

# INFRA GUIDANCE NOTES



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## “Greening” The Infrastructure Recovery and Assets (INFRA) Platform<sup>i</sup>

*This Guidance Note is a product of the Sustainable Development Network and is aimed at helping World Bank Task Team Leaders and other Bank specialists in the design and implementation of infrastructure investments, developed as part of the Infrastructure Recovery and Assets (INFRA) Platform. The INFRA Platform has been developed to bridge infrastructure financing, project preparation, and capacity gaps resulting from the global financial crisis. The Platform comprises a rapid diagnostic tool to identify at risk infrastructure projects, a concessional financing window to support the preparation and financing of projects, initiatives for parallel and donor financing, and a common reporting system. More information at [www.worldbank.org/infra](http://www.worldbank.org/infra)*

### Abstract

*“Greening” infrastructure potentially offers a convergence of delivering multiple objectives: promoting economic growth and development, enhancing long-term competitiveness, and poverty reduction along with environmental sustainability. This Guidance Note is aimed at providing a broad framework for the design and implementation of infrastructure investments, developed as part of the INFRA Platform, that helps increase resilience to climate variability and change, and provide infrastructure services through lower emission alternatives wherever possible.*

### OBJECTIVE

The primary objective of this note is to summarize the key elements of Greening approaches that could be incorporated under the interventions proposed as part of the INFRA platform. In this context, “Greening” is defined as identifying and supporting opportunities to improve natural resource management and increase resilience to climate variability and change, and provide infrastructure services through lower emission alternatives (with respect to harmful local pollutants and GHGs) wherever possible, while meeting the core objectives of re-vitalizing the economy and generating employment. This note also provides information on sources and mechanisms of additional and concessional

financing that can help in buying-down the cost of Greening efforts in the context of the World Bank’s future infrastructure development portfolio.

### WHY “GREEN” IN THE TIME OF CRISES?

Coming at the heels of the food and fuel crises, the financial crisis has quickly transformed into an economic crisis for World Bank client countries, with a disproportionate impact on the poor and vulnerable. It comes at a time when the World is also faced with the real and growing threat of climate change, which – based on current scientific evidence and climate projections – will lead to unavoidable impacts such as water scarcity, and increased frequency of extreme weather events. This has the

potential to further aggravate the economic impacts, particularly on the poor and vulnerable in developing countries given their lack of resources and capacity.

The timing of these crises has focused the attention of national governments and the global development community to seek complementarities between the respective paths to recovery and future resilience. This convergence is clearly illustrated in Table 1, which shows that the fiscal stimulus packages of a number of countries include a significant share of “Green” components, which are as high as 38% for China and 80% for South Korea (see Box 1). Clearly, there is acceptance that Greening

efforts in infrastructure have the prospect of leading economic recovery while positioning countries for longer-term sustainable development. There are also significant employment creation opportunities in the Green sectors as part of short-term stimulus package(s).

The infusion of new fiscal (stimulus) resources in response to the global economic crisis, coupled with availability of additional climate financing provides an opportunity for helping affected economies, as well as putting their infrastructure on a more environmentally sustainable path.

### Box 1: Examples of “Green” Components of Stimulus Packages

As part of its stimulus package, *China* plans to i) promote smaller cars and alternate energy vehicles, ii) expand rail networks, iii) develop flexible and sophisticated electricity grid to enable greater use of renewable energy, and iv) enhance water and waste water management.

*South Korea's* stimulus package includes i) a commitment to increase energy supply from renewable sources, ii) building energy efficiency measures, iii) allocation for promotion of fuel efficient vehicles, iv) expansion of rail network, bike paths, other public transport modes, and v) water and waste water management.

## THE WORLD BANK GROUP RESPONSE

The World Bank Group Infrastructure Framework for Recovery and Assets (INFRA) platform is a manifestation of the global response to the financial and economic crises. In addition to utilizing the Bank’s existing lending instruments, INFRA targets the employment of analytical and advisory services to support key infrastructure operations, including those that support the Green agenda. It will also support upstream diagnostic analysis and technical assistance during project implementation. The upstream diagnostics will be a necessary tool to identify potential Greening entry-points in lending operations, including parallel financing opportunities, as well as in scoping the technical assistance requirements.

It is expected that conventional Specific Investment Loans (SILs) and Development Policy Operations (DPOs) will form the two main lending instruments under the INFRA platform, with the bulk of the lending expected

through the latter. Given their inherent nature, SILs are good at delivering physical interventions (at design, construction, and operational stages of a project cycle) while DPOs are effective at facilitating institutional / policy / regulatory / fiscal reforms. Both these instruments offer significant opportunities to scale up the delivery of projects and actions that are “Green” in nature, and in convergence with the objectives of the World Bank’s Strategic Framework for Development and Climate Change (SFDCC).

## WHAT ACTIONS CAN BE TAKEN?

Given the long life time of infrastructure to be supported under the INFRA platform<sup>ii</sup>, “Greening” provides a strategic opportunity for the Bank to help facilitate longer-term sustainable development. New approaches to incorporate Greening opportunities in early stages of preparing interventions under the INFRA platform will help prevent client countries from locking-in to a high-carbon emissions path. In addition, investments in

infrastructure should also help incorporate climate resilience and adaptability to current and future climate variability and impacts that these client countries face. One possible approach that has also been recommended under the SFDCC is to undertake screening of all relevant interventions for opportunities to reduce GHG emissions, as well as for their vulnerability to extreme weather events. The preferred way to implement these actions under the INFRA platform is to prioritize and focus on interventions that are already “tried and tested” in past projects, before venturing into new methods and applications.

The following sections provide an illustrative list of possible “Greening” interventions that the World Bank has employed in various sectors and could possibly be scaled-up further under the INFRA platform. However, their applicability will depend on country-specific priorities and the enabling environment. Examples of World Bank interventions that include “Greening” components are presented in Box 2. Annex A provides a list of useful references and sources of additional information related to Greening infrastructure.

### **ENERGY**

Both renewable energy (RE) and energy efficiency (EE) offer tangible “Greening” solutions towards climate-friendly development while meeting the pressing needs for scaling up energy access for development.

A range of EE interventions, across the entire chain of modern energy production, distribution and consumption, and ensuing energy saving options that exist across different sectors, ranging from households to buildings to industries, offer multiple opportunities to simultaneously address the challenge of rising energy prices, dwindling energy security and rising local and global environmental impacts. These interventions can also have a significant impact in creating new jobs. While disparities in energy intensities between developing and industrialized countries, create short- to medium-term opportunities for providing significant gains through EE in both the supply- and demand-side and would continue to be scaled-up under the INFRA platform, these

“Green” investments face technical, institutional, policy and financial barriers, often accentuated by irrational tariffs in a large number of the client countries. Energy Efficiency measures in key sectors include, *inter alia*: buildings (better insulation, advanced windows, EE lighting, space conditioning, water heating and refrigeration technologies); industry (waste heat recovery, cogeneration, efficient drives); households (EE lighting, appliances, and improved cook stoves); Agriculture (efficient irrigation water pumping); Power supply and distribution (efficient generation plants and T&D loss reduction measures like efficient distribution transformers and smart metering systems).<sup>iii</sup>

In the short- to medium-term, encouraging investment and use of RE sources such as small hydro, wind, biomass, geothermal and solar, is considered a win-win solution from both economic and environmental standpoints. While the developing world has 1.6 billion people lacking access to modern energy services, mostly in Sub-Saharan Africa (SSA) and in South Asia, RE opportunities, which lend themselves more readily to decentralized, off-grid installations than do conventional sources of energy, become an important cost-effective choice for the provision of the infrastructure, particularly amongst populations that are sparse and dispersed across far-flung areas, away from urban centers. Renewable Energy solutions in many countries, such as many implemented by the World Bank<sup>iv</sup>, have already demonstrated their efficacy in terms of providing energy access to the poor as well as creating employment (e.g. Bangladesh, China, Vietnam, and now in Africa). Globally about 2.3 million jobs have been created in the RE sector in recent years<sup>v</sup>, even though these provide only 2 percent of global primary energy.

### **TRANSPORT**

Transport projects which are advanced in the project preparation cycle can have a strong impact on effective demand at low administration and implementation costs due to their generally large scale. Desirable reforms of transport infrastructure and policy reforms, such as increased expenditure on maintenance, are particularly labor-intensive and offer

protection against crisis-induced job losses<sup>vi</sup>. In addition to the benefits as “counter-cyclical” expenditures, they offer opportunities to make the transport sector more resilient against the consequences of climate change and to change the modal structure of transport to reduce its environmental footprint. At the same time the investments meet the increasing demand for passenger and freight transport services.

The most important short-run measures are the reform of infrastructure maintenance and retrofitting existing facilities. Maintenance for roads and rail tracks is underprovided in many countries, leading to high asset value losses which exceed the required maintenance costs. Compared to new investment the labor-intensity of maintenance is usually far higher. Climate change will even increase the demand for reliable and more frequent maintenance services to avoid an increase in asset losses and to respond to an increased wear and tear due to flooding and more frequent extreme weather events. Retrofitting existing infrastructure is a second dimension of scaling-up adaptation in transport. It will include the rehabilitation and up-grading of drainage systems to avoid traffic disruptions by changing precipitation patterns and the protection of bridges, canals and port facilities from extreme weather events and rising sea levels.

Limited and uncertain prospects of technology substitution to reduce the environmental costs of transport will require a change of the modal structure of transport to reduce environmental costs. In a long-term perspective, the increase in infrastructure investment can correct the modal structure which may have grown out of an imperfect regard for the external costs of transport. The neglect of environmental costs has privileged the road sector over rail and waterborne transport, and individual car use over mass transit in the urban context. The long, over half a century lifetime of infrastructure facilities and the fact that investment expenditures are sunk, determines the long-run pollution and carbon-intensities of transport. Changes in the modal structure of transport avoid a future “lock-in” of developing countries into transport systems with high environmental costs. As external costs of transport will increasingly be internalized (e.g. through carbon

tax, emission trading schemes etc.) and rapid urbanization is associated with drastic increases of road congestion, mass transit projects are of particular importance to provide affordable mobility at the urban level.

## **WATER AND WASTE**

Greening of INFRA in the field of water management can include actions in three main areas: watershed management and catchment protection, urban and rural water supply and sanitation, as well as multi-purpose infrastructure.

Local/rural employment guarantee schemes and/or community driven development schemes may support the Green agenda through the construction of small-scale ecological infrastructure such as reforestation, small water storage and retention, rainwater harvesting etc. In relation to existing projects and where appropriate such components may be added in the short-term.

Ongoing and planned urban water supply and wastewater investments can be extended with additional emphasis on rehabilitation of existing infrastructure and with a focus on energy efficiency in infrastructure and operations. Rehabilitation investments are often more labor intensive and will reduce water losses and energy consumption. A large number of options exist for improved energy efficiency including renewed pumping stations, better pressure zoning, leakage detection and repair, more energy efficient treatment plants etc. Digestion of wastewater solids combines improved infrastructure with addressing climate change as the digestion process generates methane that can be used for power generation or other energy uses, while reducing the volume of solids that need further management (landfill, composting, land application, etc). In a number of cases investments in wastewater have included wastewater re-use (recently Morocco). The issue of designing wastewater treatment plants to make the effluent and sludge appropriate for re-use is becoming more prominent with the increase in peri-urban agriculture.

For rural water supply, there are often options to improve drainage and rehabilitate irrigation infrastructure, which have negative economic costs to the economy as a whole. Principled, but practical interventions in making such systems financially sustainable when including this type of investment may yield very high returns.

Multi-purpose infrastructure, such as dams and reservoirs, from the smallest to the largest may provide win-win-win opportunities in terms of mitigation of climate change, adaptation to variability in run-off and increased resilience of local communities to deal with climate change, in addition to the economic benefits from power production and irrigation. However, environmental flows continue to be a challenge for these projects, and need to be studied.

Solid waste management projects including landfill investments that include collection of gas (and possibly electricity production) is another area that combines improved infrastructure with the climate change agendas. Improvement of landfill design and operations that maximizes the potential for landfill gas capture as well as provides other environmental and public health benefits is an outgrowth of such a program. Composting of the organic fraction of municipal waste and/or wastewater treatment plant sludge is another example of an action in the waste management field that can combine improved infrastructure with addressing climate change. There are many examples of successful inclusion of traditional human scavengers into such projects, thus providing better working conditions while preserving jobs.

In both the short- and the long-term an increased emphasis on a risk-based approach to project preparation will be essential to secure the viability of investments, and in the face of uncertainties induced by climate change. In some cases such an approach will require an additional investment now in order to reduce the risk of poor performance (or failure) later.

### ***URBAN DEVELOPMENT***

Cities have emerged as the engines of economic growth for most countries in the world, and hence are facing a disproportionate impact of

the financial crisis. With more than half of the world's population residing in cities, they are also responsible for almost three-quarters of energy consumption and related GHG emissions. In addition, many coastal cities are threatened by the impacts of climate change (e.g. sea-level rise). Urban poor are particularly vulnerable in this respect.

Most of the World's existing backlog on the Millennium Development Goals in cities is caused by poor urban environments. Immediate requirements for the urban poor are increased access to basic urban services: water, sanitation, safe neighborhoods. Longer term efforts for the urban poor involve moving people away from dangerous lands. Experience however shows that the first option is in-situ improvement.

The most important area for targeting within the urban sector is municipal management. Through a blend of enhanced staff capacity; improved data collection, management and communication; better integration of community groups; legal framework; and clear and credible inter-governmental relations, overall city management and service delivery improves. These improvements to service delivery, if well targeted, can benefit the poor most dramatically while also contributing to the Greening agenda.

For the long term development of cities, support can be provided to ensure integrated urban planning in coordination with investment in transport infrastructure which can have a lock-in impact on settlement patterns and hence determine the trajectory of future growth.

### **HOW TO ENABLE "GREENING" ACTIONS?**

In addition to financing the interventions, appropriate government policies and regulations, and fiscal measures, accompanied by dedicated institutions, will be indispensable to create an enabling environment for Greening infrastructure. These measures also create incentives to generate more private sector participation which could help leverage limited and targeted public sector funds. Experience from around the world, particularly the industrialized countries, indicates that broad range of financial incentives, aggressive subsidy reforms, and a spectrum of EE policies and RE

legislations, together with appropriate government and para-statal institutions that are effective in working with private players and domestic financial sector for implementing and enforcing the measures, can go a long way in Greening infrastructure. However, implementation always faces difficult political economy considerations, which need to be assessed on a case by case basis. Table 2 presents illustrative examples of such enabling measures

that can support Greening interventions in the medium- to long-term.

#### WHAT ARE THE ADDITIONAL FINANCING MECHANISMS AVAILABLE?

A number of dedicated resources are available to provide financial incentives for scaling up the Greening agenda within the World Bank Group infrastructure portfolio. These are shown in Table 3 below<sup>vii</sup>, and discussions are on-going to leverage additional financial resources.

**Table 3 - Main Instruments for Financing Climate Action<sup>viii</sup> (A=Adaptation; M=Mitigation)**

<b>Adaptation Fund</b>	<b>A</b>	Funding mainly comes from a 2% levy on Certified Emission Reductions (CERs) issuance. World Bank is trustee for Adaptation Fund.
<b>Carbon Funds and Facilities</b>	<b>M</b>	12 funds and facilities, of which 2 recent facilities focusing on post-2012: (i) the Forest Partnership Facility (FCPF), to pilot a market mechanism to provide incentives for reducing emissions from deforestation and land degradation; (ii) the Carbon Partnership Facility (CPF), to use carbon finance to catalyze a transformation toward low-carbon economic development.
<b>Climate Investment Funds</b>	<b>M</b>	The Clean Technology Fund: to finance scaled-up demonstration, deployment, and transfer of low-carbon technologies <sup>ix</sup> .
	<b>A</b>	The Strategic Climate Fund: (i) Pilot Program for Climate Resilience (PPCR) to help build climate resilience in core development; (ii) Forest Investment Program (FIP); (iii) Program to Scale up Renewable Energy (SREP) for Low Income Countries.
	<b>M</b>	
<b>Global Environment Facility (GEF)<sup>x</sup></b>	<b>M</b>	Largest source of grant-financed mitigation resources. Special Program on Adaptation (SPA) is a funding allocation within the GEF T to support pilot and demonstration projects that address local adaptation needs and generate global environmental benefits in all GEF focal areas.
<b>UNFCCC GEF-administered Special Funds</b>	<b>A</b>	Least Developed Countries Fund (LCDF): helps in the preparation and financing of implementation of national adaptation programs of action (NAPAs) to address the most urgent adaptation needs in the least developed countries.
		Special Climate Change Fund (SCCF): supports adaptation and mitigation projects in all developing countries, with an emphasis on adaptation.
<b>Global Facility for Disaster Reduction and Recovery</b>	<b>A</b>	Partnership within the UN International Strategy for Disaster Reduction (ISDR), focusing on building capacities to enhance disaster resilience and adaptive capacities in changing climate. In addition, there are specific instruments for climate risk management <sup>xi</sup>
<b>Other Trust Funds and Partnerships; Guarantees</b>	<b>M</b>	Grant financing for knowledge products, capacity building, upstream project work/pilots; Partial risk guarantees to support development / adoption / application of clean energy technologies, including those not fully commercialized in client countries.
	<b>A</b>	

#### EXPECTED OUTCOME(S) AND INDICATORS

Greening the INFRA platform will help deliver positive outcome of re-vitalizing the economy and spurring employment in World Bank client

countries, while addressing the drivers and impacts of climate change. In order to measure / track the outcome from a global environment perspective, following are some of the generic indicators proposed for interventions under the INFRA platform:

- Enhanced public spending on development measures that bring about climate benefits.
- Reduction in GHG emissions compared to without Greening scenario.
- Amount of leveraged additional private investments through different climate financing instruments and policies.
- Increased number of regulatory, institutional and policy frameworks introduced/strengthened for scaling up Green interventions in the energy sector.
- Enhanced investment in resilience to extreme weather events such as droughts and floods.
- Enhanced awareness and capacity of task teams and clients to access additional climate finance to deliver local and global benefits.

While all the indicators will not apply to each and every proposed intervention, they can be made more specific depending on the nature of intervention.

## CONCLUDING REMARKS

The economic crisis offers an opportunity to reinvigorate a transition across various sectors, towards a more climate-resilient and low-carbon economy. Greening infrastructure potentially offers a convergence of delivering multiple objectives: promoting economic growth and development, enhancing long-term competitiveness, and poverty reduction along with environmental sustainability. Greening of infrastructure should be considered as a good development practice and as a means for enhanced business opportunities. In communicating to clients about what options are available to further scale up the Bank's Greening agenda, it is important to identify the local opportunities and additional, positive co-benefits that can accrue from Greening, such as higher employment, reduced local pollution, and better quality of life.<sup>xii</sup>

### Box 2: Examples of World Bank Interventions that Include "Greening" Components

The names and identification numbers of relevant IBRD/IDA project interventions, some of which are blended with climate finance instruments, are provided below:

P115066: Efficient Lighting Program, Togo

P090119: Energy Efficiency Project, Argentina

P103238: Renewable Energy Development Project, Vietnam

P114012: Sustainable Transport and Air Quality, Mexico

P092509: Urban Transport Project, Ghana

P097974: Multi-sectoral Water and Electricity Infrastructure Project, Burundi

P104937: Solid Waste Sector DPL, Morocco

P 110849: Climate Change DPL, Mexico

P096481: Municipal Services Improvement, Macedonia

P095847: Second Water Sector Investment, Tunisia

P099224: Liaoning Third Medium Cities Infrastructure Project, China

P107612: National Water Supply and Sanitation Program, Moldova

P108078: Environmental Management Project, Maldives

P103539: Conservancy Adaptation Project, Guyana

## ANNEX A: REFERENCES AND USEFUL SOURCES FOR ADDITIONAL INFORMATION

A Climate for Recovery: the Color of Stimulus goes Green, Hong Kong and Shanghai Banking Corporation (HSBC), February 2009

A Green Global Economy Assessing US Economic Stimulus and the Prospects for International Coordination, Policy Brief, Petersen Institute for International Economics and World Resources Institute, February 2009

Adaptation Fund,  
<http://go.worldbank.org/94MCZJN740>

An Outline of the Case for a “Green” Stimulus, Policy Brief, Alex Bowen, Sam Fankhauser, Nicholas Stern, and Dimitri Zenghelis, Grantham Research Institute on Climate Change and Environment and Centre for Climate Change Economics and Policy, February 2009

Autoblog green  
<http://www.autobloggreen.com/>

Bringing Home the Green Recovery: A User’s Guide to the 2009 American Recovery and Reinvestment Act,  
<http://www.greenforall.org/resources/recoveryusersguide>

Carbon Finance,  
<http://www.carbonfinance.org>

Carbon Finance and Urban Waste,  
<http://go.worldbank.org/MIQIKRO3N0>  
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<http://go.worldbank.org/6GRFSZ8ZZ0>

Climate Investment Funds,  
[www.worldbank.org/cif](http://www.worldbank.org/cif)

Declaration on Green Growth, Adopted at the Council Meeting at Ministerial level on 25 June 2009, OECD

Eco Transit <http://www.ecotransit.org/>

Ecological Cities as Economic Cities,  
<http://www.worldbank.org/eco2>

Energy and Climate,  
<http://go.worldbank.org/7W3DZHKNF0>  
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<http://www.sustainable-transportation.com/>

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[http://www.iea.org/Textbase/subjectqueries/keyresult.asp?KEYWORD\\_ID=4121](http://www.iea.org/Textbase/subjectqueries/keyresult.asp?KEYWORD_ID=4121)

Non-motorized Transport: Confronting Poverty Through Affordable Mobility (Infra Note UT-4), Paul Guitink, Susanne Holste and Jerry Lebo, The World Bank, April 1994

Non-Motorized Transport in African Cities: Lessons from Experience in Kenya and Tanzania, Sub-Saharan Africa Transport Policy Program, SSATP Working Paper No. 80, The World Bank, September 2005

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[http://www.oecd.org/department/0,3355,en\\_2649\\_34363\\_1\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/department/0,3355,en_2649_34363_1_1_1_1_1,00.html)

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<http://www.pewclimate.org/technology/sector/transportation>

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Policy and Institutional Reforms to Support Climate Change: Adaptation and Mitigation in Development Programs, A Practical Guide, Muthukumara Mani, Anil Markandaya, Viju Ipe, The World Bank, 2008

Strategic Planning for Non-motorized Mobility (Infra Note OT-4), Paul Guitink, August 1996

Strategic Framework for Development and Climate Change, The World Bank  
<http://go.worldbank.org/PGEFG0GKW0>

Sustainable Prosperity: making markets work for the environment, Building a Green Economic Stimulus package for Canada  
[www.sustainableprosperity.ca](http://www.sustainableprosperity.ca)

Sustainable Urban Transport Project  
<http://www.sutp.org/>

The Eddington Transport Study  
<http://www.dft.gov.uk/about/strategy/transportstrategy/eddingtontstudy/>

The Green Rebound: Clean energy to become an important component of global recovery plans, Hong Kong and Shanghai Banking Corporation (HSBC), Climate Change Global Renewable Energy, January 2009

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<http://www.vcacarfueldata.org.uk/>

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Towards a global Green Recovery: Recommendations for Immediate G20 Actions, Report Submitted to the G20 London Meeting, Ottomar Edenhofer and Lord Nicholas Stern, April 2009

Urban Environment and Climate Change  
<http://go.worldbank.org/EGNG7C0SS0>

UNFCC GEF-administered Special Funds – Least Developed Countries Fund (LDCF) -  
<http://go.worldbank.org/0AMPS3UNG0>

UNFCC GEF-administered Special Funds – Special Climate Change Fund (SCCF) -  
<http://go.worldbank.org/03VKHCLY60>

Water and Climate,  
<http://www.waterandclimate.org/index.php?id=5thWorldWaterForumpublications810>  
<http://go.worldbank.org/9M1BQ7DZR0>

World Resources Institute EMBARQ: Center for Sustainable Transport  
<http://www.wri.org/project/embarq>

**Table 2 - Examples of Fiscal Stimulus Packages which Include “Green” Components (HSBC, 2009)**

Country	Fund USD bn	Period Years	Green Fund USDbn	% Green Fund	Low Carbon Power		Energy Efficiency (EE)			Water/Waste
					Renewable	CCS/Other	Building EE	Low Veh + C	Rail	
<b>Asia Pacific</b>										
Australia	26.7	2009-12	2.5	9.3%			2.48			
China	586.1	2009-10	221.3	37.8%				1.50	98.65	70.00
India	13.7	2009	0.0	0.0%						
Japan	485.9	2009 onwards	12.4	2.6%			12.43			
South Korea	38.1	2009-12	30.7	80.5%	1.80		6.19	1.80	7.01	13.89
Thailand	3.3	2009	0.0	0.0%						
<b>Sub-total Asia Pacific</b>	<b>1,153.8</b>	<b>0.0</b>	<b>266.9</b>	<b>23.1%</b>	<b>1.80</b>	<b>0.00</b>	<b>21.10</b>	<b>3.30</b>	<b>105.70</b>	<b>70.00</b>
<b>Europe</b>										
European Union	38.8*	2009-10	22.8	58.7%	0.65	12.49	2.85	1.94		4.85
Germany	104.8	2009-10	13.8	13.2%			10.39	0.69	2.75	
France	33.7	2009-10	7.1	21.2%	0.87		0.83		1.31	4.13
Italy	103.5	2009 onwards	1.3	1.3%					1.32	
Spain	14.2	2009	0.8	5.8%						0.83
United Kingdom	30.4	2009-12	2.1	6.9%			0.29	1.38	0.41	0.03
Other EU states	308.7	2009	6.2	2.0%	1.90		0.40	3.90		
<b>Sub-total Europe</b>	<b>325.5</b>	<b>0.0</b>	<b>54.2</b>	<b>16.7%</b>	<b>3.50</b>	<b>12.50</b>	<b>14.70</b>	<b>7.90</b>	<b>5.80</b>	<b>9.00</b>
<b>Americas</b>										
Canada	31.8	2009-13	2.6	8.3%		1.08	0.24		0.39	0.79
Chile	4.0	2009	0.0	0.0%						0.13
US EESA	185.0**	10 Years	18.2	9.8%	10.25	2.60	3.34	0.76	0.33	0.92
US ARRA	787.0	10 Years	94.1	12.0%	22.53	3.95	27.40	4.00	9.59	11.00
<b>Sub-total Americas</b>	<b>1,007.8</b>		<b>114.9</b>	<b>11.4%</b>	<b>32.80</b>	<b>7.60</b>	<b>31.00</b>	<b>4.80</b>	<b>10.30</b>	<b>12.70</b>
<b>Total</b>	<b>2,796.0</b>		<b>436.0</b>	<b>15.6%</b>	<b>38.00</b>	<b>20.10</b>	<b>66.80</b>	<b>15.90</b>	<b>121.80</b>	<b>91.70</b>

**Table 3 - Examples of “Greening” Interventions and supporting Enabling Measures<sup>xiii</sup>**

Interventions	Enabling Measures			
	Fiscal	Policy / Regulatory	Design / Physical Interventions	Technical Assistance
Low carbon or renewable energy production and use (e.g. wind, solar, hydro, biomass)	Production tax credit; Reform of tariff structure and promote feed-in tariffs; Provide capital investment grants to promote and commercialize RE generation; Financial incentives to support the development of advanced electricity storage technologies to store generated energy from RE sources i.e. wind and solar; Green Innovation R & D Fund targeted at universities and the private sector	Open access to energy produced from RE sources; Reform legal environment to promote use of RE; Develop institutional arrangements for operation of RE projects; Programs to enforce mandatory RE targets (portfolio standards) to raise the contribution of RE sources in the total electricity supply mix; Programs to develop codes and procedures for RE generation and distribution	Development and installation of software and systems to allow accurate load and demand forecasting to enable dynamic systems configuration	Communication to increase public awareness on benefits of clean energy; Programs to develop local expertise in the installation, operation, management, and maintenance of technically and economically proven RE systems; Support demonstration of RE technologies to encourage adoption; Increasing R & D of cleaner power generation and storage
Upgrading and extending electricity grids	Subsidies for incentivizing access to grids for energy generated from RE sources	Plans for grid upgrade and extension; Plans for smart metering and smart grids	Creating a smart national power grid with smart metering; Connecting RE sources to the grid; Combining with increasing energy storage	Communication to increase public awareness about demand-side measures; Programs to develop local expertise for operation and maintenance of upgraded grids; Support to R&D for energy storage
Electric home appliance	Upfront subsidies to manufacturers; Incentives to consumers for use; Subsidy schemes to provide financial incentives/discounts for retail purchase price of the energy	Codes and standards, energy labeling; Programs to enforce minimum EE requirements /standards for household appliances, office equipment, etc; Schemes to		Educational and awareness programs to encourage consumers to select EE appliances; Programs to develop the capacity of the relevant institutions and

Interventions	Enabling Measures			
	Fiscal	Policy / Regulatory	Design / Physical Interventions	Technical Assistance
	saving devices; Financial incentives penalties to enforce EE labels on equipments and appliances	enforce mandatory energy labeling		professional organizations; Increasing R & D for enhancing EE of home appliances
Building construction / retrofits	Low-interest loans to those who want to improve EE and resilience of buildings; Performance-based tax credit programs to encourage rapid adoption of energy efficient / Green building practices; Mass procurement for public buildings	Codes and regulations to include EE and resilience measures in building (e.g. minimum thermal resistance of walls, maximum window heat loss/gain, and minimum boiler efficiency); Mandatory EE audits of boilers and air conditioning units; Enforcement of Energy Performance Standards for buildings; Development of EE legislation for buildings; Voluntary EE ratings for buildings	Design / construction of new low-carbon and climate resilient buildings; Use of appropriate building materials (solar panels on roofs, heat recovery ventilation systems etc); Scope for building envelope and weatherization retrofits such as insulation, certain mechanical measures to heating and cooling systems, and replacement furnaces, boilers, and air-conditioners; Public buildings such as school, offices in vulnerable areas to serve as multipurpose shelters against adverse weather events	Training and capacity building to increase access / adoption of appropriate technologies and measures; Provide assistance and develop guidance material for households , architects and construction industry; Support programs to disseminate knowledge about strategies and available technologies of sustainable energy use for cooling and heating services
Roads repair/ construction	Tax breaks for using low carbon construction practices and technology; Easing import duties / taxes for low carbon technology and equipment	Revision of construction codes and manuals to ensure factor of safety for extreme weather events; Contract evaluation to provide weightage for appropriate practices and technology use	All roads in vulnerable areas to be multipurpose; Development and maintenance of road network, taking into account of need to reduce energy use	Training and capacity building to increase access / adoption of appropriate technologies and measures; Provide assistance and develop guidance manual for road construction industry;

Interventions	Enabling Measures			
	Fiscal	Policy / Regulatory	Design / Physical Interventions	Technical Assistance
				Support dissemination of knowledge about available appropriate technologies and practices
Promotion of modal shift to public transport	Grants to states and municipalities ; Preferential loans to public transport projects; Congestion pricing; Programs to provide discounts and other incentives for using public transportation system	Reduction of demand for private transport use; Promote the availability and use of carpools, vanpools, and public transportation; Enforcement of tolls on congested routes	Dedicated lanes for public transport and other high occupancy vehicles	Training and capacity building on various aspects of public transport reform and management; Communication campaign to improve the image of public transport
Facilities for non-motorized transport (NMT)	Provision of credit facilities for NMT purchase by the poor; Improving availability and prices of NMTs and spare parts through the removal of import restrictions and lowering of tariffs and taxes	Integration of NMT into the transport system and into infrastructure and land use Planning; Endorsing and facilitating the use of non-motorized transport modes; Development of road design and maintenance standards that recognize NMT as a traffic component; Development of traffic legislation that takes account of NMT as a transport mode	Provision of infrastructure such as bike lanes and pedestrian walkways; Improve NMT infrastructure in high dividend areas and eliminate safety "black spots"; Introduce traffic calming measures to reduce speed and increase safety for NMT users; Appropriate intersection designs to increase the efficient flow of NMTs	Communication campaigns for NMT promotion and educational campaigns for all road users; Support research and new initiatives to improve NMT performance; Training courses to sensitize policy makers, traffic planners and engineers to transportation systems that include all transport modes
Shift freight from road and air, to rail transport	Tax breaks for using rail; Frequent usage points / miles redeemable against future use	Increase private sector participation in rail services; Improved service standards, including tracking facility	Design and construction of the rail network system taking account climate effects and impacts (e.g use of locomotives with regenerative brakes)	Communications campaigns for promoting rail freight movement; Sensitize policy makers and planners about the climate benefits of rail
Low emission vehicles	Scheme to provide tax incentives based on emission-	Program to enforce energy labeling with fuel efficiency	Developing advanced batteries for fuel efficient cars; Retooling	Support R&D for lower emission vehicles, including

Interventions	Enabling Measures			
	Fiscal	Policy / Regulatory	Design / Physical Interventions	Technical Assistance
	tax deductions for cleaner vehicles; Programs to impose lower taxes on cleaner fuels ; Investment programs to improve fuel efficiency of vehicles	standards of all new cars and other vehicles; Set up clean-vehicle quotas for government vehicle procurement programs	vehicle manufacturing facilities	electric, and hybrids
Urban development	Incentivize integrated planning and mixed-use development	Promulgate guidelines and codes for Greening, energy efficient housing, and public procurement for utilities (such as street lights); Regulation for integrated urban planning and mixed use development; Target backlog of provision of basic services to low income neighborhoods – map and protect areas of high vulnerability	Provide adequate basic services infrastructure, such as water supply, waste management, transportation etc; Ensure that infrastructure facilitates densification and reduces the need to travel; Prepare neighborhood improvement programs – implement with service provisions, e.g. water, sanitation, street upgrading	Training and capacity building of city planners, managers, and relevant private stakeholders; Provision of building codes template, energy efficiency targets, city planning, vulnerability assessments
Water supply and sanitation	Reforms in pricing of municipal water used so as to reflect at least the full operational costs (inclusion of depreciation and the true economic value should be a long term goal); Reform in pricing of power for irrigation water supply and initial step in pricing of the water resource to reflect true economic value	Institutional arrangement for comprehensive upstream (e.g river basin) planning and management to help solve problems of water quality and quantity; Mechanisms to regulate water supply; Schemes to promote water conservation; Plans for short-term measures to adapt to water shortages	Invest in energy efficiency in water infrastructure (pumping stations, pressure zoning etc.); Invest in improved operations (bulk metering, pressure zoning, leakage detection and repair etc.) to reduce leakage and system inefficiency and reduce non-revenue water; Rehabilitation of drainage and irrigation infrastructure to reduce wastage of water and	Communications and public extension/education programs to encourage water conservation; Communications and public extension / education programs to encourage good sanitary practices; Support to develop institutional mechanisms for addressing water and climate issues

Interventions	Enabling Measures			
	Fiscal	Policy / Regulatory	Design / Physical Interventions	Technical Assistance
		Use of appropriate design standards (water use per capita, taking increased variability in run-off into account, re-use of wastewater etc.); Policies / Programs to improve access to improved water and sanitation services; Foster integrated water resource management for sustainable consumptive water use; Schemes to encourage adoption of water conservation practices at home such as water saving taps, flushing and showering appliances	energy; Construct rainwater harvesting and storage facilities and increase on-site storage capacities; Recycle water used in cooling and processing; Infrastructure for water transfer from alternative water sources if needed; Improve construction of water resources infrastructure (such as reservoirs, dams, canals, pipelines, pumping plants, storm drainages and flood control works etc) to adapt to increased variability in runoff or to a need for greater storage capacity	
Waste management	CDM as a source of finance for solid waste management projects; Incentives/Tax credits for electricity generation from landfill gases; Programs to provide tax exemption for electricity generated by waste incineration with energy recovery	Schemes to implement standards for land-fill performance to reduce methane emissions; Mechanisms to regulate wastewater discharge Design of policies (pollution tariffs, penalties etc.) to ensure that pollution does not pay; Enforcement of existing pollution regulation policies	Upgrade wastewater treatment facilities to improve effluent quality and sludge treatment where appropriate; Upgrade landfill infrastructure to extend their life (e.g. through segregation and compaction of waste); Investment in landfill gas collection (and electricity generation where appropriate)	Communications and public extension/education programs to encourage good waste management practices, such as reduction of waste, appropriate disposal, separation and recycling.

## ENDNOTES

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- <sup>i</sup> This Guidance Note is not intended to provide detailed operational guidance to technical staff; such information can be sourced from relevant sector teams.
- <sup>ii</sup> The INFRA platform will support investments in Energy, Transport, Urban and Water sectors. The overarching considerations for investment selection will be impact on the real economy in the near-term (i.e., within 12 months); and on employment in terms of labor intensity. It is anticipated that the order of priority will be projects/activities related operations and maintenance; ongoing public or public-private infrastructure projects facing liquidity problems; continued preparation of labor intensive investment projects close to implementation; and finally new labor-intensive infrastructure investments.
- <sup>iii</sup> Transport and Urban sector EE interventions also offer significant greening opportunities but are not elaborated in this section.
- <sup>iv</sup> World Bank has articulated an Africa Energy Access Plan that aims to provide new and credible way to provide access in Sub-Saharan Africa (SSA), an increase to 47% by 2030.
- <sup>v</sup> In comparison the oil and gas industry employed about 2million people in 1999.
- <sup>vi</sup> A study by Sub-Saharan Africa Transport Policy Program (SSATP) found that a loss of \$ 45 bn in road assets for all of SSA between 1970 - 1989 could have been avoided by increasing maintenance by \$ 12 bn
- <sup>vii</sup> In addition, World Bank Group is deploying efforts to increase resources mobilization, maximize leverage and impact of existing resources and instruments on core development finance, for instance through: (i) Green Bonds, to raise funds on capital markets for climate-friendly initiatives; (ii) exploit synergies between funding mechanisms (e.g. improving energy efficiency of building chillers - a major source of power demand in some developing countries - and accelerating phasing out of ozone depleting substances, building on synergies between Montreal Protocol Fund, Carbon Finance and GEF support); (iii) maximize leverage of available resources through innovative combination of instruments (e.g. combination with risk-management tools, such as Carbon Delivery Guarantee (IFC), Carbon Insurance Product (MIGA) or other in-house Guarantees, or with frontloading mechanism of future carbon finance revenues).
- <sup>viii</sup> Some instruments are Bank executed (e.g. TFs and partnerships) and others Recipient executed (e.g. Adaptation Fund and GEF)
- <sup>ix</sup> Investment plans endorsed for three countries: Egypt, Mexico and Turkey.
- <sup>x</sup> In addition, resources from the Special Climate Change Fund (a GEF-administered UNFCCC Special Fund) are available for technology transfer. With respect to WB engagement, cumulative GEF resources committed to mitigation projects reached US\$ 1.64 billion at mid-FY08, with a leverage (on IBRD/IDA resources) of roughly 2.2.
- <sup>xi</sup> The WBG has begun offering a complementary suite of products and services to assist countries develop catastrophe risk financing strategies, increase penetration of insurance and access reinsurance markets. Examples include assistance to develop innovative agriculture index-based insurance programs in several low- and middle-income countries (e.g., Mongolia, India, etc.); catastrophe risk deferred drawdown option (CAT-DDO), or contingent loan providing immediate liquidity during an emergency, while other forms of assistance are being mobilized; assistance to 16 Caribbean countries in establishing the Caribbean Catastrophe Risk Insurance Facility (CCRIF), offering parametric insurance against major hurricanes and earthquakes; insurance-linked securities, to transfer catastrophe risk to capital markets.
- <sup>xii</sup> It is important to be aware of the sensitivities of different client countries related to climate change negotiations.
- <sup>xiii</sup> For a more exhaustive treatment of this subject refer to Policy and Institutional Reforms to Support Climate Change: Adaptation and Mitigation in Development Programs, A Practical Guide, (Muthukumara Mani, Anil Markandaya, Viju Ipe)The World Bank, 2008.