



GLOBAL GREEN NEW DEAL

POLICY BRIEF

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UNEP, March 2009

Global Green New Deal – A Policy Brief

1. Executive Summary

The world today finds itself in the worst financial and economic crisis in generations. The financial crisis has triggered an unprecedented policy response: interest rates have been dramatically reduced, in some cases down to almost zero, and hundreds of billions of dollars in liquidity support and fresh capital have been provided to banking systems around the world. Moreover, governments are planning to deploy fiscal resources on an unprecedented scale: at the time of writing, proposed fiscal stimulus packages totalled around US\$ 3.0 trillion globally.¹

The question arises: are these responses going to create a post-recession economy that is sustainable in the medium to longer term? And would it not be efficient and wise to invest now to build that future sustainability, whilst stimulating the economy for growth, jobs and tackling poverty?

A recent research paper² commissioned by UNEP argues that an investment of 1 percent of global GDP over the next two years could provide the critical mass of green infrastructure needed to seed a significant greening of the global economy (of course, the specific focus of the investment will differ between developed and developing countries, as would the mix of fiscal and aid funding). The overall size of this recommended 'green' stimulus is well within the realm of the possible: at 1 percent of global GDP, (i.e. approximately US\$ 750 billion) it is only a fourth of the total size of proposed fiscal stimulus packages.

The "Global Green New Deal" (GGND) presented here has three broad objectives. It should make a major contribution to reviving the world economy, saving and creating jobs, and protecting vulnerable groups. It should promote sustainable and inclusive growth and the achievement of the MDGs, especially ending extreme poverty by 2015. Also, it must reduce carbon dependency and ecosystem degradation – these are key risks along a path to a sustainable world economy.

Our consultations and our commissioned research³, summarized here in this Policy Brief, make a strong case for the active 'greening' of proposed fiscal stimulus packages. However, this must also be backed by necessary changes in international and domestic policy architectures, as the current framework is biased in favour of resurrecting an unsustainable "brown economy". Our proposals (see Section 3) are therefore grouped under three categories - targeted stimulus spending in 2009-10, changes in domestic policies, and changes in international policy architecture. Furthermore, we recognize that many less developed countries do not have the resources of their own and will have to rely on foreign aid and support, both financial and non-financial.

We propose that the fiscal stimulus (to be applied over 2009 and 2010) should prioritize energy efficient buildings and investments in sustainable transport and renewable energy. Developing countries should prioritize investment in agricultural productivity measures, freshwater management, and sanitation, as these have demonstrable and exceptional social returns. Domestic policy reforms are recommended to substantially reduce perverse subsidies (eg: fossil fuels) and instead to create positive incentives and appropriate taxes which will encourage a greener economy. Domestic reforms should also address some common issues in land use and urban policy. Integrated management of freshwater would also require some domestic policy changes, and this should be prioritized by developing countries. Domestic policy responses should be based on effective monitoring and accountability and integrate the principles of environmental accounting. International policy architecture needs attention in the areas of trade, aid, carbon pricing and technology and policy coordination. Global carbon markets should be created through the Copenhagen process under the United Nations Framework Convention on Climate Change (UNFCCC) in order to improve the price

signaling thus far achieved, and a re-vamped and more inclusive Clean Development Mechanism (CDM) is part of that need. Proposals to develop global markets for ecosystems services should also be tabled. The GGND will need international coordination to be effective, and the UN organization should support and provide that function.

2. A Backdrop of Multiple Crises

In 2008 the world witnessed the worst **financial crisis** of our lifetime, triggering the start of the most severe recession since the Great Depression of the 1930s. In 2009 the number of the world's unemployed could rise up to 50 million over the 2007 level.⁴ Every 1 percent fall in growth in developing economies translates into an additional 20 million people consigned to poverty.⁵ This happens at a time when economic inequality globally and within countries has been on the rise, widening the gap between the haves and have-nots.

As governments devise a new international financial architecture to prevent future crises of this scale and find ways to jump start economic recovery, they need also to recognise and address the risks from another brewing crisis with sweeping impact – **climate change**. The current level of atmospheric CO₂ concentration is already at an ecological threshold if no drastic actions are taken immediately. The world's poor are especially vulnerable to climate-induced rising sea levels, coastal erosion, and frequent storms. Around 14 percent of the population and 21 percent of urban dwellers in developing countries live in low-elevation coastal zones that are exposed to these risks.⁶ Sixty percent of the world largest urban areas with a population over 5 million are located within 100 km of the coast. This includes 12 out of 16 cities worldwide with populations greater than 10 million.

Indeed, the world today is in the grip of multiple crises.

The price of oil had hit nearly US\$150 per barrel.⁷ Although the outbreak of the financial crisis and the ensuing recession brought a significant correction to below US\$40 per barrel, the **fuel crisis** remains real. The International Energy Agency (IEA) projects the oil price to reach US\$200 per barrel by 2030 due to rapidly increasing demand in contrast to increasingly constrained supply⁸ and at such levels many developing economies may no longer be able to afford oil imports.

Another is the **food crisis**. In 2007, the upsurge in the prices of food grains cost developing countries US\$324 billion, the equivalent of three years worth of global aid.⁹ Although the recession has also brought down food prices, the issue of food security is not to be dismissed. To feed a growing population, the world's food production must double by 2050.¹⁰ But biodiversity and ecosystem services, which ultimately determine the future sustainability of agricultural productivity, are eroding rapidly. This erosion is particularly poignant for subsistence farmers and pastoralists who depend predominantly on ecosystem services such as the regular and free flow of water and nutrients from forests to aquifers to their fields.

Last but not least is the persisting **water crisis**. One in five people in the developing world lacks access to sufficient clean water. At the same time demand for water for competitive uses is growing and water availability in many parts of the world will increasingly be affected by climate change (changing patterns of precipitation, melting glaciers, droughts). About half the developing world's population or 2.6 billion people do not have access to basic sanitation.¹¹ Although the number of people with access to basic sanitation grew by half from 1990 to 2004, the number without sanitation remained essentially the same, because of population growth.¹²

Collectively, these global crises are severely impacting our ability to sustain prosperity in the world and to achieve the Millennium Development Goals (MDGs). They compound and exacerbate persistent social problems of job losses, socio-economic insecurity and poverty which threaten social stability in developed as well as developing countries.¹³

Although the causes of these crises vary, at a fundamental level, they share a common feature: the gross misallocation of capital. In the last two decades, much capital has been poured into property, fossil fuels, and structured financial assets with embedded derivatives, but relatively little has been invested in renewable energy, energy efficiency, public transportation, sustainable agriculture, and land and water conservation.

Some governments are now launching massive stimulus packages to restore economic growth and employment prospects. There appears to be widespread consensus that such investment and spending is needed to restore growth and jobs. What is not clear, however, is whether the post-crisis economy that emerges will itself be sustainable or whether it will be a resurrected “brown economy” with its traditional dependence on low energy efficiency, non-sustainable energy sources, high materials use, unsustainable use of our ecological commons and a high degree of climate risk. If these financial resources were to flow into unsustainable sectors, societies would risk reproducing the imbalances and vulnerability which caused the current crisis and therefore risk perpetuating the multiple crises the world now faces. The “Global Green New Deal” proposed here aims to address these risks whilst achieving an efficient and sustainable solution to our multiple crises.

3. A Global Green New Deal

Seventy-five years ago, during the depths of the Great Depression, US President Franklin D. Roosevelt launched a “New Deal”. It included a series of wide-ranging programmes to provide employment and social security, reform tax policies and business practices, and stimulate the economy. These programmes included the construction of homes, hospitals, schools, and other public buildings, roads, dams, and electrical grids. The New Deal put millions of people back to work. However this package was not just about fiscal spending and employment generation but about creating a policy framework of governance that modernized US infrastructure at the same time and lasted for the rest of the twentieth century.

The UNEP discussion paper “A Global Green New Deal” argues that today’s multiple crises demand the same kind of government leadership, but at the global scale and embracing a wider vision. A **Global Green New Deal (GGND)** is proposed as a manifestation of that leadership. It refers to a set of globally coordinated large-scale stimulus packages and policy measures that have the potential to bring about global economic recovery in the short term while laying the foundation for sustained economic growth in the medium and long term. Furthermore, our “GGND” seeks to enhance the participation of those who are mostly going to be affected – workers, employers, local, regional and subregional governments among others- as a means of broad-basing recovery to be more inclusive and able to meet our objectives.

In Section 3 of this Policy Paper, we highlight the rationale, objectives, and key elements of the policy changes and stimulus allocations that we recommend, and their differing nature and priorities depending on whether the countries in question are developed, developing, or lesser developed economies.

We carry this thinking forward in the Annexes, which illustrate through relevant sectoral analysis and examples the kind of success which our recommendations are targeting. The Annexes summarize what we know of the “green” components of various proposed stimulus packages and their expected outcomes in terms of employment, fostering recovery, and advancing sustainability objectives.

3.1 Rationale for a Global Green New Deal

The first and perhaps the most pragmatic aspect of the rationale is the unique opportunity presented by the multiple crises and the ensuing global recession. The opportunity for a global, green, “New Deal” manifests itself in three ways. First, there is widespread acceptance that the old system no longer works and there is consequently a willingness to listen to new solutions. Second, the enormous

fiscal resources being released can potentially be used to achieve “critical mass” of investment and employment in order to kick-start the new sustainable paradigm. Third, the architecture for the financial system is being re-written even as we prepare to create the next generation framework for global emissions governance at Copenhagen later this year.¹⁴ This provides an opportunity to coordinate the two efforts in a way that avoids a “race to the bottom” and a serious loss of effectiveness.

Secondly, the multiples crises affecting us are global, and there is every reason to suggest that they will exacerbate poverty and accentuate social risks and costs. Therefore, the exceptional returns to investment in developing countries from securing freshwater, providing sanitation and optimizing agricultural productivity must also be captured and invested in as part of any global New Deal.

Third, the world economy needs the stimulus provided by a GGND because the unregulated market cannot resurrect itself on its own from a failure of a historical proportion without significant and coordinated government interventions.

Fourth, there is much analysis and evidence to show that “green sectors” such as building retrofits and renewable energy have the prospect of leading the global economic recovery while addressing major environmental crises, and doing so with better returns to capital than “brown” development or a “spending spree”. Decent new employment generated per billion dollars invested also outstrips competing uses of fiscal stimulus.

Falling employment and income levels are the destabilizing social consequence of the economic crisis. Maintaining and creating jobs and income levels is vital for social stability as well as for restoring aggregate demand to start and underpin economic recovery. Many green sectors have higher employment leverage per unit investments or final demand in the sector than less green alternatives. There are also very significant opportunities to create employment in green sectors as part of short-term stimulus packages.

The multiple crises are affecting developing countries disproportionately even though they have contributed little to causing them. Developing countries also have limited capability and resources to confront these crises. Fair and just global solutions are the right way forward to address a complex suite of far-reaching global problems, and we believe that the necessary international understanding and cooperation needed to achieve that can be embodied in a ‘Global Green New Deal’.

The rules of financial architecture and of global environmental governance are being simultaneously re-written in 2009. We believe that there is a unique historical opportunity now to create the basis of a new Green Economy that is able to allocate natural capital and financial capital in a far more effective and efficient manner into the foreseeable future.

We must not miss this chance to fundamentally shift the trajectory of human civilization.

3.2 Objectives of a Global Green New Deal

The overall objectives of a GGND should contribute to multilateral and national efforts to address the current financial crisis and its social, economic and environmental impacts, while simultaneously addressing the interconnected global climate, food, fuel and water challenges that threaten society over the medium term.

At the first level, the objectives of a GGND should represent a common desire to restore to health a disrupted financial system, an economy in recession, and severe job losses. Our objectives must also address the vulnerability of the poor, which is especially acute at such times of crisis.

Secondly, we must ensure that our “post-crisis” economy follows a sustainable model and does not continue to add to the two most significant risks faced by society: ecological scarcity and climate instability.

This leads to our third consideration, the need to end extreme poverty. In fact, the second and third considerations are inextricably intertwined, though this is not widely understood. A common misconception is that there is a trade-off between economic development and environmental stewardship. This view is exacerbated at times of economic difficulty. In reality, this is not a tradeoff because all human activity depends on the existence of a responsible framework for using environmental assets. This is especially true about the poorest populations as they depend disproportionately on the ecological commons both for livelihoods and for consumption. For instance, it has been estimated that ecological services of forests account for 7.3 percent of India’s overall GDP, but that they account for 57 percent of the “GDP of the Poor”¹⁵, or the effective household income of those living below the poverty-line and relying on activities like subsistence farming and the gathering of non-timber forest produce. The destruction of forests, pollution and depletion of freshwater sources and climate change can have a disproportionately large impact on the poor. In short, if we revert to “business-as-usual” with the continuing loss of ecosystems and biodiversity that it entails, we shall exacerbate the persistence of poverty. A ‘global, green’ New Deal must address the causes of worsening ecological security in order to be relevant for the poor.

We summarize thus the three broad objectives of a GGND thus (these are drawn from Edward Barbier’s paper for UNEP¹⁶):

- 1) Make a major contribution to reviving the world economy, saving and creating jobs, and protecting vulnerable groups ;
- 2) reduce carbon dependency and ecosystem degradation, putting economies on a path to clean and stable development;
- 3) further sustainable and inclusive growth, achievement of the MDGs, and end extreme poverty by 2015.

3.3 Elements of a Global Green New Deal

These objectives are to be achieved by including and implementing a number of common elements – these are either direct investments and spending in key sectors, or they are reforms which will serve as “enabling conditions” to support a global and coordinated response to the prevailing crisis.

For the purposes of this Policy Brief, we break up these elements into three categories:

- a) Sectorally targeted fiscal stimulus to be carved out of the US\$ 3.0 Trillion of stimulus packages being proposed now (section 3.4);
- b) domestic policy reforms to enable the success of green investments within domestic economies (section 3.5), and
- c) reforms to international policy architecture and international coordination to enable and support national initiatives (section 3.6).

In promoting a GGND, the principle of “common but differentiated responsibilities” must be upheld with regard to developed countries, emerging economies, countries with economies in transition, and least developed countries. The financial crisis, which has triggered the call for a GGND, is the making of developed countries but is affecting not only these countries but other countries as well. The crisis is causing massive job losses worldwide and hitting the poor in developing countries especially hard.

A fair and just GGND, therefore, should consider including developed countries’ additional support to other countries especially least developed countries in the areas of finance, trade, technology, and capacity building in the interest of effectiveness as well as of fairness. With regard to national stimulus packages and policies, emerging economies, countries with economies in transition, and least developed countries have their particular circumstances. Their priorities may therefore be different from those of developed countries when it comes to large-scale public spending programmes and policy measures.

Accordingly, the policy responses listed below, and indeed the green economic sectors and the enabling conditions discussed here, are not prescriptions. They provide rather a “menu” of options under a potential GGND which can be adapted and customized for consideration by different groups of countries.

3.4 Fiscal Stimulus for 2009 and 2010

At the time of writing of this policy brief, governments around the world had promised around US\$ 3.0 trillion in fiscal spending to re-inflate demand (much of it to be spent over 2009 and 2010). We feel that a substantial portion of this new spending should be on creating the critical mass of infrastructure needed for a new environmentally-sustainable economy. According to an analysis of 15 nations' approved and pending stimulus plans, conducted by HSBC Global Research in January 2009, the average green investment was about 14 percent of the total monetary commitment. Moreover, we feel that such spending will create the next generation of jobs. Sectors that are particularly important in terms of their economic, employment, and environmental benefits are efficient buildings, renewable energy, sustainable transport, agriculture and freshwater. These are addressed below.

3.4.1 Energy Efficient Buildings

Governments are encouraged to invest in retrofitting public buildings to be energy efficient, and to provide incentives for greening and weatherizing homes and offices. This is an area with the highest potential for improved efficiency as well as for job creation. Buildings are responsible for 30-40 percent of all energy use, greenhouse gases and waste generation. Using current building technology, we can already cut energy use by around 80 percent compared to traditional designs.¹⁷ We feel that the retrofitting of the existing building stock could provide large investment opportunities and jobs in the immediate future. Governments are encouraged to include the greening and weatherizing of buildings in their stimulus packages as a low-hanging fruit. They could begin with direct spending on retrofitting all public buildings, including government offices and public schools, universities, hospitals and social housing, to achieve much higher energy efficiency and to using renewables. In addition, they could provide tax incentives to private companies and individual households for improving insulations and installing energy and resource efficient appliances in office and residential buildings, respectively. In the long run, governments are encouraged to include zero-emission buildings policies and energy- and resource-efficient buildings within urban planning and management systems. As recession bites, the construction sector is expected to face increasing job losses and experience surplus capacity, thus a focus on this sector also has the added advantage of not carrying material inflation risks. Furthermore, the jobs and growth potential is evidenced by action taken by many early movers, including Germany and France (see Annex-A).

3.4.2 Sustainable Transport

Governments are encouraged to use more of the stimulus packages and the financing provided by international financial institutions to develop more energy-efficient, less polluting transport modes and infrastructure, improved public transportation, and the use of greener vehicles.

Unless there is a major shift away from current patterns of energy use, world transportation energy demand is expected to grow by 2 percent per year, with energy use and greenhouse gas emissions at 80 percent above 2002 levels by 2030.¹⁸ New investment and financing should be directed towards developing an integrated approach to transportation planning and financing, particularly at the urban level, with priority given to investment in energy efficiency and low carbon mobility that is also cost effective, e.g. rail, bus rapid transit systems, integrated public and non-motorized transport, while supporting a doubling of vehicle fuel efficiency worldwide.

It is anticipated that between now and 2050 the global car fleet will triple, and more than 90 percent of this growth will take place in non-OECD countries. In response to this, the Intergovernmental Panel for Climate Change (IPCC) has indicated that the global fleet's vehicle fuel economy needs to improve by 50 percent by 2050 to stabilize emissions from road transport¹⁹. This can be achieved with existing technologies - the efficiency of light duty vehicles in OECD countries can already improve by 30 percent over the next 15-20 years. A 50 percent improvement will require the widespread adoption of this efficiency in non-OECD countries and greater hybridization and electrification of fleets. UNEP has launched a global initiative to double the fuel economy of the global vehicle fleet - in line with IPCC and G8 recommendations. Together with the International Energy Agency, FIA Foundation and the International Transport Forum the Global Fuel Economy Initiative (GFEI) promotes the investments in green, efficient cars. Applying technologies available today, this could save 6 billion barrels of oil, or 2 gigatonnes of CO₂ emissions per year (similar to half of all EU emissions today).

More than 3.8 million jobs could be created globally through the increased production of low emission vehicles. Up to 19 million additional ancillary jobs worldwide could be created in fuel refining and distribution, sales, repairs, and services. Investment in clean and efficient public urban transit transport also contributes secondary employment effects, with a multiplier of 2.5 to 4.1 per direct job created. In the United States, for example, a 10-year federal investment programme in new high-speed rail systems has the potential of creating 250,000 jobs.²⁰ In the Republic of Korea, US\$7 billion to be invested in mass transit and railways over the next three years is expected to create 138,000 jobs.²¹ Public urban transit systems have significant direct employment impacts globally, accounting for 367,000 workers in the United States and 900,000 in the European Union alone. In the Annex-C below, we outline further examples.

3.4.3 Sustainable Energy

Governments of developed countries are encouraged to help finance ongoing clean energy projects, invest in "smart" grids, and expand their investment in renewables infrastructure. Developing country governments are encouraged to support the scaling and diffusion of small-scale off-grid technologies. The recent energy crisis was a wake-up call for the need to develop renewable energy sources such as wind, solar, tidal and geothermal. For many countries, this switch is important from an energy security perspective even if one ignores the carbon emission of fossil fuels. Countries like Germany, USA, China and the UK have already invested large sums in renewable energy projects such as wind farms and solar power plants. However adding renewable capacity alone will not be enough to make the shift to a low-carbon energy system. Such a transition will be enabled by greater energy efficiency (see 3.4.1 above), investment in smart grids that can cope with decentralized and fluctuating supply and can support a system of private feed-in, and investment in improved power storage and carbon capture and sequestration.

In response to the effects of the crisis and the urgency of full-scale actions to mitigate climate change and prevent its repercussions on the economy, a number of countries have announced during the second half of 2008 the designation of substantial shares of their economic stimulus packages to greening their economies. Most of these packages are focused on infrastructure projects.

Governments were asked to step in to help financing clean energy projects as banks were lacking liquidity due to the credit crisis to finance the growth of clean energy markets. Measures taken by governments to stimulate the market include tax-equity legislation to make it easier for ordinary investors to participate, R&D credit, demonstration projects and the greening of governmental infrastructure. These recovery packages could lay the seeds for a “much more progressive and long-term global stimulus package – an unprecedented global green deal of jobs, capital and technology flows to catalyze sustainable growth and avoid dangerous climate change”. It is estimated that such a package to address climate change and energy development needs at the global level may require US\$45 trillion up to 2025.²²

It should be clarified that renewable energy is not only meant for the rich and developed. An interesting model of how developing countries could embrace renewable energy is provided by the microfinanced model of Grameen Shakti (an energy subsidiary of Grameen Bank) in Bangladesh²³, which illustrates a *non-grid* solution to clean energy for the poor (see Annex-B). This model is especially powerful as (a) it is commercial in operation and microfinance-driven and (b) as it substitutes kerosene (the usual lighting fuel, held responsible for respiratory diseases) with photovoltaic electricity at the village level.

In this vein, we encourage developing country governments (and international funding agencies partnering them) to direct stimulus support to scale up implementation of modular, small-scale, clean energy technologies to benefit off-grid and vast poor rural areas. A number of successful projects which have facilitated access to finance through micro-financial institutions, or through the deployment of appropriate risk management instruments, have shown that rural populations constitute a commercial viable market for small-scale clean energy technologies.

3.4.4 Agriculture and Freshwater

Governments are encouraged to invest in sustainable agriculture and freshwater systems – for developing countries in particular to increase agricultural investment in infrastructure for value addition and reduce water transmission losses in irrigation canals and traditional water systems, and both developing and developed countries to improve storage and water quality.

Farming is a politically sensitive sector that is affected by virtually the whole array of distortions discussed in this paper, including – trade protectionism, perverse subsidies, wastage of water, unsustainable farming practices, overuse of harmful chemicals. With over a billion workers, agriculture continues to be the single largest sector in the world in terms of employment. It is also the sector that where the majority of the world’s poor and extremely poor are concentrated. In their fiscal spending, governments are encouraged to create a level playing field for sustainable agricultural production, including organic products, through increased investment in infrastructure for production of organic farming inputs, value addition at home, storage and transportation. The sustainability of agriculture is closely linked to the supply of water. Irrigated agriculture uses 70 percent to 80 percent of global freshwater supplies. It is estimated that around half to two-thirds of water is lost in transit in surface irrigation. Some of the solutions lie in changing the institutional architecture of water management but there is a case for directly investing private and public capital in water systems. This is especially true for developing countries where existing canals and traditional water-systems are in dire need of repairs. Such an effort would not just reduce the wastage of this precious resource but has the potential for creating millions of low to medium-skill jobs in developing countries.²⁴ Of course, there is potential for water-related investments in developed countries as well. South Korea, for example, has recently announced a plan to spend KRW14.5trillion over two years in cleaning up four major rivers. It is expected that this will create 200,000 jobs.²⁵ A further 16,000 jobs are expected from creating water infrastructure such as small dams.

In responding to the challenges of agriculture and the food crisis, important international initiatives have already been taken, such as the World Food Summit of 2008 and the Comprehensive Framework

of the United Nations High-Level Task Force on the Food Price Crisis. These provide valuable elements of a policy framework in fostering the emergence of a more stable and sustainable agricultural production systems and markets. In the Annex-D and F, several successfully implemented examples are provided on freshwater and sustainable agriculture.

3.5 Domestic Policy Initiatives

A range of domestic policy interventions are urgently needed at this point to ensure that a “level playing field” is established for the investments in green sectors (if stimulated as recommended in 3.4 above) to take hold and flourish as commercially viable businesses. In the absence of domestic policy reforms, there is a risk that the sheer size and spread of perverse subsidies will jeopardize many elements of the proposed GGND. . Introducing or improving environmental legislation, reducing or eliminating perverse subsidies, introducing fiscal measures to promote greater use of renewables versus fossil fuels, public transport versus private cars, etc, are some areas where it will reward governments to look to rapid evaluation and implementation of domestic policy reforms.

Some of the changes required have been advocated for some time with the purpose of poverty reduction – such as changes in access and use rights to common lands for the poor, and the securing of legislation around property rights.

In this section, we outline these key areas and highlight the rationale for our recommended policy changes.

Among those changes that need to be given the most urgent attention are reform of perverse subsidies, provision of right incentives and tax reform, land use and urban policy reforms, integrated management of freshwater, and strengthening environmental legislation.

3.5.1 Perverse Subsidies

A number of perverse subsidies are embedded in the national policy architecture of most countries. These have an impact at both the national level as well as on the global commons.

Agricultural subsidies continue to be significant, especially in developed countries, and remain a priority area for reform for viable and sustainable agricultural systems to emerge in the developing world and globally. Protection and subsidy support to producers in the OECD declined from 37 percent of the gross value of farm receipts in 1986 to 1988 to 30 percent in 2003 to 2005. However, the amount of support increased over the same period from US\$242 billion a year to US\$273 billion.²⁶ In promoting sustainable forms of agriculture, subsidies on synthetic inputs need to be reformed so that organic farming inputs are made more competitive and more accessible to producers.

A critical area supported by perverse subsidies is fossil fuels, inhibiting the offtake of renewables. Price and production subsidies for fossil fuels amount to over US\$200 billions per year globally.²⁷ Governments are, therefore, encouraged to consider reforming such perverse subsidies, taking advantage of the current low oil prices.

We also recommend prioritization of subsidies on fisheries, as the forecasted depletion of fisheries represents a livelihoods problem and a health problem of serious proportions.²⁸ Global subsidies for fisheries are estimated to be valued at US\$15-35 billion annually and include such items as direct cash grants, tax breaks, and loan guarantees.²⁹ Although some subsidies promote responsible fishing practices, most subsidies directly contribute to over-fishing. This is a grave challenge given that the Food and Agriculture Organization of the United Nations (FAO) estimates that more than three-quarters of the world’s fisheries have already been fished to their biological limits or beyond.³⁰

Governments are encouraged to do a full review of their subsidies to make sure that they do not have such perverse consequences, and to operationalize the Polluter Pays Principle, in order to promote to internalization of environmental costs.

3.5.2 Incentives and Taxes

An incentive system of subsidies, taxes, and regulations that encourage environmentally responsible behaviour and helps to internalize externalities should be promoted. For instance, the use of personal automobiles has well-known negative externalities. These externalities can be charged through a variety of ways – taxes on fuel, taxes on road use, taxes on automobiles. Singapore provides a very good example of how to control vehicular use. First, it auctions a limited number of car permits every year (valid for 10 years). This allows authorities to directly restrict the number of cars. Second, it uses a sophisticated system of Electronic Road Pricing to charge for road use. (Of course, these measures have to be complimented with good public transport).

Financing support is an important positive incentive. As the current credit situation remains tight and the collapse in oil prices makes renewable energy less competitive, governments and international financial institutions should ensure that renewable energy businesses as well as other environmental enterprises especially small and medium enterprises will have secured access to credit. Microcredit schemes and time-bound tax incentives for the sector should also be developed to prevent the reversal of the sector's rapid growth in recent years. Furthermore, developed countries should remove trade barriers and provide training and capacity building to facilitate the access to, and diffusion of clean energy technologies in developing countries.

Governments are encouraged to use their stimulus packages to green the automobile industry and promote public transport. Governments can achieve this by attaching green conditionalities to the large-scale bailout plans requested by the world's leading automobile manufactures and providing time-bound incentives such as tax credits for consumers to switch to fuel-efficient and non-polluting or less polluting cars. Governments can also directly invest in public transport and public transport infrastructure, for bus and train transit systems, as well as for non-motorised infrastructure, such as pedestrian and bicycle lanes. At the policy level, they can use regulations and incentive measures (see Annex-C, Sustainable Transport, for several successfully implemented examples) to discourage the use of private vehicles and encourage the use of public transport by commuters. In addition, they should discourage trade in obsolete and fuel-inefficient vehicles.

The economic crisis provides an opportunity for broad, neutral and equitable tax reform, such that the tax burden is shifted away from economic "goods" such as jobs, income, fuel efficient vehicles and other activities providing environmental and social benefits, to economic "bads" such as carbon, pollution, and dirty and inefficient vehicles is particularly sensible. It is estimated that a US\$15 tax per metric tonne of CO₂ in the US could reduce emissions by 720 million tons while allowing for a rebate in payroll taxes by up to 73 percent.³¹ In Germany, as a result of the green tax reform, 250,000 jobs have been created, fuel consumption has been reduced by 7 percent, CO₂ emissions by 2-2.5 percent, and pension costs by US\$7 billion.³²

3.5.3 Land Use and Urban Policy

The appropriate management of available land is very important from both economic and environmental points of view. There are a wide range of issues that one needs to consider. First, we need to look at changes in land use (say from forest to farming, or farm to urban). Second, in many developing countries, there are problems with unclear property rights and legal enforcement. This can severely impact management of and investment in the land. Finally, there are specific, often outdated, land use laws that can be perverse. All these issues get exacerbated when dealing with cities. For instance, the newly built city of Gurgaon in India had laws that discouraged densification. Thus, it developed largely as a low rise sprawl. Although high-rises are now allowed, the structure of the city is already dispersed. In turn, this impacts everything from the provision of civic amenities to the excessive reliance on private modes of transport.

Non-OECD countries are where almost all future vehicle growth will take place. There is an urgent need to transfer knowledge, technologies, and building capacities including the capacity to formulate appropriate legislations in order to ensure that non-OECD countries will put these measures in place.

3.5.4 Integrated Management of Freshwater

Freshwater is essential for all human societies and should be a priority for public policy. However, in many water systems there are severe misuse of both freshwater as well as the wider ecological system that supplies freshwater. A key issue is how to create a market or a payment system for use and preservation of watersheds. A well-known example is that of the Catskills. These mountains are the watershed that provides 90 percent of the 1bn gallons used by New York City each day. In order to maintain this supply, the city has invested millions of dollars to acquire land and restrain development in the Catskills. The scheme has been very successful and has reduced the need to invest far larger sums in filtration plants and alternative sources.³³ Governments should agree to explore and create similar incentive structures to preserve watersheds in other parts of the world, particularly in developing countries. Developing countries account for over 70 percent of global water withdrawal and much of this is used for irrigation.

Governments of water scarce countries are encouraged to rationalise their policies, incentives, and institutions that govern or influence the water sector. Particular attention should be given to improve the efficiency of irrigation systems, which currently account for 70-80 percent of water consumption. In this regard, equitable allocation of water rights or water use rights accompanied by appropriate pricing of water is of particular importance to ensure the financial viability of the sector as well as poor people's secured access to clean water in the long term. In addition, terms of trade should reflect the undervalued water embedded in commodities to promote efficient use of water in both exporting and importing countries.

3.5.5 Environmental Legislation

Introducing or improving environmental legislation is an important area where it will reward governments to look for domestic reform which complements fiscal and other measures towards a green economy. Some of the changes required have been advocated for some time with the purpose of poverty reduction – such as changes in access and use rights to common lands for the poor, and the securing of legislation around property rights.

National legislation in the area of environment, transport, construction and energy, among others, can create powerful market incentives and stimulate green investment. Capping carbon emissions and specifying targets for the proportion of renewable energy supply in the total energy mix at the national level, for example, will send a signal to energy investors. Additional examples (see Annex-C) include raising the fuel efficiency and carbon emission standard for vehicles, capping and auctioning the issuance of the number of licenses for vehicles each year, strengthening building codes to improve energy and resource efficiency of the construction sector, stipulating rules and regulations on recycling, including the use of recycled materials in particular production processes, and labeling green farm produce. Energy and related subsidies, urban management and building regulations, and transport policies are also important parts of environmental legislation that needs changing. The effectiveness of environmental regulations can be enhanced when designed and introduced to complement economic incentives.

Capacity building in this area is particular important for many developing countries. For example, while the majority of OECD countries have fuel economy policies in place, most non-OECD countries do not have these policies in place.

3.5.6 Monitoring and Accountability

The world economy is in a state of great uncertainty. The actions proposed in the GGND require considerable resources, and may have profound economic, social and environmental consequences. Policy makers as well as the public need to be informed of how the resources of the various stimulus packages are being used. There is also need to consider tools for evaluating and understanding the potential impacts of policies and measures to be implemented. In that context, it is important to move away from anecdotal evidence and promote the use of international statistical standards, the System of Environmental-Economic Accounting to measure systematically the contribution of the environment to economic growth, including green jobs and the impact of the economy on the environment. This would facilitate the development of internationally comparable information systems that enable us:

- to monitor and provide insight on how the stimulus packages are being spent and financed;
- to signal effectiveness of measures taken and provide information to facilitate decision-making to correct course when needed;
- to assess the impacts of the packages on reducing carbon dependency, ecosystem degradation and dematerialization of the economy;
- to promote the use and monitoring of integrated natural resources management and in particular of water (the SEEA-Water was already adopted as an international statistical standard by the United Nations Statistical Commission in March 2007 and recognized as a useful tool for integrated water resource management).

3.6 International Policy Architecture

Key to a successful Global Green New Deal is a rearticulating of the international policy architecture, in ways that enable countries and the international community better anticipate and respond to global crises, while providing the global framework for a transition towards a more sustainable economic system. This report puts an emphasis on action in the areas of international trade, international aid, a global carbon market, global markets for ecosystem services, development and transfer of technology, and international coordination for a GGND.

This report does not, however, address some fundamental aspects of the reform of the international policy architecture such as reform of the international financial system because they are being considered under other relevant policy processes, including under the Commission of Experts of the President of the UN General Assembly on Reforms of the International Monetary and Financial System.

3.6.1 International Trade

Trade protectionism is becoming a major concern in the current financial and economic crisis. The discriminatory use of stimulus funds to support domestic industries at the expense of foreign companies would likely invoke retaliatory measures from trading partners, which could drag the world economy further into recession. As an expression of support for the GGND, governments are encouraged to refrain from taking trade protectionist measures.

The experience of the 1930s shows that we should avoid a slide into protectionism in these difficult times. Indeed, there are potentially large gains from ongoing negotiations to liberalize agricultural trade.³⁴ For decades, global agricultural subsidies and protectionism have encouraged inefficient agricultural production in high-income economies and discouraged efficient and more sustainable production in developing economies. The World Bank estimates that the kind of agricultural trade barrier reductions under consideration in the Doha negotiations may lead to higher global commodity prices in the short run but in the long run should generate a more transparent, rules-based and predictable agricultural trading system that would raise incomes worldwide. It is estimated that the removal of agricultural protectionism could reduce global poverty by as much as 8 percent.³⁵ In addition to removing trade barriers on agricultural products more generally, developed countries

should pay special attention to opening up their markets to sustainably produced products, such as organic produce.

The removal of other subsidies that are clearly harmful to the environment should also be a priority. Arguably the most important opportunity for achieving this is the current WTO negotiations on limiting fisheries subsidies. Fishery subsidies are estimated at US\$15-35 billion annually and include such items as direct cash grants, tax breaks, and loan guarantees.³⁶ Although some fisheries subsidies, such as subsidies directed at fisheries management, promote responsible fishing practices, most subsidies directly contribute to over-fishing. This is a grave challenge given that the Food and Agriculture Organization of the United Nations (FAO) estimates that more than three-quarters of the world's fisheries have already been fished to their biological limits or beyond.³⁷ In this context, we are especially concerned with blatant non-compliance with international regulations that govern the global commons. The FAO introduced a Code of Conduct for Responsible Fisheries in 1995 but a recent study showed that 28 out of a sample of 53 countries did not comply at all with the code and only six countries received a compliance score of over 60 percent.³⁸

Special attention should also be given to the financing of trade. It is estimated that more than 90 percent of trade is financed with some form of short-term credit, insurance or guarantee. However, in the wake of the international financial crisis this short-term credit has begun to dry up. Exporters are increasingly demanding that overseas buyers obtain letters of credit from banks and these are becoming more expensive and harder to get.³⁹ The problem is being felt most acutely in emerging economies, particularly those resource-dependent economies that rely on export-led growth. The World Trade Organization (WTO) estimates that the current liquidity gap in trade finance is about US\$25 billion.⁴⁰

Several national export credit agencies and international financial institutions have announced new trade finance facilities to address this challenge. Governments are encouraged to further develop and expand this new trade financing, and where feasible, to target this financing to support the GGND. Likewise, there is an opportunity to mobilize committed *trade facilitation* financing in support of the GGND. The OECD estimates that trade-related development assistance amounts to approximately US\$25 to US\$30 billion a year, which represents around 30 percent of total development assistance.⁴¹

In the medium and long-term, trade liberalisation of environmental goods and services will provide further impetus to green investments. These goods and services include renewable energy technologies, zero carbon vehicles, equipment for public transport, energy and resource efficient construction materials and designs, waste treatment facilities, recycling technologies, water conservation and waste water treatment technologies and facilities, sustainable agriculture production, and related consultancy services. It should be noted, however, that most environmental goods and services are currently focused in industrial sectors where many developing countries, especially low income countries, lack comparative advantages. Given this, a phased-in approach to liberalisation, accompanied by technology transfer and skill building, should be promoted to allow for the growth of environmental goods and service industries in developing countries. Eliminating the use of perverse incentives such as fossil fuel subsidies, which inhibit the development of renewable energy and low-carbon technologies, should also be addressed in this context.

In general, when promoting trade liberalization, care should be taken to avoid or reduce any negative environmental, social, and economic impacts and to ensure global development gains, as well as ways to address potential losses. One of the most effective means of achieving this is by strengthening domestic institutions and regulations that govern and manage trade liberalization processes.

3.6.2 International Aid

Fixing the global financial architecture is necessary to get international capital to flow again. However, even in the best of times, many less developed countries will continue to require foreign

aid. It is especially important to try and maintain these flows in difficult times and, where possible, to channelize them towards creating sustainable infrastructure. The UNFCCC recommends that nearly \$15 billion in development assistance is required by developing countries if they are to adopt hybrid and alternative fuel vehicles, improve the efficiency of all motorized transport and develop second-generation biofuels. Shortfalls in development assistance will also impose a severe handicap on the necessary improvements in the sustainability of primary production in developing economies. It was also noted that the water and sanitation sector in 2006 accounted for less than 5 percent of development assistance, yet aid flows would need to double in order to bring within reach the Millennium Development Goal of halving the proportion of the population without these services by 2015. These estimates in the gap in development assistance are sobering, as no doubt the situation has worsened because of the current global recession. Bilateral and multilateral aid donors should increase their development assistance over the next few years, and target it to the sectors and actions that comprise the key components of the Global Green New Deal. Of urgent need is guaranteed financing for the type of vulnerability fund proposed by Robert Zoellick and overcoming shortfalls in the aid necessary to promote clean water and sanitation in developing economies. In addition, the international community should consider developing and expanding innovative financing mechanisms, such as the International Finance Facility, Climate Investment Funds and Global Clean Energy Cooperation, as possible means to contribute to meeting global funding requirements.

3.6.3 Global Carbon Market

In the absence of a new agreement on climate change at the 15th conference of the parties of the UNFCCC in Copenhagen, Denmark, in December 2009, there will be a growing uncertainty over the future of the global carbon market and the Clean Development Mechanism after 2012. This uncertainty runs the danger of locking new investments into carbon inefficient technologies. We are aware of the many inefficiencies of the current arrangement, but studies show that a delay will significantly increase future adjustment costs.⁴² Therefore we feel that the international community must commit itself to reach an agreement at Copenhagen later this year.

Negotiators are encouraged to agree on ambitious emission reduction targets and expand the Clean Development Mechanism to cover more countries (the current system is dominated by projects from a handful of countries - India, China and Brazil), more sectors, and more technologies. An early agreement will reduce the uncertainty for investors and can provide a timely reinforcement to the effects of spending on renewable energy and low-carbon technologies under the stimulus packages.

Currently the most liquid carbon markets are the European Union Greenhouse Gas Emission Trading Scheme (EU-ETS) and the global Kyoto compliance markets. Other countries with growing markets are Australia, Japan, and the US with its Regional Greenhouse Gas Initiative (RGGI). Then there is the voluntary market, rapidly taking shape and increasing in volume. These markets may soon be joined by a US Federal carbon market and the global scheme that could emerge from the negotiations in Copenhagen in 2009. These trends show that an early agreement will reduce the uncertainty for investors and can provide a timely reinforcement to the effects of spending on renewable energy and low-carbon technologies under the stimulus packages.

In view of the climate crisis, international financing for mitigation and adaptation deserves special attention. For the successful conclusion of the new climate agreement, it is estimated that at least US\$100 billion is required annually to cover the costs for developing countries to take mitigation and adaptation actions.⁴³ This spending appears large, but pales in comparison to the trillion dollar bank bailout that has been put forward within a short span of time.

Some developed countries have already made commitments in this regard. Germany, for example, has used one-third of the available revenue (after setting aside about half for general fiscal allocation) from auctioning emission allowances under the European Emission Trading Scheme to support the transfer and deployment of carbon-efficient technologies and measures to increase forest carbon

storage in developing countries. Currently, however, there remains a big gap between the demand for, and provision of such support.

Funding to support the new climate agreement may benefit from such global initiatives as the United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (UN-REDD Programme) – a collaborative enterprise of the Food and Agriculture Organisation, the United Nations Development Programme, the World Bank (Forest Carbon Fund) and UNEP. This multi-donor trust fund was established in July 2008 to allow the pooling of resources in support of developing countries' forest conservation efforts. This funding can function under the guidance of, and be accountable to the Conference of the Parties, which shall decide on its policies, programme priorities, and eligibility criteria.

3.6.4 Global Markets for Ecosystem Services

The conservation of many eco-systems suffers from the fact that the costs of preservation are borne nationally but its benefits are often enjoyed internationally. This is true for trans-border river systems as well as dense tropical forests that act as global carbon-sinks. Of course, similar problems exist even within national boundaries when the costs are borne by a certain province or social group but the benefits are widely enjoyed. A mechanism needs to be devised to compensate societies that preserve the global commons. Unfortunately, there are no existing examples of such cross-border payments but the UN's new Reduced Emissions from Deforestation and Forest Degradation in Developing Countries (REDD) programme could become an important effort in this direction. Another proposal put forward recently by Nobel Laureate Joseph Stiglitz is the creation of "Green Paper Gold" to invest in environmental infrastructure.⁴⁴ Admittedly, these and other proposals are still under development but we feel that such mechanisms should be considered carefully. The main stumbling block is to generate prices for externalities. The "cap-and-trade" carbon market provides one route to price discovery but other systems could be devised using the range of sophisticated green valuation/accounting techniques developed over the last two decades.

3.6.5 Development and Transfer of Technology

Technological solutions will be essential drivers in the transition towards a green economy. Environmentally sound technologies include a variety of cleaner production process and pollution prevention technologies as well as end-of-pipe and monitoring technologies. Moreover, they cover total systems including know-how, procedures, goods and services and equipment as well as organizational and managerial procedures. Technology transfer therefore includes soft technologies, such as the knowledge, systems and management approaches that can be employed by developing societies in making the transition to the Green Economy. This highlights the need for engagement of business, training and educational institutions such as business schools.

Technology solutions do not only originate from abroad. Some green technologies already exist in developing countries at affordable prices. The use of such technologies is not yet widespread largely due to the lack of information, education, financing, and technical support. Many groups have been active in providing support, training and capacity-building for the diffusion of such technologies in developing countries. Their efforts should be scaled up with the support of both domestic and external resources and enhanced international cooperation, from both the private and public sectors. Part of the "vulnerability funds" proposed by the World Bank, for example, could be allocated for such purposes. Indigenous knowledge is also a source of simple but effective and low-cost green technologies. An example is the Turfan water system - *Karez* – a traditional low-cost technology for conserving water in arid and semi-arid areas. Such indigenous know-how should be identified and widely disseminated nationally and across countries. This is an area where South-South cooperation has a particularly important role to play.

There are certain technologies whose transfer to developing countries especially low-income countries has been hampered by high cost, stringent intellectual property rights (IPRs), and lack of human capacity to operate and service the technologies. High-speed railway systems are an example. Developed countries are encouraged to make such technologies more affordable to developing countries. Reducing the period of protection for the IPRs over such technologies could be considered to count towards developed countries' emission reduction obligations. In addition, investing in developing countries' research and development (R&D), educational programmes, and human resources in green technologies should also be a priority in international development assistance. Developing countries also need support in strengthening their local patents regimes, as research has shown how weaknesses in this area undermines greater transfer of technologies on a commercial basis. Improved local enforcement of international standards will help improve business confidence and transfer of knowledge and know-how along with foreign direct investment flows.

3.6.6 International Coordination of a Global Green New Deal

This brings us to perhaps the most difficult issue in the new international framework – who will coordinate and police the new world order? Do we need another supra-national agency? Should we rely on a network of international agreements? How will we get an agreement between all countries? Who will ensure compliance? These may seem intractable issues but we feel that progress is possible if the world's largest economies take the lead. After all, it is a handful of major countries who account for most of the world's GDP, population, energy consumption and green house gas emissions. For instance, countries represented in the G-20 represent almost 90 percent of global GDP, two-thirds of world population and 80 percent of international trade. Such a forum could provide the platform for a global deal. The UN could then be used to take the framework to the wider community of nations, and to provide the complex coordination, support, monitoring and reporting that follows thereafter.

4. Next Steps

These recommendations for a GGND (“Global Green New Deal”) must be presented and discussed over the next few months at every major international forum where today's leaders of the large economies meet, so that they may decide wisely and with full information on the course and the nature of tomorrow's economies. They must be able to see the evidence, debate the issues, and hopefully forge agreements on the lines recommended here and elsewhere.

Instances of such international forums include the G20 Summit in London and the World Bank/IMF Spring Meetings in Washington, both in April; the G8 Summit in Rome in June, and a series of events leading to the climate conference in Copenhagen in December .

A United Nations interagency working group will be set up to provide the information needed to facilitate the adoption of a GGND by governments through the United Nations General Assembly.

Meanwhile, the “Green Economy” initiative of UNEP will continue to work with UN agencies to develop further and communicate information and advice tailored to diverse stakeholders, including major country groupings, on “greening” their economies. Investment strategy and policy reforms will be part of such advice.

Over the next 12-18 months, UNEP in collaboration with sister UN organizations and other relevant international institutions and lead experts will conduct in-depth studies on the status and prospects of key green sectors by major regions and country groupings. These studies will also examine the major barriers to countries' efforts to move their economies onto a green path. The objective is to inform and assist policymakers and businesses in their green investment decisions as well as their initiatives on policy reforms. These studies will be carried out with close involvement of, and communication with governments, the private sector, trade unions, academic institutions, and civil society groups.

ANNEX

“Green Economy” – Sectoral Analysis

We outline in this section those “Green Economy” sectors which will be particularly important in terms of their impacts on employment and GDP, and where the environmental benefits in terms of reduced carbon dependency or reduced ecological scarcity are the most significant. These are efficient buildings, renewable energy, sustainable transport, sustainable agriculture, freshwater, and ecological infrastructure. We do consider other sectors to be very important (materials efficiency and waste management), but they are either not able to deliver ‘quick wins’, or they have not reached a state of widespread dissemination of process knowledge and technology such that governance and risks are easily managed. On the sectors below (A to G), we have no such concerns, and they do deliver “quick wins” on the employment and growth front, so they are all included in our GGND recommendations in Section 3.

A. Energy Efficient Buildings

This sector is not just about the retrofitting and the use of insulation and other current technologies, but also about adaptive and resilient design - that allows easier retrofit of new technologies as they become cost effective (for example, pre-wired for rooftop photovoltaic systems) and constructed to withstand not just existing variations in weather but also anticipated local impacts of climate change, such as more intense hurricanes and extreme weather, fire and drought.

Globally the construction sector has a turnover of US\$3 trillion annually. A worldwide transition to energy-efficient buildings would create millions of jobs as well as “greening” existing jobs for the estimated 111 million people employed in the sector. Investments in improved energy efficiency in buildings could generate an additional 2-3.5 million green jobs in Europe and the United States alone. The potential is much higher in developing countries and in the countries in transition. The latter often have large stocks of inefficient buildings.

Construction is also a sector most affected by the current downturn in many countries with plenty of spare capacity and readily available technology. Cost-effective renovation for energy efficiency can be implemented on a large scale at relatively short notice.

Investments in green buildings have already been proposed for inclusion in a number of economic stimulus packages, including France, Germany, Japan, Republic of Korea and the United Kingdom.

For the United States, the Peterson Institute and the World Resources Institute estimate the average cost of weatherizing per home is \$1,640, resulting in an overall program cost of \$ 6.2 billion, the amount called for in H.R. 1, the American Recovery and Reinvestment Act of 2009, as of January 26, 2009.⁴⁵ Furthermore, reducing energy demand of all federal buildings by 20 percent would cost \$9.4 billion.⁴⁶ As we will discuss below, these investments could create a very large number of jobs.

In Australia, a proposed US\$3 billion green housing package over 4 years is expected to reduce greenhouse gas emissions by 3.8 million tons a year while creating 160,000 jobs in auditing and installation services.⁴⁷ In the US, it is estimated that US\$100 billion to improve the energy efficiency of buildings and cities over four years will generate 2 million new jobs.⁴⁸

As a result of its participatory decision-making process on environmental policies known as the "Grenelle de l'environnement", the French government has taken ambitious initiatives to promote energy efficiency and the use of renewable energy in the renovation and construction of buildings. The goal is to reduce the energy consumption of existing buildings in France by at least 38 percent by 2020. For instance, one measure is to start by 2012 the renovation of existing public buildings to

reduce their energy consumption by 40 percent and their GHG emissions by 50 percent. For new offices and public buildings the norm will become 50 kWh/m²/year per year from 2010. Similar initiatives will be implemented progressively for the construction of private buildings and in buildings renovation. Agreements have also been established between the government and the banking and construction sectors to provide zero-interest loans to owners who want to improve the energy efficiency of their buildings.⁴⁹

Technologies and materials to improve the efficiency of buildings are commercially available at competitive prices. Using current building technology, we can already cut energy use by around 80 percent compared to conventional designs.⁵⁰ To achieve a wide adoption of these technologies and materials in new construction and renovation, however, there is a need for large-scale investments in skill development and capacity building. This is essential for increasing the supply of and access to such technologies and materials, particularly in developing countries.

In the field of energy efficient building governments can gain support from local governments. Cities and local governments are regulating building standards and pass building permits. These could include mandatory investments on energy-efficiency or promote the installation of renewable energy technologies on buildings. Germany, for instance, launched a program on retrofitting existing housing stocks to improve energy efficiency. So far, over 200,000 apartments have been retrofitted and 25,000 new jobs were created and 116,000 existing jobs were sustained.

Box 1: Learning from termites to cool and heat naturally in Harare, Zimbabwe

The Eastgate Centre is a shopping centre and office block in downtown Harare which has been designed to be ventilated and cooled entirely by natural means. The building stores heat in the day. In the evening and at night the warm internal air is vented through chimneys, assisted by fans but also rising naturally, drawing in denser cool air at the bottom of the building. This system based on a mechanical or “passive” cooling system replaces the artificial air-conditioning.

The Eastgate Centre uses less than 10 percent of the energy of a conventional building of its size. These efficiencies translate directly to the bottom line: Eastgate’s owners have saved \$3.5 million alone because no air-conditioning system had to be implemented. The energy efficiency also trickle down to the tenants whose rents are 20 percent lower than those of occupants in the surrounding buildings.

Source: <http://www.inhabitat.com/2007/12/10/building-modelled-on-termites-eastgate-centre-in-zimbabwe/> (last accessed on 4 March 2009).

B. Sustainable Energy

Investing in renewable energy makes economic sense, apart from its contributions to emission reductions. About 2.3 million people have in recent years found new jobs in the renewable energy sector, even though these provide only 2 per cent of global primary energy. In comparison, total employment of the oil and gas, and oil refining industries in 1999 was just over 2 million jobs⁵¹. Globally, projected investments of US\$630 billion in the renewable energy sector by 2030 would translate into at least 20 million additional jobs: 2.1 million in wind energy, 6.3 million in solar photovoltaic (PV), and 12 million in biofuels related agriculture and industry. Apart from its higher direct job creation potential, renewable energy is also expected to secure jobs in downstream industries by reducing related emissions and by reducing the costs of production in the future amidst the carbon constraint and reduced supply of oil and gas, thereby contributing to the competitiveness of final products. In expanding investment and employment opportunities in renewable energies, careful attention needs to be given to the environmental and social consequences of certain forms of production, as is the case with some forms of biofuels.⁵²

The prospect of investing in the renewable sector at the country level is encouraging. In China, the renewable energy sector generates output worth US\$17 billion and employs 1 million workers, of which 600,000 are employed in solar thermal making and installing products such as solar water heaters.⁵³ In Nigeria, a biofuels industry based on cassava and sugar cane crops could provide jobs for 200,000 people. India could generate 900,000 jobs by 2025 in biomass gasification. In Bangladesh, at least 20,000 jobs have been created with the uptake of three renewable energy technologies: PV solar home systems, biogas facilities, and improved cooking stoves (see Box 1).⁵⁴ Such technologies have the added benefits of improving the health of the rural poor, especially women.

Box 1: Off-grid Renewable Energy Solutions in Bangladesh

Through an innovative microcredit scheme, Grameen Shakti in Bangladesh has embarked on an ambitious program to provide a range of affordable renewable energy technologies to rural households. Already, over 205,000 homes across Bangladesh have installed PV solar systems capable of powering lights and small-scale electronic appliances. Over 8,000 PV solar systems are being installed per month, and demand for the systems is increasing exponentially. The goal is to install 2 million PV solar systems in homes by 2011 and 7.5 million by 2015, which would reach half of the rural population of Bangladesh.

In addition, Grameen Shakti has also installed 6,000 biogas plants, which convert animal dung and organic litter into pollution-free biogas and slurry. The biogas can be used to cook food, for lighting and to produce electricity. The slurry is used as organic fertiliser and as fish feed. Grameen Shakti has a goal of building 500,000 biogas plants by 2015. Grameen Shakti has also disseminated over 20,000 improved cooking stoves and has the goal of providing one million stoves by 2010 covering 35,000 villages.

The employment and other economic opportunities of the program are far reaching. At least 20,000 jobs have been created already with the current uptake of these three renewable energy technologies across Bangladesh. The goal is to create at least 100,000 direct jobs by 2015, mainly for women. This example illustrates a *non-grid* solution to clean energy for the poor, especially powerful as it is (a) commercial in operation and microfinance-driven and (b) as it substitutes kerosene (the usual lighting fuel, held responsible for respiratory diseases) with photovoltaic electricity.

Source: Barua, Dipal. "Bringing Green Energy, Health, Income and Green Jobs to Bangladesh." Presentation at the Preparatory Meeting, International Advisory Board to the International Climate Protection Initiative of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. Poznan, Poland, December 7, 2008.

In many developing countries, a major issue is the lack of access by two billion people to clean and modern energy to cook food and for daily living. The Clean Development Mechanism (CDM) has helped expand the reach of renewable energy projects for power production to low-income countries such as the Democratic Republic of the Congo, Madagascar, Mauritius, Mozambique, Mali, and Senegal. Assuming governments agree on a deep and decisive new climate agreement in 2009, Africa overall could see roughly 230 projects by 2012. These could cumulatively generate over 65 million certified emission reductions, worth close to one billion US dollars at a conservative carbon credit price of US\$15 per tonne.

C. Sustainable Transport

An increase in energy efficiency and a shift away from energy-intensive modes in both passenger and freight movement are required in order to achieve the necessary reductions from transport greenhouse gas emissions within the next 50 years. Together with integrated transport planning and demand management, low carbon fuels and greater electrification of transportation is needed to meet short and long term economic and sustainability targets. Greater demand for renewable energy in the

transport sector through the increased electrification of road transport (from plug-in hybrids to full electric vehicles) can be linked to a growth in renewable power generation. These complementary sectors could absorb skilled labor from other transport subsectors, including the automotive industry.

One way of moving in a more sustainable transport direction through targeted investment is to include ‘green’ conditionalities to large-scale bailout plans provided to automobile manufactures to significantly improve automotive fuel economy and redirect research to more affordable on-board energy storage. International financial institutions can also catalyze a modal and efficiency shift by targeting investment for well-planned, greener transport infrastructure that meets the needs of all users – both motorized and non-motorized. The planning of urban and peri-urban centers according to mixed-use and smart growth design principles must be part of a sustainable transport future. Urban development along these principles will serve to lower dependence on personal vehicles and support in the increased use of public transport systems and non-motorized transport for short distances and daily commutes.

Rail currently accounts for only 3 percent of transport energy use and greenhouse gas emissions; increasing the market share of rail would greatly improve overall transport resource and energy efficiency – particularly in developing countries and for freight transport. While the efficiency gains depend on the mix between diesel and electric traction for freight trains and the fuel used to generate electric power, according to the International Transport Forum rail can move goods long distances with significantly lower CO₂ emissions than road haulage, on condition that the rail operation itself is efficient. Some governments have successfully provided grants to shift freight from road to rail to reduce CO₂ emissions at reasonable cost with careful targeting. The International Energy Agency in its 2008 energy report estimates that shifting 25 percent of all air travel in 2050 under 750 km to high-speed rail travel would result in savings of around 0.5 Gt of CO₂/ year. In addition, if 25 percent of all road freight over 500 km were shifted to rail, 0.4 Gt of CO₂ more could be saved per year. The increase in rail infrastructure investment worldwide would lead to long-term job creation and absorb labor from other less efficient sectors.

In International Energy Agency ‘Business as Usual’ scenarios, CO₂ emissions from the transport sector are expected to grow by 120 percent by 2050 compared to 2000 levels. Emissions from light-duty vehicles grow more slowly, but are still 90 percent higher in 2050 than in 2000. While there are significant finance and policy challenges to be overcome, the transport sector – and in particular road transport – offers enormous opportunities for efficiency gains, in addition to employment and economic stimulus through the movement of people and goods. Fiscal measures aimed at converting economies from fossil-fuel based, inefficient, private transportation to renewables-based, efficient, public transportation are already visible in a number of countries – but their widespread use and promotion is needed to meet sustainability and economic objectives. Box 3 provides a snapshot of the fiscal policies that are already in place in a number of countries in support of sustainable transport.

Box 3: Fiscal Policies for Sustainable Transport	
Fuel tax	Gasoline/diesel tax (Poland); carbon tax (Sweden)
Vehicle tax	Annual vehicle attribute taxes and fees (European Union); Tax and fee reductions or exemptions for new clean, fuel-efficient cars (Denmark, Germany, Japan); Annual fees for CO ₂ and smog externalities (Denmark; United Kingdom). Auctioned vehicle permits (Singapore).
New vehicle incentives	Clean car rebates (Japan, United States); Gas guzzler tax (United States); “feebate”: variable purchase tax with fuel consumption (Austria).
Road fees	Road pricing/high occupancy toll lanes (California, US); Congestion pricing (London, UK); Electronic Road Pricing (Singapore).
User fees	Parking fees (California, US); In-lieu fees for parking (Canada, Germany,

	Iceland, South Africa); Parking demand management (United States).
Vehicle insurance	Fines for lack of mandatory insurance (United Kingdom, United States); Insurance-specific auto tax (France); Pay-as-you-drive and pay-as-you pump insurance (United Kingdom, United States).
Fleet vehicle incentives	Cost-effective, clean and fuel-efficient public fleets (Canada); Incentives for clean, fuel-efficient company cars (United Kingdom).

Source: Adapted from. "Fiscal Policies for Sustainable Transportation: International Best Practices." Gordon, Deborah. 2005 in *Studies on International Fiscal Policies for Sustainable Transportation*. The Energy Foundation, San Francisco, pp. 1-80.

D. Freshwater

Apart from meeting basic human needs for clean water, investing in the water sector is also a good business. Globally, the market for water supply, sanitation, and water efficiency is estimated at US\$253 billion and will grow to US\$658 billion by 2020.⁵⁵ The estimated investment of US\$15 billion per year towards meeting the MDG of halving by 2015 the proportion of people (counted in 1990) without sustainable access to safe water and basic sanitation could generate global economic benefits worth US\$38 billion annually, US\$15 billion of which would accrue to Sub-Saharan Africa alone.⁵⁶

Efforts are already being taken to target this sector in a number of stimulus packages. The 2009 American Recovery and Reinvestment Act provides for investments of \$4 billion for clean water infrastructure and US\$2 billion for drinking water infrastructure.⁵⁷ In the US\$38 billion South Korean economic stimulus package, nearly \$12 billion are allocated for improvements to four major river systems.⁵⁸ In Australia, the parliament did not pass their most recent economic stimulus package until provisions were made for investment to improve the Murray-Darling River system, which underlies almost half of the nation's agricultural output.⁵⁹

E. Ecological Infrastructure

Governments of developed and developing countries and economies in transition are encouraged to consider ecological infrastructure as one of the top priorities for public spending both in their immediate responses to the current global financial crisis and in their regular national budget. Investing in ecological infrastructure is important for all countries. Developing economies in particular are home to hundreds of millions of poor people whose livelihoods depend on critical ecosystem services. Developed country governments and international development organizations are encouraged to support such investments by providing financial resources, scientific and technological cooperation, and support for capacity building or enhancement.

Ecological infrastructure refers to healthy ecosystems like water catchments and river systems, wetlands, soil, forests, oceans, and coral reefs, which provide substantial economic services at national and in many cases global level. Healthy ecosystems provide food and fiber as well as natural medicines and pharmaceuticals. They also provide regulating services such as water purification, erosion control, storm protection, soil fertility, pollination, and carbon sequestration. It should also be noted that urban development and ecological infrastructure can co-exist - for example, wildlife corridors, natural storm water drainage systems, urban forests, constructed wetlands for water treatment, etc, which makes for interesting cases and high valuations of such infrastructure as a range of "urban" utilities.

Ecological infrastructure contributes directly to human well-being. It is as vital for the functioning to the economy as physical infrastructure such as roads, electricity, and telecommunications – they contribute directly to human well-being and are indispensable for a

functioning economy. The role of forests as “public utilities”, for example, is vital to economic health; they regulate and deliver freshwater to farms and towns, provide nutrient flows to farmlands, prevent soil erosion, and produce fuel-wood for the poor. Their contributions to the economy, however, are often unappreciated because their services are seen as provided naturally and thus not accounted for nor priced. This has led to the long-standing disregard of this sector in public policies and to a global degradation and loss of public goods and services provided by these so-called “commons” – fifteen out of the 24 ecosystem services analyzed by the Global Millennium Assessment were found to be in decline.

Evidence, however, is accumulating to show that it makes economic sense to invest in ecological infrastructure. A global marine protected area system, accounting for the closure of 20 percent of total fishing area and resulting in a lost profit of US\$ 270 million per year, would help sustain fisheries worth US\$ 70-80 billion per year while creating 1million jobs.⁶⁰ The world’s wetlands, covering 6 percent of the land area, produce 25 percent of the worlds’ food from fisheries, agriculture, and hunting.⁶¹

Natural infrastructure programmes can be carried out with labour-based approaches.⁶² These approaches are well understood and time-tested, they can meet the same quality standards as heavily mechanized works and they compare favorably with other methods in terms of cost. Labor-based methods have manifold positive consequences: generation of substantial numbers of local jobs and income boosting the local economy, improvement of the competitiveness of local-enterprise and of course environmental recovery. The ILO estimates that the implementation of 20 percent of the US\$ 192 billion in annual investments in water and transport infrastructure in developing countries with labor-based methods would generate up to 110 million more jobs annually than equipment based methods in low-income countries.

Table 1 provides an indicative overview of the additional job opportunities that could be created in two wage rate scenarios. First, using average wages of US\$ 5 and US\$ 2.5 for equipment-based and labour-based wages respectively for the “low-income” scenario and secondly, average wages of US\$ 10 and US\$ 5 for equipment-based and labour-based wages respectively in the “middle-income” scenario. Assuming that 20 percent of the annual water and transport infrastructure investments in developing countries (US\$ 192 billion) will be carried out using Employment Intensive Investment Programme (EIIP) approaches, this represents an investment of US\$ 38.4 billion.

Table 1: Indicative Overview of Potentials for Creating Additional Jobs through EIIP approaches

Annual Outputs	At wage rates fo US\$ 2.5 to 5 per day			At wage rates of US\$ 5 to 10 per day		
	Equipm.based wage \$ 5/d	Labour-based wage \$ 2.5/d	Additional	Equipm.based wage \$ 10/d	Labour-based wage \$ 5/d	Additional
At investment level of US\$ 38.4 billion						
Direct short term labour days (billion)	0.768	6.144	5.376	0.384	3.072	2.688
Spin-off and multiplier labour days (billion)	0.960	12.288	11.328	0.480	6.144	5.664
Total number of labour days (billion)	1.728	18.432	16.704	0.864	9.216	8.352
Local jobs created (million)	11.5	122.9	111.4	5.8	61.4	55.7
Direct annual income transfer (US\$ billion)	3.8	15.4	11.5	3.8	15.4	11.5

Notes: The following assumptions have been made: Under EIIP approaches, the labour-costs constitute 40 percent of the total investment costs and for equipment-based approaches the labour-costs constitute 10 percent of the total investment costs. The average daily wage rate of US\$ 5 / 10 and US\$ 2.5 / 5 have been used in the calculations for the two scenarios. The number of local jobs created has been estimated on the basis of 150 days

of work per year (i.e. with about 50 percent of the available time spent on the job). For EIP approaches a spin-off cum multiplier effect has been factored in at 2.0. For equipment-based approaches this factor has been estimated at 1.25.

Source: *ILO EIP 2008*

On municipal level, the introduction of an EcoBudget management system is an efficient way to reduce the use and to ensure a more sustainable way of using existing natural resources. This translates also in important financial savings. The EcoBudget management system adds an annual budget for natural resources and environmental quality to the municipal budget. Parallel to the financial budget review, the use of natural resources is evaluated. By doing so, environmental impacts of municipal operations and projects are monitored with the objective to reduce the use of natural resources.

F. Sustainable Agriculture

In developing a GGND, developed countries should allocate part of their stimulus packages to the development of sustainable agriculture in developing countries. They should also enhance the sustainability of their own agricultural systems and open their markets to sustainably produced farm produce from developing countries. Existing international cooperation on promoting agriculture in developing countries should adhere to the principles of sustainable agriculture including ensuring these countries' food security, generation of local jobs, and minimising any negative impacts on soil and climate.

Agriculture is vitally important for developed and developing countries alike⁶³. In 1960, the average hectare of arable land globally supported 2.4 persons. By 2005 this figure had increased to 4.5 persons per hectare and by 2050 the estimate is that a single hectare of land will need to support between 6.1 and 6.4 people. However, the rate of growth in agricultural productivity has been declining. The key message from the recently launched International Assessment of Agricultural Knowledge, Science and Technology for Development conveys a clear message that "The way the world grows its food will have to change radically to better serve the poor and hungry if the world is to cope with a growing population and climate change while avoiding social breakdown and environmental collapse." Achievement of the desired levels of human wellbeing, reduced poverty, sustainable trade, increased access to food and other commodities, and improved health of natural resources even with all the efforts and investments that are available to the international community, is less likely if the production and consumption patterns of 20th century are continued. Over reliance by farmers on increasing levels of chemical and fossil fuel inputs to raise productivity, has harmed soils and ecosystems and brought diminishing returns⁶⁴. In order to ensure that farms are a sustainable source of food, fibre, and livelihoods, and breeding grounds for biodiversity as well as sinks for carbon, increased investments in sustainable agriculture are needed, particularly in the smallholder farming in developing countries which has been neglected for the last 30 years.

Sustainable agriculture is an effective strategy for improving food security and reducing poverty. It promotes the production of ample food without depleting the earth's resources or polluting its environment. Sustainable agriculture offers opportunities to achieve economic development, save and create jobs, reduce poverty, and even cut down GHG emissions. It also helps ensure food safety of consumers, provide food security to the poor and smallholder farmers, offers trade opportunities for developing countries, and restore and improve ecosystems.

Different standards and certification schemes are in place to measure the level of compliance of agriculture practices with principals of sustainable development. The one that are well recognized in the international market, among many others, include Organic Agriculture, Fair Trade, Good Agricultural Practices (GlobalGAP), Demeter Certified Biodynamic, Food Alliance (FA), and Rainforest Alliance Certified. All these schemes offer premium prices to producers and link them with global supply chains (see Box 2).

Box 2: Major Types of Sustainable Agriculture

Organic agriculture (OA), which is based on the principle of health, ecology, fairness, and care, relies on ecosystem management and eliminates the use of synthetic inputs. Organic production apart from being suitable to marginal as well as productive environments, contributes to soil, water, and biodiversity conservation. It produces the diversity necessary for healthy nutrition, makes use of local resources and traditional knowledge and thus strengthens farming communities. Since many farms in developing countries use little or no agrochemical inputs, conversion to organic agriculture is simplified because they have been operating using methods similar to organic standards. Currently there are 32.2 million hectares of agricultural land that are managed organically by more than 1.2 million producers, including smallholders in 141 countries.⁶⁵ This sub-sector provides a unique export opportunity for many developing countries. In terms of price premiums and income for farmers, for example in Uganda, the farm gate price of organic pineapples, ginger, and cotton, are 80 percent, 185 percent, and 33 percent respectively, higher than conventional products. In relation to the climate change, an FAO study (Scialabba and Hattam (2002) concluded that “CO₂ emissions per hectare of organic agriculture systems are 48 percent to 68 percent lower than in conventional systems”. Various studies have shown that organic fields sequester 3- 8 tone more carbon per hectare compared to conventional agriculture. The Rodale Institute in 2007 estimated that “Converting the U.S.’s 160 million corn and soybean acres to organic production would sequester enough carbon to satisfy 73 percent of the Kyoto targets for CO₂ reduction in the U.S.”⁶⁶

On average, organic agriculture uses 30 percent more labor than conventional production resulting in creating 172,000 jobs per year. In Mexico, the number of jobs created through organic agriculture was 172,251 in 2007 in comparison to 13,785 jobs created in 1996. An analysis of 114 cases of conversion to organic or near organic production method in Africa showed an increase of 116 percent in farm productivity and improved levels of natural, human, social, and financial capital. Globally, there has been an increase for organic products with sales increasing by over US\$5 billion a year. Organic Monitor estimates that organic food and drink sales tripled between 1999 and 2007 and crossed US\$46 billion mark. Organic agriculture offers a real trade and poverty reduction opportunity for developing countries as 97 percent of the revenues are generated in Europe and North America whereas more than 80 percent of the producers are in Africa, Asia and Latin America. The countries with the most producers are Uganda, followed by India, Ethiopia and Mexico.⁶⁷

G. Other “Green Economy” Sectors

Readers would have observed that we have not made any overt recommendations for the Global Green New Deal, in Chapter 3, on some important sectors of a “Green Economy”, viz., materials efficiency, energy efficiency (other than buildings), and waste management. This is not to say that these sectors are unimportant or unworthy of legislative or fiscal support and investment. On the other hand, our observation is that these sectors do not exhibit returns in the nature of “quick wins”.

In the case of materials efficiency and energy efficiency in industrial processes, much work has been done in the commercial arena to assess the profitability of various abatement actions and the relative cost-benefit cases for these actions. The fact that many “profitable” options highlighted by abatement curves constructed for industrial processes suggest that the cause for inaction is not the lack of capital (which should seek out such returns) but rather a combination of other factors - including management knowledge and inertia, the existence of subsidies for fossil fuels specifically and energy generally, the lack of internalization of the costs of excessive extractive use of materials, etc.

Waste management and recycling is an urgent public policy issue. The rapid increase in the volume and types of waste generated, including industrial waste, e-waste, and municipal waste, mainly owing to economic growth, industrialisation and the lack of both physical and institutional infrastructures, represents a growing problem for both national as well as local governments. The increasing amounts of wastes and the associated rise in the hazards that it poses are severely affecting global and local

environments, natural resources, public health, local economies, and living conditions, thereby hampering the attainment of MDGs. It is estimated that total amount of municipal solid waste generated globally reached 2.02 billion tonnes in 2006, representing a 7 percent annual increase since 2003⁶⁸.

Whilst waste management does not generate the immediate “quick wins” for employment that are expected (for example) of housing retrofits, however, it is an important area of the “Green Economy” in the long run. Governments are encouraged to legislate towards internalizing the costs of externalities in this arena. This will help turn waste management and recycling sector into a highly profitable and labour intensive business sector, providing reliable and competent services as well as decent conditions for workers. The sector should cover safe and clean handling, transfer, storage, and disposal of waste and promote the 3Rs – reduce, re-use, and recycling.

In considering public funding support to renewable energy technologies, green transport, and efficient buildings, for example, governments should encourage the use of materials and products recycled or remanufactured from waste. At least, they should give equal fiscal treatment to original and recycled/remanufactured materials and products.

Investing in waste management and recycling can turn the waste problem into an economic opportunity. In the US recycling generates US\$236 billion annually and employs over 1 million people at 56,000 public and private facilities⁶⁹. The US national average recycling rate of roughly 30 percent saves about 256 billion barrels of crude oil, the equivalent of fuelling 22 million cars each year⁷⁰. Remanufacturing operations worldwide save about 10.7 million barrels of oil each year, or an amount of electricity equal to that generated by five nuclear power plants. They also save a volume of raw materials that would fill 155,000 railroad cars annually. In 2000, the remanufacturing sector in the European Union member countries accounted for about 4 percent of the region’s GDP⁷¹. This sector is expected to grow rapidly in many countries in the face of escalating commodity prices.

This sector has traditionally been associated with problems of social equity and the use of child labour, which are not insignificant concerns. Thus in order that the ‘green jobs’ potential in this sector is translated to ‘decent jobs’, it requires careful planning, risk assessment, investment and use of technology, and a strong system of monitoring and oversight coupled with appropriate regulation and penalties. Such checks and balances are not trivial or quick to implement, and yet they are vital. Therefore we have not included this important part of the ‘green economy’ specifically in our GGND recommendations.

Other Enabling Conditions: International Finance

The World Bank’s suggestion for every high-income economy to pledge 0.7 percent of its stimulus package to a global “vulnerability fund”⁷² and the ILO suggestion to create a global jobs fund⁷³ are commendable. The “vulnerability fund” would be used to finance a social safety net for the poor, investment in infrastructure including low-carbon technology projects, and support for small and medium-sized enterprises and micro-finance institutions.

Apart from such initiatives, governments and international financial institutions are encouraged to design innovative financing mechanisms, such as converting some of the failed investment banks into national development banks, to support the efforts by developing countries and countries with economies in transition to shift their economies onto a green path.

An additional incentive for the banking sector to support the GGND is for governments to require factoring potential environmental risks as well as environmental gains into the standard asset valuation and credit rating procedures of banks and financial institutions.

Endnotes

¹ Prof Kevin Gallagher, Boston University, at <http://www.voxeu.org/index.php?q=node/3156>

² Edward B. Barbier, “A Global Green New Deal”, UNEP-DTIE, February 2009

³ *ibid*

⁴ International Labor Organization (ILO). 2009. *Global Employment Trends January 2009*. ILO, Geneva. International Institute of Labour Studies, ILO. 2009.

⁵ World Bank. 2008. *Global Financial Crisis and Implications for Developing Countries*. Paper for G-20 Finance Ministers’ Meeting. São Paulo, Brazil. November 8, 2008.

⁶ Source: IPCC 2007: Fourth Assessment Report. Working Group II Report "Impacts, Adaptation and Vulnerability" p.319 available online at: <http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-chapter6.pdf>; Organization for Economic Cooperation and Development (OECD). 2008. *Costs of Inaction on Key Environmental Challenges*. OECD, Paris. United Nations Development Programme (UNDP). 2008. *Human Development Report 2007/2008. Fighting Climate Change: Human Solidarity in a Divided World*. UNDP, New York. Sukhdev, Pavan. 2008. *The Economics of Ecosystems & Biodiversity: An Interim Report*. European Communities, Brussels.

⁷ USA Today. July 11, 2008. *Oil sets new trading record above \$147 a barrel*. Available at: . http://www.usatoday.com/money/economy/2008-07-11-3815204975_x.htm

⁸ Businessgreen.com. November 7, 2008. *IEA warns oil will hit \$200 a barrel by 2030*. Available at: <http://www.businessgreen.com/business-green/news/2230069/soaring-oil-price-encourage>

⁹ IPS. November 24, 2008. *How the Bailouts dwarf Other global Crisis Spending*. Institute for Policy Studies.

¹⁰ UN News Centre. February 4, 2009. *Only sustainable farming will help meet growing food demand, says UN expert*. Available at: <http://www.un.org/apps/news/story.asp?NewsID=29766&Cr=FAO&Cr1=crop>

¹¹ United Nations Development Programme. 2006.

¹² Barbier, Edward. 2009. “A Global Green New Deal”. Report prepared for the Economics and Trade Branch, Division of Technology, Industry and Environment, United Nations Environment Programme. February, 2009.

¹³ For a more detailed discussion see: ILO (2009) The financial and economic crisis: A Decent Work response’ ILO Governing Body 304th Session, Geneva, March 2009 (GB.304/ESP/2)

¹⁴ Negotiations on climate change are carried out under the UNFCCC, and seek to enhance international action on mitigation, adaptation, technology and financing, in addition to reaching a shared vision for long-term cooperative action on climate change. These negotiations were launched in December 2007 in Bali, Indonesia, and are due to conclude at the end of 2009, in Copenhagen, Denmark.

¹⁵ Sukhdev, Pavan, et al, “*The Economics of Ecosystems and Biodiversity – Interim Report*”, European Communities 2008.

¹⁶ Barbier, Edward B., “A Global Green New Deal”, prepared for UNEP-DTIE, February 2009

¹⁷ “Green Jobs: Towards decent work in a sustainable, low-carbon world”, report commissioned by UNEP, ILO, IOE and ITUC, September 2008.

¹⁸ Technical Summary in : “*Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*” Barker et al.

¹⁹ FIA Foundation. *50 By 50 – Global Fuel Economy Initiative*. Available at: http://www.fiafoundation.org/Documents/Environment/50by50_leaflet_lr.pdf

²⁰Bezdek, Roger H. and Robert M. Wendling. 2005. *Potential long-term impacts of changes in U.S. vehicle fuel efficiency standards*. Energy Policy 33:407-419. Renner, Sweeney and Kubit 2008, op cit. Zhao, Jimin. 2006. "Whither the Car? China's Automobile Industry and Cleaner Vehicle Technologies." Development and Change 37(1):121-144.

²¹ UNEP/G.R.I.D. Arendal. February 16, 2009. *Realizing a 'Green New Deal*. Available at: <http://www.grida.no/news/press/3469.aspx>

²² UNFCCC. 2009. Letter from Yvo de Boer, UNFCCC Executive Secretary to Juan Somavia, Director General, ILO, 13 January 2009.

²³ The source for this box is: Barua, Dipal. "Bringing Green Energy, Health, Income and Green Jobs to Bangladesh." Presentation at the Preparatory Meeting, International Advisory Board to the International Climate Protection Initiative of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. Poznan, Poland, December 7, 2008.

²⁴ Note that water management in developing countries is not merely about irrigation. It is closely linked to important issues such as availability of drinking water, health and sanitation.

²⁵ <http://www.greengrowth.org/download/2009/Korea-green-growth-project-02-01-09.pdf>

²⁶ World Bank (2008). Agriculture for Development. World Development Report 2008. Washington D.C. The World Bank. Available at: http://siteresources.worldbank.org/INTWDR2008/Resources/WDR_00_book.pdf

²⁷ Morgan, T. Menecon Consulting. 2007. *Energy Subsidies. Their Magnitude, How They Affect Energy Investment and Greenhouse Gas Emissions, and Prospects for Reform*. UNFCCC Secretariat Financial and Technical Support Programme. Available at: http://unfccc.int/files/cooperation_and_support/financial_mechanism/application/pdf/morgan_pdf.pdf

²⁸ *The Economics of Ecosystems and Biodiversity, Interim Report*. (European Communities , May 2008)

²⁹ United Nations Environment Programme (UNEP). *Fisheries Subsidies: A Critical Issue for Trade and Sustainable Development at the WTO*. UNEP, Geneva, May 2008.

³⁰ Food and Agricultural Organization (FAO) of the United Nations. 2007 *The State of World Fisheries and Aquaculture 2006*. FAO, Rome.

³¹ The Brookings Institution. *A GREEN EMPLOYMENT TAX SWAP: USING A CARBON TAX TO FINANCE PAYROLL TAX RELIEF – Policy Brief*. World Resources Institute. 2007

³² Ecologic. 2005. *Effects of Germany's Ecological Tax Reforms on the Environment, Employment, and Technological Innovation*. Available at: http://www.ecologic.de/download/projekte/1850-1899/1879/1879_summary.pdf

³³ "City's Catskill Water Gets 10-Year Approval", New York Times, April 13th, 2007.

³⁴ Mattoo, Aaditya and Arvind Subramanian. "Multilateralism Beyond Doha." Working Paper Number 153. Center for Global Development, Washington DC, October 2008. United Nations 2009, *World Economic Situation and Prospects 2009*, op cit. World Bank 2009, *Global Economic Prospects*, op cit.

³⁵ World Bank 2009, *Global Economic Prospects*, op cit.

³⁶ UNEP, *Fisheries Subsidies: A Critical Issue for Trade and Sustainable Development at the WTO*, May 2008.

³⁷ FAO, *The State of World Fisheries and Aquaculture 2006*, 2007.

³⁸ "Not Honoring the Code", Tony Pitcher et al, Nature 457, 5th February 2009.

-
- ³⁹ The New York Times, Trade Losses Rise in China, Threatening Jobs, 14 January 2009.
- ⁴⁰ World Trade Organization, Lamy Warns Trade Finance Situation “Deteriorating”, 12 November 2008.
- ⁴¹ Taipei Times. September 22, 2008. ‘Aid for Trade’ initiative could benefit Taiwan. Available at: <http://www.taipetimes.com/News/taiwan/archives/2008/09/22/2003423876>
- ⁴² “Delayed Action and Uncertain Targets: How Much will Climate Policy Cost”, Valentina Bosetti et al, Fondazione Eni Enrico Mattei, Milan 2008.
- ⁴³ Tearfund. 2007. *Adaptation and the Post 2012 Framework*. Available at: <http://www.tearfund.org/webdocs/Website/Campaigning/Policy%20and%20research/Post%202012%20web.pdf>. (See page 7, footnote 14. Christian Aid. 2007. Global war chest needed to fight impact of climate change on the poor.)
- ⁴⁴ “Green Paper Gold”, Jeremy Becher, FPIF December 2008. <http://www.fpif.org/fpifxt/5759>
- ⁴⁵ “The Green Global Recovery? Assessing US Economic Stimulus and Prospects for International Coordination” by Houser, Mohan and Heilmayr, Peterson Institute of International Economics and World Resources Institute (to be published March 2009).
- ⁴⁶ Based on authors’ correspondence with FEMP analysts, December 22, 2008.
- ⁴⁷ The Greens. October 14, 2008. *Greens’ stimulus package to create 160,000 jobs and power Australia’s green economy*. Available at: <http://greens.org.au/node/3355>
- ⁴⁸ Pollin, Robert, Heidi Garrett-Peltier, James Heintz, and Helen Scharber. 2008. *Green Recovery: A Program to Create Good Jobs and Start Building a Low-Carbon Economy*. Center for American Progress, Washington DC.
- ⁴⁹ http://www.developpement-durable.gouv.fr/article.php3?id_article=4390
- ⁵⁰ UNEP, ILO, IOE, ITUC. September 2008. *Green Jobs: Towards decent work in a sustainable, low-carbon world*. Available at: http://www.unep.org/labour_environment/PDFs/Greenjobs/UNEP-Green-Jobs-Report.pdf
- ⁵¹ United Nations Environment Program. 2008. *UNEP Background Paper on Green Jobs, United Nations Office at Nairobi*. Publishing Services Section (UNON) 2008
- ⁵² The International Monetary Fund reports (IMF, April 2008) that “although biofuels still account for only 1.5percent of the global liquid fuels supply, they accounted for almost half of the increase in consumption of major food crops in 2006-2007, mostly because of corn-based ethanol produced in the US”. So even though agrofuels based on agricultural crop production may give millions of jobs to developing countries, its effects (e.g. increased food prices, environmental degradation due to land use changes) seem to be harmful to a much larger amount of of people.
- ⁵³ Rutgers. October 11, 2008. *Fighting climate change: China’s contribution (part one)*. Available at: <http://www.csp.rutgers.edu/csp-posts/archives/35>
- ⁵⁴ Barau, Dipal. 2008. *Bringing Green Energy, Health, Income and Green Jobs to Bangladesh*. Presentation at the Preparatory Meeting, International Advisory Board to the International Climate Protection Initiative of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. Poznan, Poland, December 7, 2008.
- ⁵⁵ Ibid.
- ⁵⁶ UNDP. 2006. *Human Development Report Beyond scarcity: Power, poverty and the global water crisis*. 2006. Published for the United Nations Development Programme (UNDP)
- ⁵⁷ Recovery.gov. *Your Money at Work*. Available at: <http://www.recovery.gov/>

⁵⁸ World Business Council for Sustainable Development. January 6, 2009. *S. Korea Unveils 'Green New Deals' to Kick-Start Economy*. Available at: <http://www.wbcsd.org/plugins/DocSearch/details.asp?type=DocDet&ObjectId=MzI5Njc>.

⁵⁹ Bloomberg.Com. February 12, 2009. *Australia Senate Rejects A\$42billion Stimulus Plan*. Available at: <http://www.bloomberg.com/apps/news?pid=20601081&sid=avkguoqyxs5k&refer=australia>

⁶⁰ European Commission and German Federal Environment Ministry. 2008. *The Economics of Ecosystems and Biodiversity-An Interim Report*. EC and German Federal Environment Ministry, 2008.

⁶¹ Reuters. July 20, 2008. *Wetlands could unleash "carbon bomb"*. Available at: <http://www.reuters.com/article/newsOne/idUSN1745905120080720>

⁶² <http://www.ilo.org/public/english/employment/recon/eiip/about/lbt.htm>

⁶³ To the richest countries of the world natural capital only accounts for 2 percent of the wealth but to the poorest natural capital accounts for 26 percent of the wealth. Source: Where is the wealth of nations?)

⁶⁴ FAO. February 4, 2009. *Farming must change to feed the world - FAO expert urges more sustainable approach*. Available at: <http://www.fao.org/news/story/en/item/9962/icode/>

⁶⁵ IFOAM and FiBL. 2009. *The world of organic Agriculture. Statistics and Emerging Trends 2009*. International Federation of Organic Agriculture Movements (IFOAM), Bonn and Research

⁶⁶ http://www.rodaleinstitute.org/ob_31

⁶⁷ National Organic Agriculture Movement of Uganda 2008 and IFOAM and FiBL 2009. *The world of organic Agriculture. Statistics and Emerging Trends 2009*. International Federation of Organic Agriculture Movements (IFOAM), Bonn and Research

⁶⁸ Global Waste Management Market Assessment. 2007. *Global MSW Generation in 2007 estimated at two billion tons*. Key Note Publications Ltd , March 1, 2007

⁶⁹ United States Environmental Protection Agency. January 2002. *Recycling is working in the United States*. Available at <http://www.p2pays.org/ref/43/42126.pdf>

⁷⁰ Sustainable Business.com. February/March 2008. *The State of the Recycling Industry*. Available at: <http://www.sustainablebusiness.com/index.cfm/go/progressiveinvestor.sample/id/76/sectionid/325>

⁷¹ UNEP, ILO, IOE, ITUC. September 2008. *Green Jobs: Towards decent work in a sustainable, low-carbon world*.

⁷² World Bank. 2009. *Zoellick Calls for 'Vulnerability Fund' Ahead of Davos Forum*. Available at: <http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0,,contentMDK:22049582~pagePK:64257043~piPK:437376~theSitePK:4607,00.html>

⁷³ ILO (2009) The financial and economic crisis: A Decent Work response' ILO Governing Body 304th Session, Geneva, March 2009 (GB.304/ESP/2)