytype=bool&context=0

—. 2008b. *Conclusions on Promoting Rural Employment for Poverty Reduction*. Adopted by the International Labour Conference, 97th Session, June 2008 (Geneva).

—. 2009a. *General Survey Convention 95, Protection of Wages: Introduction* (Geneva). Available at: http://www.ilo.org/ilolex/cgilex/pdconv.pl?host=status01&textbase=iloeng&document=170&chapter=25&query=%28%23docno%3D252003G*%29+%40ref&hightlight=&querytype=bool&context=0

—. 2009b. *Rules of the Game. A Brief Introduction to International Labour Standards* (Geneva).

—. 2009c. *World of Work Report 2009: The global jobs crisis and beyond*. Available at: http://www.ilo.org/wcmsp5/groups/public/–-dgreports/–-dcomm/documents/publication/wcms_119186.pdf

—. 2010a. *A Skilled Workforce for Strong, Sustainable and Balanced Growth.* Proposals to G20 leaders for a training strategy as per their request in Pittsburgh (September 2009), Geneva, June. Available at: http://www.ilo.org/public/libdoc/jobcrisis/download/g20_skilledworkforce.pdf

—. 2010b. *Report of the Committee of Experts on the Application of Conventions and Recommendations.* International Labour Conference, 99th Session, June 2010 (Geneva). Available at: http://www.ilo.org/wcmsp5/groups/public/–-ed_norm/–-relconf/documents/meetingdocument/wcms_123424.pdf

—. 2010c. *World social security report 2010/11: Providing coverage in times of crisis and beyond* (Geneva). Available at: http://www.ilo.org/public/libdoc/ilo/2010/453536.pdf

—. 2010d. *General Survey Concerning Employment Instruments* (Geneva). http://www.ilo.org/wcmsp5/groups/public/–-ed_norm/–-relconf/documents/meetingdocument/wcms_123390.pdf

—; IMF. 2010. *The Challenges of Growth, Employment and Social Cohesion.* Discussion document to the joint ILO–IMF conference in cooperation with the Office of the Prime Minister of Norway. Available at: http://www.osloconference2010.org/discussionpaper.pdf

ITUC. 2007. *Submission by the International Trade Union Confederation* Subject: Nairobi Work Programme on impacts, vulnerability, and adaptation to climate change. Economic diversification. Available at: http://unfccc.int/files/adaptation/application/pdf/nairobiwp_itucsubmissionecodiversification.pdf

—. 2009. *What's Just Transition?* (Brussels). Available at: http://www.ituccsi.org/IMG/pdf/01-Depliant-Transition5.pdf

—. 2010. *Resolution on Combating Climate Change through Sustainable Development and Just Transition* (Brussels). Available at: http://www.ituccsi.org/IMG/pdf/2CO_10_Sustainable_development_and_Climate_Change_03-10-2.pdf

Olsen, L. 2009. *The Employment Effects of Climate Change and Climate Change Responses: A Role for International Labour Standards?* Global Union Research Network (GURN) Discussion paper N° 12. (Geneva). Available at: http://www.gurn.info/en/discussionpapers/no12nov09theemploymenteffectsofclimate-change-and-cliamte-change-responses-a-role-for-international-labour-standards

Strietska-Ilina, O.; Hofmann, C.; Duran Haro, M.; Jeon, S. Forthcoming. *Skills for Green Jobs. A Global View* (Geneva, ILO).

Sustainlabour; ITUC. 2009. *Women Workers and Green Jobs: Employment, Equity and Equality* (Madrid). Available at: http://www.sustainlabour.org/dmdocuments/en255_2009.pdf

TUC. 2008. *A Green and Fair Future: For a Just Transition to a Low Carbon Economy*. Available at: http://www.tuc.org.uk/touchstone/Justtransition/greenfuture.pdf

UNEP. 2009. *Rethinking the Economic Recovery: A Global Green New Deal*. Available at: http://www.unep.org/greeneconomy/portals/30/docs/GGND-Report-April2009.pdf.

—. 2010. *Global Trends in Green Energy 2009: New Power Capacity from Renewable Sources Tops Fossil Fuels*. Press release, July 2010 (Nairobi). Available at: http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=630&ArticleID=6647&l=en.