

# GREEN economy

Green Economy Report: A Preview



UNEP



# FOREWORD



Our current economic models are unlikely to allow us to achieve the multiple goals the international community has set, including Agenda 21 at the Rio Earth Summit and the Millennium Development Goals set out at the World Summit on Sustainable Development. Nearly twenty years after Rio, we have come to realize that a more sophisticated economic lens and a more evolved economic model are needed if we are collectively to thrive over the coming years and decades.

The Green Economy Initiative – launched by UNEP in 2008, at the height of the global financial and economic crises – has served to inform governments of two unique opportunities. First, that a significant slice of the multi-trillion-dollar stimulus packages could, if targeted at environmental investments, be deployed to revive the global economy, save and create employment, while also assisting in addressing emerging environmental challenges. Second, that such investments coupled with domestic policy reforms in some key areas and the development of international policy and market infrastructure, could set the stage for a transition to a truly “Green Economy”: one which achieves increasing wealth, provides decent employment, successfully tackles inequities and persistent poverty, and reduces ecological scarcities and climate risks.

The Global Green New Deal report, released in February 2009, recommended that one per cent of global GDP, or somewhere under a third of the global stimulus packages, might assist in this transition. Large investments have, in fact, been earmarked in many countries around the world. Relevant bodies and forums, from the G20 to the OECD ministerial meetings, have also underlined green growth and the green economy as an important new direction. The UN Secretary-General and the UN system as a whole have also lent their wholehearted support.

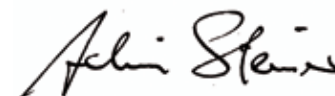
The Green Economy Initiative has gained traction across capital cities, many of which are now requesting support on how best to tailor a green economic transition to their often differing developmental, social and environmental

departure points and circumstances. Requests cover many of the economic sectors analyzed in our forthcoming “Green Economy Report”. This brochure offers, in a sense, a first preview of the Report and focuses on three sectors, namely fisheries, transport and water. I am pleased to present this document as a contribution to the preparatory process of the UN Conference on Sustainable Development (Rio+20), given that one of the themes to be addressed in 2012 will, indeed, be a green economy in the context of sustainable development and poverty eradication.

The Green Economy has rapidly evolved from the theoretical and global, to the national and practical. Its implementation depends in large part in a fresh framing of choices in terms of development so they capture the full suite of challenges and opportunities. This lens, in turn, can assist decision makers, such as ministers of environment, transport, planning, finance and indeed a head of state to make more informed decisions. It can also provide the business community with a new vehicle to motivate green investments.

It is time to catalyze and embed the Green Economy transition across the globe from the international level down to the local community. The Green Economy can – if brought into the cabinet rooms, board rooms and town hall chambers – offer a viable alternative to the unsustainable status quo. As we prepare for Rio+20, we can embark on making it more operational and set about the kind of fine-tuning that will ensure it stays the course and help address the needs of sustainable development and poverty eradication over the coming decades.


**Achim Steiner**  
**UNEP Executive Director**  
**United Nations Under-Secretary General**





A **Green Economy** is characterized by substantially increased investments in economic sectors that build on and enhance the earth's natural capital or reduce ecological scarcities and environmental risks. These sectors include renewable energy, low-carbon transport, energy-efficient buildings, clean technologies, improved waste management, improved freshwater provision, sustainable agriculture and forest management, and sustainable fisheries. These investments are driven by or supported by national policy reforms and the development of international policy and market infrastructure.

These investments and policy reforms provide the mechanisms and the financing for the reconfiguration of businesses, infrastructure and institutions, and the adoption of sustainable consumption and production processes. Such reconfiguration leads to a higher share of green sectors contributing to GDP, greener jobs, lower energy and resource-intensive production, lower waste and pollution, and significantly lower greenhouse gas emissions. It can also assist in the reduction of persistent poverty through targeted wealth transfers, new employment, as well as improvements in access and the flow of ecosystem goods and services to the bottom of the economic pyramid.



**A Green Economy can be defined as an economy that results in improved human well-being and reduced inequalities over the long term, while not exposing future generations to significant environmental risks and ecological scarcities.**





The UNEP-led **Green Economy Initiative**, launched in late 2008, consists of several components whose collective overall objective is to provide a macroeconomic analysis of policy reforms and investments in green sectors and in greening brown sectors. The Initiative will assess how sectors – such as renewable energies, clean and efficient technologies, water services and sustainable agriculture – can contribute to economic growth, creation of decent jobs, social equity and poverty reduction, while addressing climate risk and other ecological challenges.

Within UNEP, the Green Economy Initiative includes three sets of activities:

1. Producing a Green Economy Report and related research materials, which will analyse the macroeconomic, sustainability and poverty reduction implications of green investment in a range of sectors from renewable energy to sustainable agriculture, and providing guidance on policies that can catalyse increased investment in these sectors
2. Providing advisory services on ways to move towards a green economy in specific countries
3. Engaging a wide range of research, non-governmental organizations, business and UN partners in implementing the Green Economy Initiative

Beyond UNEP, the Green Economy Initiative is one of the nine UN-wide Joint Crisis Initiatives, launched by the UN System's Chief Executives Board in early 2009. In this context, the Initiative includes a wide range of research activities and capacity-building events from over 20 UN agencies, including the Bretton Woods Institutions, as well as an Issue Management Group on Green Economy, launched in Washington, DC in March of 2010.



**The Green Economy Initiative is pro-growth, pro-jobs and pro-poor. It seeks enhanced economic growth, income opportunities and social inclusion.**



The **Green Economy Report**, to be published in late 2010, uses economic analysis and modelling approaches to demonstrate that greening the economy across a range of sectors can drive economic recovery and growth and lead to future prosperity and job creation, while at the same time addressing social inequalities and environmental challenges.

The Report explains the core principles and concepts underlying a green economy and makes the case for the more sustainable use of natural, human and economic capital. The Report also examines the actions governments can take to facilitate the transition to a Green Economy. The scope of these enabling conditions is wider than financial support for investments, and covers the key policy tools and supporting infrastructure that can influence investment and consumption decisions.

The Report addresses some of the fundamental questions regarding the reallocation of pools of capital, predominantly from private sources, required to achieve a green economy globally. It explores the extent to which these pools of capital will have to be “greened” in the coming decades to serve the (upfront) capital needs in order to shift the economy into low-carbon and resource efficient sectors. Recognizing the instability of the global financial system, the Report highlights the need for adequate international and local policy and regulatory frameworks and effective measures in order to reduce external costs of portfolio holdings.

World-renowned experts and institutions from both developed and developing countries are working with a UNEP team led by Pavan Sukhdev, a former senior banker from Deutsche Bank, to develop the Report. The Report targets decision-makers, seeks to influence business leaders, and explain in simple terms the need for increased environmental investments to promote sustainable economic growth, generate employment, reduce poverty and increase quality of life.



## The Green Economy Report focuses on the following 11 sectors:

**1. Agriculture** is the largest contributor to GDP in many developing countries and employs an estimated 1.3 billion workers globally. Sustainable agriculture and food system practices will increase the number of attractive, safe and knowledge-intensive jobs in farming operations, non-farm (pre- and post-harvest) supply chains and market access infrastructures.

**2. Buildings** are responsible for over 40% of the world's total primary energy consumption. Retrofitting existing buildings has huge market potential and employment opportunities in developed countries. New green buildings can help developing countries meet additional demand for residential and commercial buildings while reducing energy consumption at low incremental investment cost.

**3. Cities** are where more than half of today's world population lives. Well-designed cities have great potential to combine resource efficiency with economic and social opportunity through proximity of urban functions, modal shifts in transportation, and increased efficiency in provision of infrastructure, utilities and energy.

**4. Energy** renewables supply nearly 15% of the world's primary energy demand, a share that needs to double by 2050 in a Green Economy scenario. Renewable energy investments can play a substantial role in meeting the Millennium Development Goals while adding significant co-benefits such as improved public health, energy security and economic activity.

**5. Fisheries\*** currently deliver annual profits to fishing enterprises worldwide of about \$8 billion, and directly and indirectly support 170 million jobs and \$35 billion in fishing household income a year. The sector, however, is underperforming. Rebuilding depleted stocks and putting in place effective management could increase marine fisheries catch from about 80 million tonnes to an estimated 112 million tonnes a year. This gives a total catch value or gross revenue of about \$119 billion annually.

**6. Forests** are being cleared or degraded at a rapid rate because of over-harvesting and pressure from other land uses, including agriculture and cattle. Action at international and national levels to negotiate a REDD+ regime and develop forest carbon projects open up the prospect of new types of forest-related employment, livelihoods and revenues; where local communities can be guardians of forests and forest carbon/ecosystem services.

**7. Manufacturing** consumes one-third of the global energy supply, emits a quarter of the total world greenhouse gas emissions, and represents a significant part of primary resource extraction. This chapter explores potential gains from investing in improved resource efficiency across a range of key industrial sectors.

**8. Tourism** is assessed in partnership with the World Tourism Organization (UNWTO). This chapter focuses on how investments in sustainable tourism solutions can contribute to the sustainable development of the sector and the transformation to the Green Economy at the national and global level.

**9. Transport\*** costs, which can add up to nearly or over 10% of a country's GDP, are likely to grow further under the current trends of ever-increasing motorization. Investment in green transport could support cities by reducing congestion, air pollution and other costs through the creation of green jobs, particularly through the development of public transport infrastructure and operations, and by alleviating poverty through increased affordability of transport and improving accessibility to markets and other essential facilities.

**10. Waste** generates economic, social, and health-related costs and liabilities around the world. Solid waste services consume up to 2% of GDP in developing countries and up to 50% of cities' administrative budgets. By turning waste into a resource and encouraging the reduction, reuse and recycling of waste, significant gains can be achieved in decoupling waste production from economic growth.

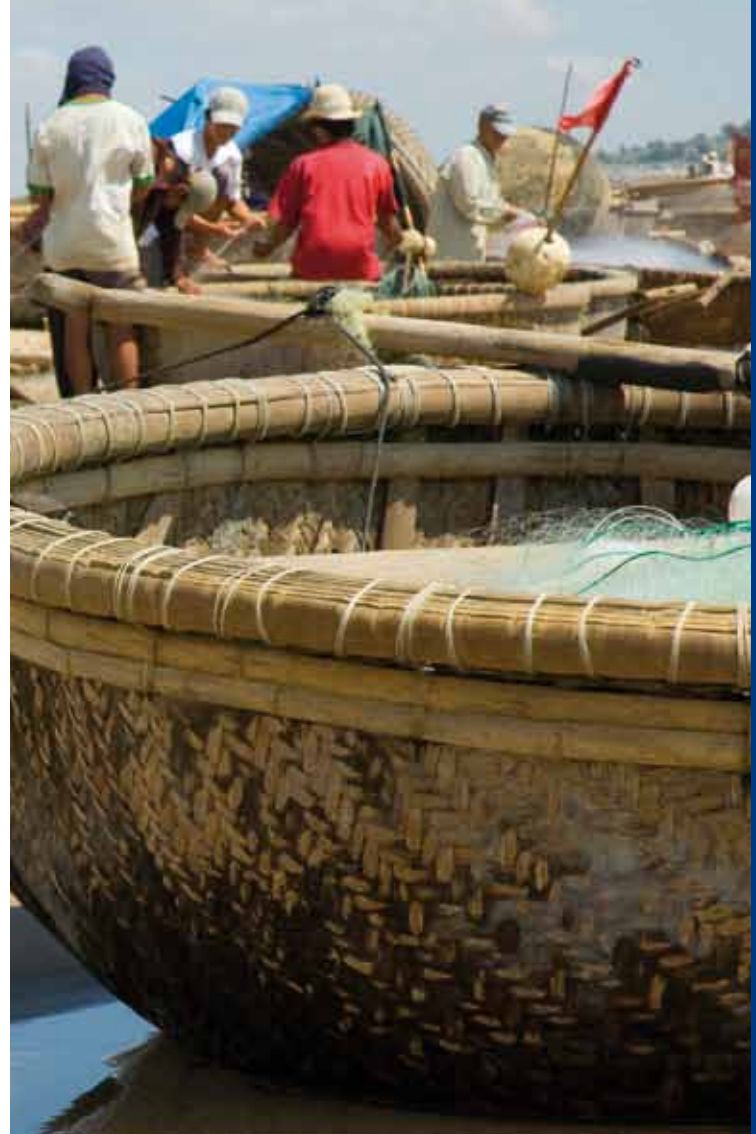
**11. Water\*** scarcity is becoming a global phenomenon that will challenge the future of nations. Current water allocation, pricing and investment policies and practices are undermining opportunities for economic and social progress. Demand for access to water is rapidly increasing. Many supplies are becoming less reliable. Policy regimes that facilitate rapid adaption to changing supply conditions and changing demands are essential.

This brochure, based on draft material prepared for the Report, provides a first preview of three of these sectors (indicated by an asterisk) and highlights investment and policy reform opportunities to transition to a Green Economy.

# FISHERIES



- Global marine fisheries provide animal protein intake and support food security to millions in many parts of the world.
- Fisheries deliver annual profits to fishing enterprises worldwide of about \$8 billion and generate \$35 billion in fishing household income a year. The sector supports, directly and indirectly, 170 million jobs.
- Global marine fisheries, however, are currently facing potential collapse, and are vastly underperforming in economic and social terms. The total value added from global fisheries was about \$17 billion in 2005, while the sector is subsidized to the tune of about \$27 billion.
- Greening the fisheries sector by rebuilding depleted stocks and putting in place effective management, including monitoring and enforcement, could increase marine fisheries catch from about 80 million tonnes to an estimated 112 million tonnes a year. This could generate a total catch value of about \$119 billion a year, against the current \$85 billion.



## Opportunities and Challenges

**Risks to the survival of marine fisheries.** Nearly 1 billion people worldwide, or about 20% of the global population, rely on fish as a primary source of animal protein.<sup>1</sup> Some 144 nations possess marine fisheries, which provide jobs for local and foreign workers. It is estimated that in 2006, there were 35 million people around the world who were directly involved either part-time or full-time in fisheries primary production.<sup>2</sup> This number expands to 170 million fisheries participants if post-fishing activities are included, and if extrapolated by an average of three dependants per fisher, it turns out that almost 8% of the world's population, or about 520 million people, are supported by the fishing industry.<sup>3</sup> There has been a steady increase in fisheries employment in most low-income and middle-income countries, while in most industrialized countries, the trend has been towards a decrease in the number of fishers in capture fisheries.

Marine fisheries around the world have been devastated over the years to the extent that the FAO believes that only about 25% of the commercial stocks, mostly of low-priced species, are currently underexploited. Studies estimated that by 2003, some 27% of the world's marine fisheries had already collapsed in the sense that their current catch level was less than 10% of the maximum registered catch.<sup>4</sup> Extrapolating these trends, these studies predict that virtually all of the world's commercial fisheries will have collapsed before 2050.



**The need for and benefits of rebuilding fisheries.** The impact of fisheries collapse can be devastating, as evidenced by the Newfoundland cod crash of 1992 in which 18,000 direct jobs were lost, fishing towns shrank in population by up to 20%, and the Canadian taxpayer spent billions of dollars to deal with the aftermath of the collapse.<sup>5</sup> However, data indicates that relatively marginal investments in maintaining the fish stocks can produce ample returns and avoid such systemic collapses.

Greening the fisheries sector is likely to increase annual profits to fishing enterprises worldwide from \$8 billion to about \$11 billion and raise the total global income of fishing households, including those engaged in artisanal fishing, from \$35 billion to some \$44 billion a year in a Green Economy scenario. A number of tools and management instruments are available that can be used to move the world's fisheries sector from its current underperforming state to a green sector that delivers higher benefits. There are a number of ways by which the cost of greening the fisheries sector can be covered, ranging from the global to the local, and the public to the private sector.

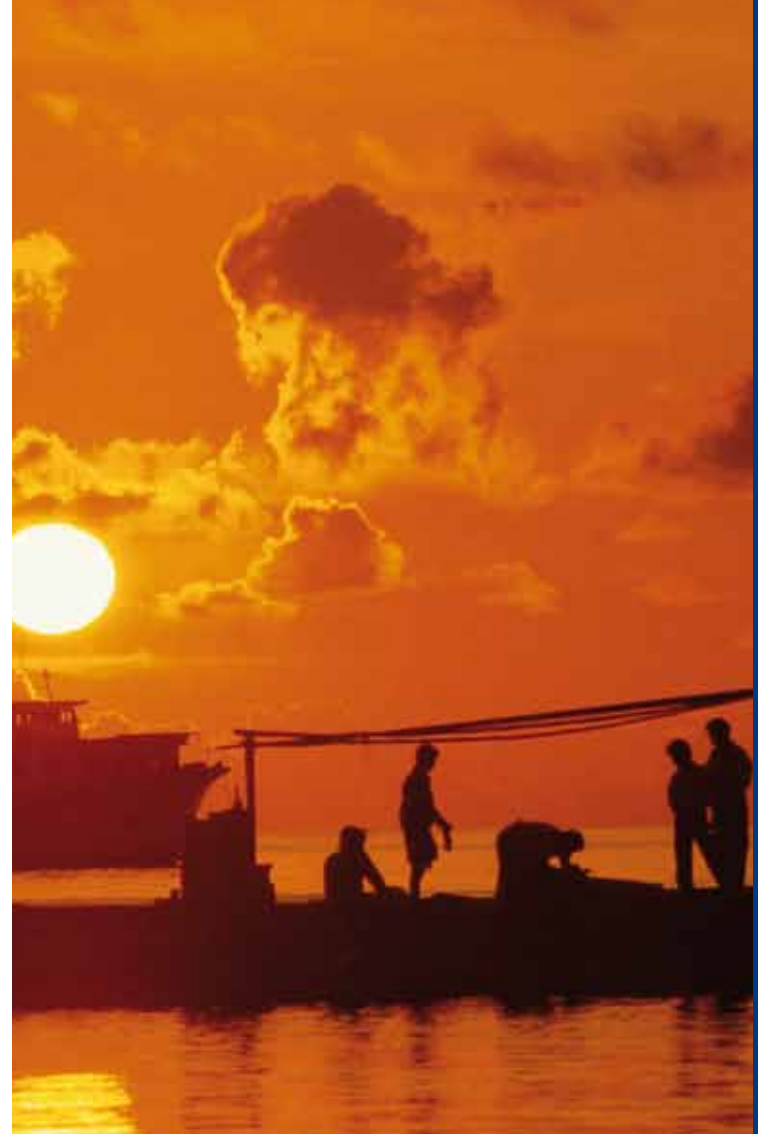
<sup>1</sup> FAO Fisheries and Aquaculture Working Paper, 2009.

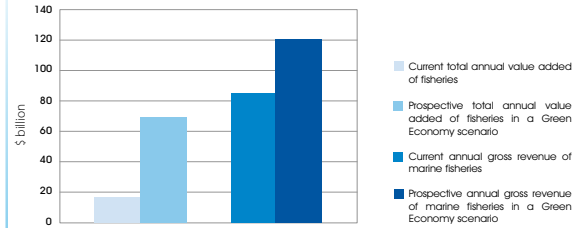
<sup>2</sup> FAO, 2009.

<sup>3</sup> FAO, 2009.

<sup>4</sup> Worm, B. et al. *Impacts of Biodiversity Loss on Ocean Ecosystem Services*, in Science 314:787–790, 2006.

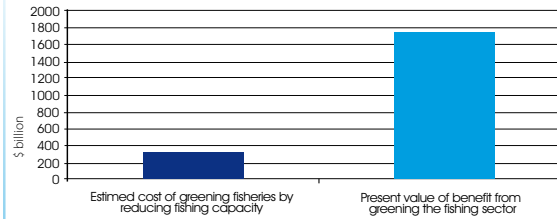
<sup>5</sup> Hirsch, Tim. *Cod's Warning from Newfoundland*. BBC News, 16 December 2002, located at [http://news.bbc.co.uk/2/hi/science\\_nature/2580733.stm](http://news.bbc.co.uk/2/hi/science_nature/2580733.stm).





Annual value added and gross revenue of marine fisheries today versus in a Green Economy scenario (\$bn)

Source: UNEP, Green Economy Report. (forthcoming)



Costs of greening fisheries versus present value of benefits from greening (\$bn)

Source: UNEP, Green Economy Report. (forthcoming)

Region	Fisheries management (\$bn)	Share of world management spending (%)	Landed value (\$bn)	Management cost intensity (%)
Africa	0.30	3.79	2.10	14.30
Asia	3.51	44.10	49.77	7.00
Europe	1.26	15.90	12.38	10.20
South and Central America	0.66	8.25	5.45	12.00
North America	1.59	20.00	9.21	17.20
Oceania	0.63	7.96	5.06	12.50
<b>Total</b>	<b>7.94</b>	<b>100.00</b>	<b>83.97</b>	<b>9.50</b>

Management cost and cost intensity by regions for the year 2003

Source: UNEP, Green Economy Report. (forthcoming)

# Enabling a Green Economy Transition

**1. Reforming fishery subsidies and other economic distortions.** Global fisheries subsidies were estimated at \$27 billion for the year 2003.<sup>6</sup> These subsidies have been classified into three categories labelled the “good”, the “bad” and the “ugly”<sup>7</sup> subsidies. “Good subsidies” enhance the conservation of fish stocks through time (e.g. subsidies that fund fisheries management or spending by governments to establish and operate marine protected areas).<sup>8</sup> “Bad” subsidies lead to overcapacity and overexploitation (e.g. fuel subsidies). “Ugly” subsidies can lead to either the conservation or overfishing of a given fish stock (e.g. buyback subsidies, which if not properly designed, can lead to overcapacity). Subsidies induce overharvesting of marine resources. Redirecting these amounts, by investing in the underlying fish resource, would generate significant returns.

World total (\$bn)	
Good	7.9
Bad	16.2
Ugly	3.0
Total	27.1

## Fisheries subsidies by category (2003)

Source: Sumaila et al. (forthcoming)

<sup>6</sup> Sumaila, U.R., Khan, Andrew J. Dyck, A., Watson, R., Munro, G., Peter Tydemers, and Pauly, D. *A bottom-up re-estimation of global fisheries subsidies* in *Journal of Bioeconomics* (forthcoming).

<sup>7</sup> Khan, A., Sumaila, U. R., Watson, R., Munro, G. and Pauly, D. *The Nature and Magnitude of Global non-Fuel Fisheries Subsidies*, in *Catching More Bait: a Bottom-up Reestimation of Global Fisheries Subsidies*. Fisheries Center, University of British Columbia, Fisheries Centre Research Report, 14(6), 2006.

<sup>8</sup> Cullis-Suzuki, S., and D. Pauly. *Preliminary Estimates of National and Global Costs of Marine Protected Areas*. Working Paper No. 7, Fisheries Centre Research Reports 16, 2008.





**2. Adjustment costs.** Vessel buyback programmes and fishers re-training and education programmes are two areas where fishing efforts can be directly reduced. It is estimated that there are currently 35 million fishers and more than 20 million boats actively engaged in fisheries. This study estimates that between 9-13 million of the current fishing vessels would need to be removed and alternative jobs and livelihoods found for between 15-22 million fishers. Using various assumptions of the average cost of vessel buybacks and average cost of relocating workers, an estimated total investment needed to reduce fishing capacity to maximum sustainable yield would be between \$220-320 billion worldwide.

Greening the fisheries sector will lead to an increase in net gains (added value) globally from about \$17 billion in 2005 to \$69 billion a year in 2050. This is a net increase of \$52 billion a year. Discounting this flow of benefit over time at 3% and 5% real discount rates gives a present value of benefit from greening the fishing sector of \$1.05 trillion and \$1.76 trillion, which is 3 to 5 times the high-end estimate of the cost of greening global fisheries.

**3. Building effective national, regional and international institutions.** The root cause of overexploitation of fish stocks is lack of control over fish catches or fishing activity, or both. One individual fisher competing with many others has an incentive to take as much fish as he can and as quickly as he can. The result of such uncoordinated efforts is depletion of fish stocks to the point of harming future fish catches, raising the cost of catching fish, and possibly wiping out fish stocks.

Even if a fish resource is privatized, there are conditions under which the private owner may find it optimal to overfish the stock, sometimes to extinction.<sup>9</sup> This happens when the stock in question grows very slowly compared to the rate of discount, so that the present value of future catches is low compared to the final gain from depleting the stock.

More effective institutions are needed at all levels, from the local and provincial/state level to the national, regional and international level. The 1982 United Nations Convention on the Law of the Sea (UNCLOS) was implemented to address problems associated with shared fish stocks, giving special rights and responsibilities over near-shore marine resources to coastal nations. However, this agreement, and the 1995 United Nations Fish Stock Agreement, which was meant to reinforce UNCLOS, has not resolved management problems of shared and transboundary fish stocks. It is suggested that in order to green fisheries that are shared or transboundary in nature, the body of international law concerning access rights must be re-examined with a focus on Regional Fisheries Management Organizations (RFMO) and the strengthening of their capacities to oversee and enforce the use of these fish stocks.

<sup>9</sup>Clark, C. *The Economics of Overexploitation*, in *Science* 181:630-634, 1973; Clark, C.W., G. Munro and U.R. Sumaila *Limits to the privatization of fishery resources* in *Land Economics*, 86(2), 209-218, 2010.





**4. Strengthening regulatory reform and fisheries management.** The basic requirement for a successful management of a fish stock is limiting the rate of exploitation to some sensible level. This necessitates a mechanism to set such a target level, and a mechanism to monitor and to enforce it. As to the specific means by which the fisheries administration achieves its goals, these must be decided on a pragmatic basis. A limit on the total catch is perhaps the most obvious instrument to use, but there are circumstances where it might not be adequate. Empirical evidence has showed that limiting fish catches alone achieves very limited objectives in the fisheries. It may, and it often has, succeeded in maintaining the fish stocks at healthy levels, while leaving the industry in shambles economically, with short fishing seasons, inferior products, low economic return, and even threats to life and limb through undue risk-taking encouraged by narrow time opportunities to catch fish. The way to deal with this is to allocate the total fish quota among the vessels or fishing communities in the industry and make the quota allocations transferable, where feasible.<sup>10</sup>

The Green Economy Report provides a summary of a comprehensive estimate of the costs of fisheries management for 148 maritime countries in the world. Regional estimates of both the cost of fisheries management and the cost intensity – defined as the ratio of management cost to catch value – indicate that the cost of fisheries management is far from being trivial. The global cost is about \$7.95 billion a year, or about 9.5% of the global annual value of marine fisheries catch. These costs, however, can be largely offset by the increased annual returns from sustainable management.

<sup>10</sup> Hannesson, R. *Some thoughts on Institutions, Planning, Policy and Regulatory Reform (and Management of the Transition to Sustainable or Green Economy Fisheries)*. Technical Appendix to the Fisheries Chapter, Green Economy Report (in press).

# TRANSPORT



- Transport is central to social and economic activity, yet current patterns of transport activity – based primarily on private motorized vehicles – generate acute social, environmental and economic costs and externalities.
- Current modes of transport consume more than half of global liquid fossil fuels; emit nearly a quarter of the world's energy related to CO<sub>2</sub>; generate more than 80% of developing cities' local air pollutants; result in more than 1.27 million fatal traffic accidents, mostly in developing countries<sup>11</sup>; and produce chronic traffic congestion resulting in time and productivity losses.

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<sup>11</sup>World Health Organization, *Global status report on road safety: time for action*, 2009.

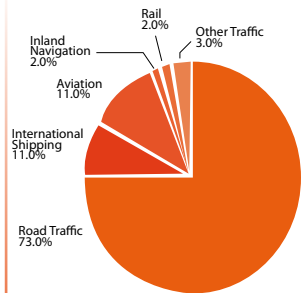


- The environmental, social and economic costs related to transport, which can add up to nearly or over 10% of a country's GDP, are likely to grow further as the global vehicle fleet is set to increase from around 800 million today to 2 to 3 billion by 2050. Almost all of this growth will take place in developing and transitional countries.
- For maritime transport, developments in world trade are increasing both the volume and distance of goods being shipped at a pace that exceeds growth in world GDP. The International Maritime Organization (IMO) predicts that by 2050, in the absence of policies, emissions from ships may grow by 150% to 250%, compared to emissions in 2007.
- Despite a temporary slowdown in demand due to the economic recession, the fundamental growth in the aviation sector remains strong. Aviation emissions are projected to increase exponentially in the next few decades, fuelled by income growth and reductions in the price of air travel.

**A fundamental change in investment patterns is needed, based on the principles of avoiding or reducing trips through integration of land use and transportation planning; shifting to more environmentally friendly modes, such as public transport and non-motorized transport; and promoting cleaner and more efficient vehicles.**

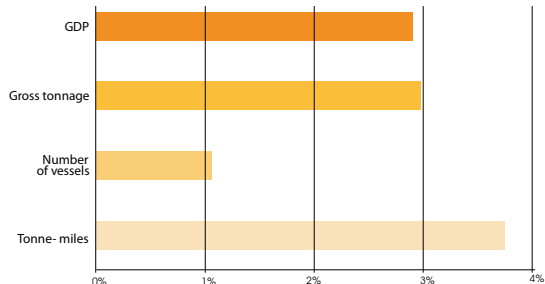
- Investment in green transport can take the form of infrastructure to support green transport modes, such as public and non-motorized transport, manufacturing and operation of cleaner vehicles/modes, alternative fuels, and telecommunication technology to substitute physical travel or enact green transport.
- Investment in transport can facilitate green growth by supporting countries with less congestion, air pollution and other costs; create green jobs; alleviate poverty by increasing affordability of transport and improving accessibility to markets and other essential facilities.
- In the aftermath of the recession triggered by the financial crisis of 2008-09, various governments have formulated stimulus packages to aid recovery. Transport is one of the major recipients of this extra spending, amounting to roughly 12% of the \$3.19 trillion spent by all surveyed governments.<sup>12</sup>
- In terms of supporting the transition to a green transport system, the spending patterns from the stimulus packages show a mixed message. Rail and public transport represent 45% of the total, low-carbon vehicles 5%, roads 33% and airports 14%. If the first two categories are considered "green" spending, they make up 50% of the stimulus money. Funding for non-motorized transport (sidewalks, bikeways) is explicitly mentioned in the stimulus packages of the Republic of Korea and Norway.

<sup>12</sup> EMBARQ, 2009, based on HSBC, 2009 and UNEP, 2009.



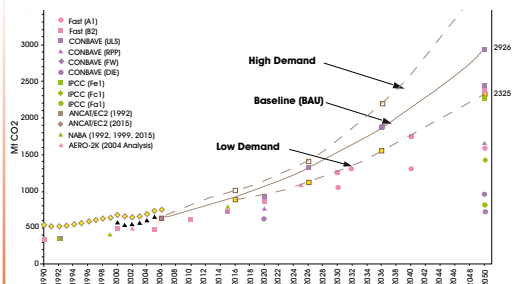
### Transport CO<sub>2</sub> emissions by subsector

Source: ITF/IEA, 2005



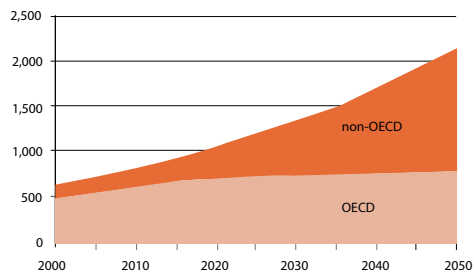
### Strong growth in shipping

Source: DfT, 2009



### Projections in aviation emissions

Source: OECD/IEA 2008



### Predicted growth of the global Light Duty vehicle fleet

Source: IEA, 2008



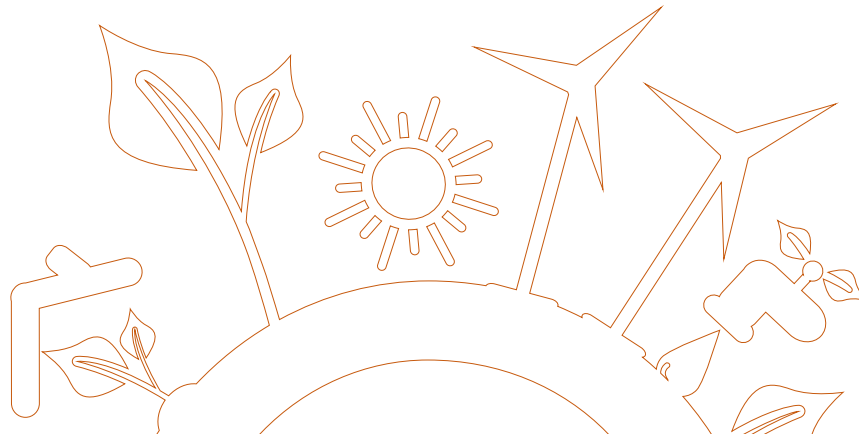
## Opportunities and Challenges

The challenges for the transport sector in becoming “green” include the following trends:

- Overall demand for transport activity (both passenger and freight) is growing rapidly and is predicted to roughly double between 2005 and 2050 (IEA, 2009)
- Transport activity is increasingly skewed towards motorized transport (e.g. private cars for passenger transport and lorries/trucks for freight)
- The global vehicle fleet is set to multiply three or four-fold in the next few decades, with almost all of this growth set to occur in developing countries
- Technological improvements (e.g. efficiency of new vehicles, alternative fuel/ power sources) have not been rapid enough to offset the greenhouse gas emissions of the growing global vehicle fleet.

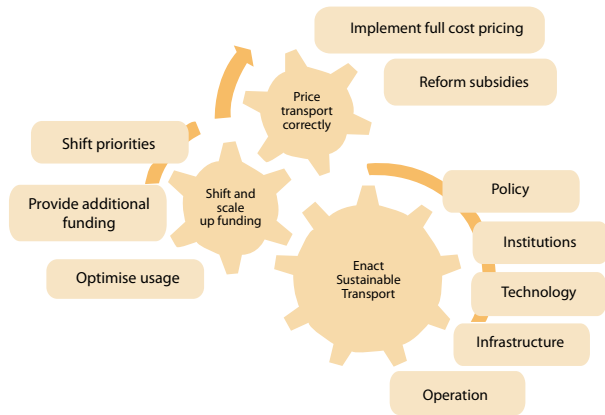
These trends translate directly into (external) costs for the environment, society and economy as:

- Energy consumption and greenhouse gas emissions
- Congestion (and associated losses in productivity of urban areas)
- Resource depletion and loss of rural landscapes
- Degradation of human health (through air pollution, noise, vibration, etc)
- Reduction in human security (through traffic accidents)
- Reduction of accessibility and severance of communities
- Loss of biodiversity



The greening of the transport sector calls for a paradigm shift in the way the transport sector is set to develop in the coming decades. This is particularly important for developing countries whose patterns of transport will be shaped by the investment and planning decisions made today. In essence, investing in green transport allows such countries to “leapfrog” towards a sustainable path.

Investment in green transport could support countries by reducing congestion, air pollution and other costs by creating green jobs, particularly through the development of public transport infrastructure and operations, cleaner and more efficient vehicles, and by alleviating poverty through increased affordability of transport and improving accessibility to markets and other essential facilities.



### Interlocking pricing and financing

Source: Dalkmann, 2009



## Enabling Conditions

Key enabling conditions for cleaner and more efficient transport depend on policy, financing, trade, technology and institutions.

- Policies, including land use planning to promote compact or mass transit corridor-based cities, regulation of fuel and vehicle standards, and the provision of information to promote behavioural change
- A shift in financing priorities towards public/non-motorized transport, coupled with strong economic incentives (via taxes, charges and subsidy reform) to promote behavioural change and ensure cleaner modes are commercially feasible
- Development and application of cleaner green transport technology
- Setting up and building capacity of institutions to allow continued implementation of the Avoid-Shift-Clean strategy

### The Avoid-Shift-Clean Strategy

Principles	Developed countries	Developing countries
<b>Avoid</b>	Emphasis on reduction of Vehicle kilometre (VKM) through Transport Demand Management (TDM), land use planning, localized production and shorter supply chains	Emphasis on avoiding unnecessary generation of VKM through land-use and transport planning
<b>Shift</b>	Shift from private vehicles to Non-Motorized Transport (NMT) and Public Transport (PT) and aviation to rail/PT; transfer of freight from road to rail, integrate more closely with maritime	Enable conditions for the lowest-emitting modes (both freight and passenger); prevent shift from NMT and PT to private vehicles
<b>Clean</b>	Clean up existing vehicles, encourage down scaling vehicle engine size. Electrification of rail (for both freight and passengers)	Ensure future vehicles/fuels are cleaner, encouraging small efficient cars; design innovations for traditional NMT such as cycle rickshaws



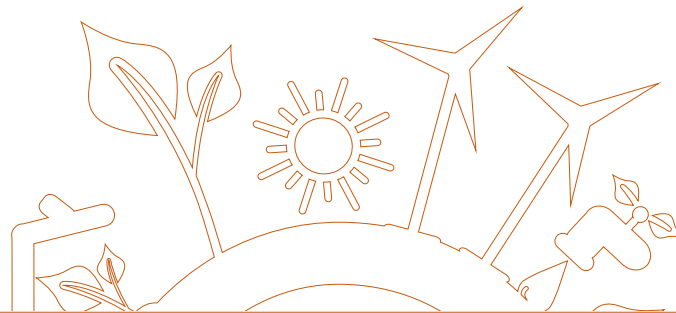
## Case Studies

### Jawahar Lal Nehru Urban Renewal Mission

In India, the Jawahar Lal Nehru Urban Renewal Mission, one of the largest urban infrastructure projects, allows cities to fund the buying of buses for public transport services. The investments not only bring in more public transport modes but also cover operational improvements like routes, ticketing facilities, bus shelters, station improvements, safety and security enhancement, and vehicle comfort improvement.

### Share the Road

The UNEP Transport Unit, supported by FIA, ITDP and iRAP,<sup>13</sup> has a programme called Share the Road, which supports a paradigm shift towards roads that incorporate a variety of modes of transport such as walking, cycling, public transport and private motor vehicles. The programme advocates a minimum 10% allocation of road investments by multilateral and bilateral donors, as well as in national government budgets for safety, inclusive of Non-Motorized Transport (NMT) infrastructure. It aims to bring together multiple groups and development sectors with a view to making safe, low-carbon and accessible mobility a reality for all users. The initiative is a good example of how investments in transport could be directed towards green transport.



<sup>13</sup> Fédération Internationale de l'Automobile (FIA); Institute for Transportation and Development Policy (ITDP); International Road Assessment Programme (iRAP)

# WATER



- Investment in the natural and physical infrastructure necessary to manage water and keep it clean is inextricably linked to prospects for economic development. Access to clean water and adequate sanitation is a basic human right and is critical to the alleviation of poverty.
- Currently, many water resources are managed inefficiently. In many regions, baseline projections indicate severe and chronic shortages by 2030. In many countries, chronic water shortages are already a reality.
- A Green Economy critically depends on securing water through ecosystems. This implies ensuring ecosystems function well by, in particular, investing in ecosystem restoration in degraded areas.



- Global water stocks are in decline and demands on them are growing. Water scarcity is becoming a global phenomenon that will challenge the security of nations. Addressing this gap provides an opportunity for investments and for water to become a major economic sector in a Green Economy.
- Investments in water could be made more effective if distortions, such as below cost pricing and undefined entitlements, are addressed. Likewise, removing distortions can generate additional funding for water investments. In most cases, the world's increasingly serious water supply and sanitation problems are resolvable at reasonable cost, but require addressing issues such as the design of entitlement systems, pricing and infrastructure finance.
- The development of robust governance arrangements coupled with the greening of water policies can be expected to half the cost of avoiding a water crisis. However, addressing distortions will require transitional arrangements to protect the poor. Demand for access to water is changing rapidly. Many supplies are becoming less reliable. Policy regimes that facilitate rapid adaption to changing supply conditions and changing demands are essential. Allocation regimes need to be designed to cope with sudden shifts to a drier climatic regime.

## Opportunities and Challenges

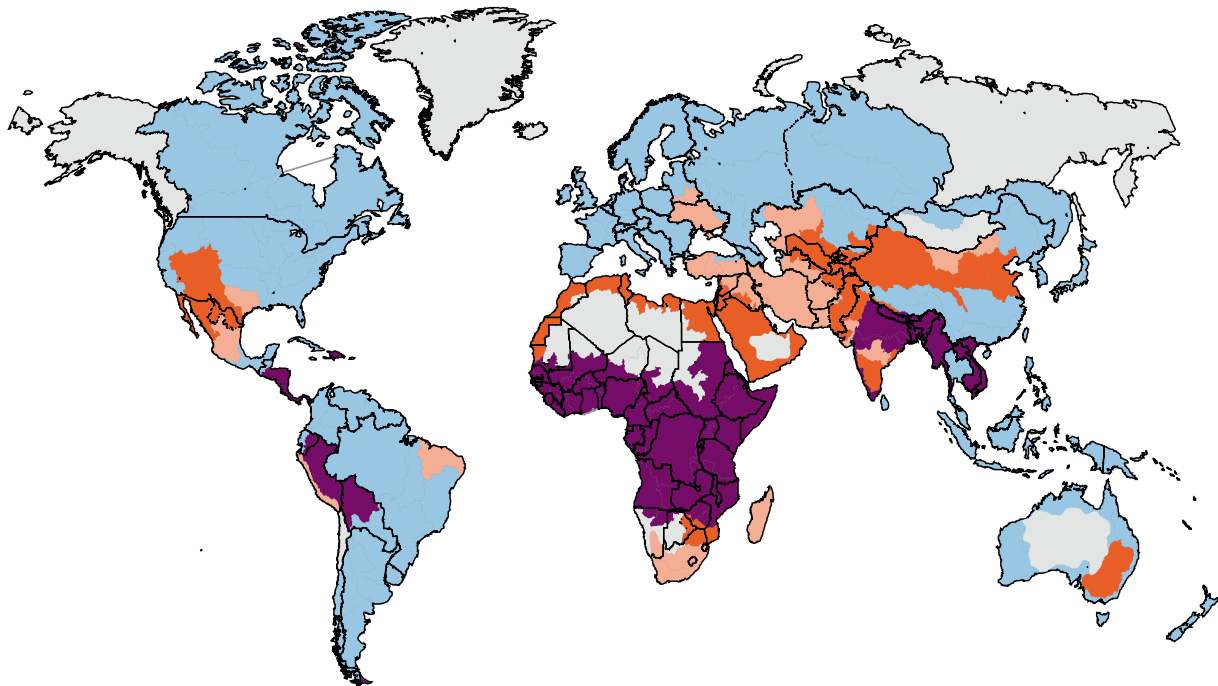
- **Poverty, access and sanitation.** Global estimates suggest that 884 million people lack access to clean drinking water and 2.6 billion people do not have access to improved sanitation facilities.<sup>14</sup> Economic impacts of poor sanitation, including water borne disease, are significant. Every year, 1.4 million children die as a result of lack of access to clean water and sanitation.<sup>15</sup> Attaining the Millennium Development Goals for water and sanitation would increase productivity, creating an extra 322 million working days per year. The global value of adult working days gained as a result of less illness would be almost \$750 million. The value of convenience time saving associated with the improved access to water and sanitation would reach \$64 billion.<sup>16</sup>

<sup>14</sup> WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation, *Progress on Sanitation and Drinking-water: 2010 Update*, World Health Organization and UNICEF, 2010.

<sup>15</sup> *The State of the World's Children 2005 - Childhood under Threat*, UNICEF, 2004; A. Prüss-Ustün et al. *Safer Water, Better Health: Costs, Benefits and Sustainability of Interventions to Protect and Promote Health*, World Health Organization, 2008.

<sup>16</sup> Tropp, H., a shortened and updated version of M. Sanctuary, H. Tropp and L. Haller, 2005 (*Making Water a Part of Economic Development: The Economic Benefits of Improved Water Management and Services*, Stockholm International Water Institute), prepared for the Green Economy Report, 2010, citing G. Hutton and L. Haller, *Evaluation of the Costs and Benefits of Water and Sanitation Improvements at the Global Level*, World Health Organization, 2004.

- Little or no water scarcity
- Approaching physical water scarcity
- Not estimated
- Physical water scarcity
- Economic water scarcity



The above map shows **areas of physical and economic water scarcity**. When physical scarcity limits are reached, investment has to focus on management of the existing, albeit limited, resource. Where scarcity is economic, there is room for further investment in dams and distribution systems if institutional and financial conditions can be improved.

Source: «Areas of physical and economic water scarcity» UNEP/GRID-Arendal Maps and Graphics Library. 2008. UNEP/GRID-Arendal. 5 May 2010 <<http://maps.grida.no/go/graphic/areas-of-physical-and-economic-water-scarcity>>.

### Definitions and indicators

*Little or no water scarcity.* Abundant water resources relative to use, with less than 25% of water from rivers withdrawn for human purposes.

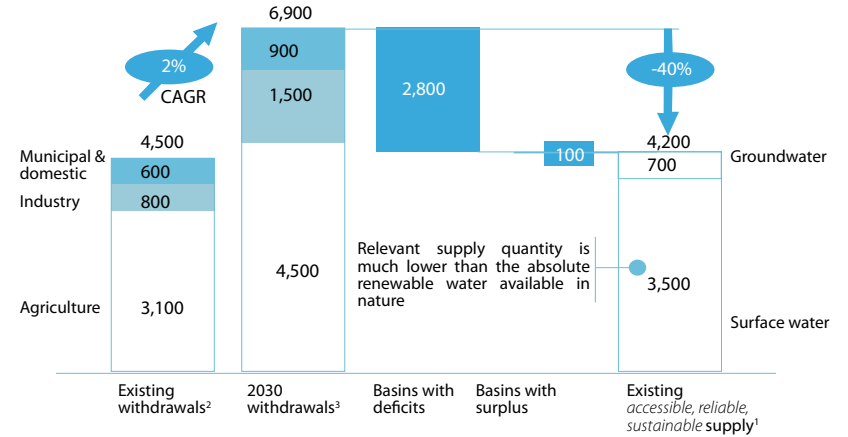
*Physical water scarcity (water resources development is approaching or has exceeded sustainable limits).* More than 75% of river flows are withdrawn for agriculture, industry, and domestic purposes (accounting for recycling of return flows). This definition—relating water availability to water demand—implies that dry areas are not necessarily water scarce.

*Approaching physical water scarcity.* More than 60% of river flows are withdrawn. These basins will experience physical water scarcity in the near future.

*Economic water scarcity (human, institutional, and financial capital limit access to water even though water in nature is available locally to meet human demands).* Water resources are abundant relative to water use, with less than 25% of water from rivers withdrawn for human purposes, but malnutrition exists.



Billion m<sup>3</sup>, 154 basins/regions



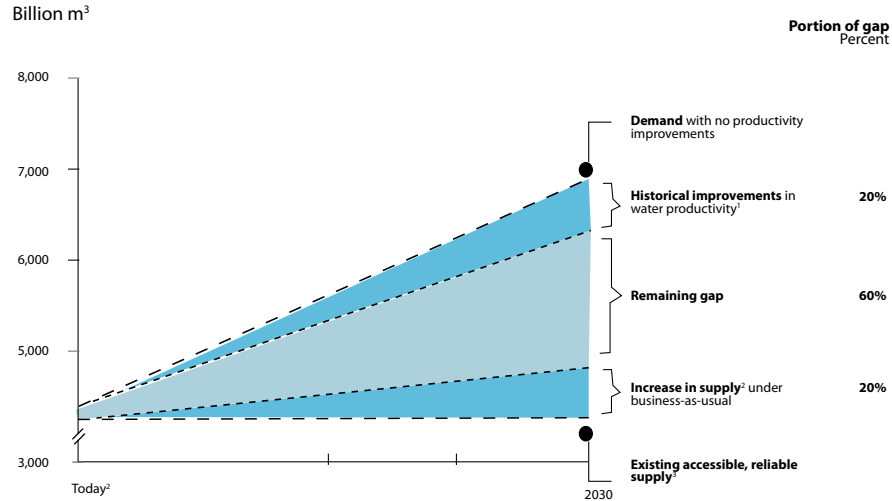
<sup>1</sup> Existing supply which can be provided at 90% reliability, based on historical hydrology and infrastructure investments scheduled through 2010; net of environmental requirements

<sup>2</sup> Based on 2010 agricultural production analyses from IFPRI

<sup>3</sup> Based on GDP population projections and agricultural production projections from IFPRI; considers no water productivity gains between 2005-2030

The above graph shows the **aggregated global gap between existing accessible, reliable supply and 2030 water withdrawals, assuming no efficiency gains**. If there is no improvement in the efficiency of water use, water supply is expected to be 40% less than demand by 2030.

Source: Water 2030 Global Water Supply and Demand Model; agricultural production based on IFPRI IMPACT-WATER base case in 2030 Water Resources Group, 2009.

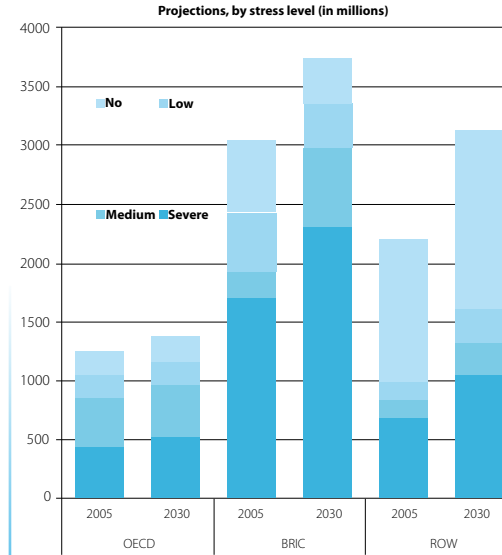


<sup>1</sup> Based on historical agricultural yield growth rates from 1990-2004 from FAOSTAT, agricultural and industrial efficiency improvements from IFPRI  
<sup>2</sup> Total increased capture of raw water through infrastructure buildout, excluding unsustainable extraction  
<sup>3</sup> Supply shown at 90% reliability and includes infrastructure investments scheduled and funded through 2010. Current 90%-reliable supply does not meet average demand

**Business as usual approaches will not meet demand for raw water**

The above graph shows that, under a business as usual scenario, improvements in water productivity can be expected to close around 20% of this gap. Supply enhancement can be expected to close a similar amount. The remaining 60%, however, must come from increased investment in infrastructure and water policy reform. If the resources are not found and if the water policy reforms not enacted, water crises will emerge.

Source: 2030 Water Resources Group – Global Water Supply and Demand Model; IFPRI; FAOSTAT in 2030 Water Resources Group, 2009.



The above graph shows the projected **number of people living in water stressed areas in 2030**, compared to 2005. By 2030, the OECD (2009) estimates that 3.9 billion people, or nearly half the world population, will live under severe water stress.

Source: OECD (2009), *Managing Water for All: An OECD Perspective on Pricing and Financing*.



- While a massive amount of water falls to the ground, much less finds its way into creeks, rivers, aquifers, wetlands, lakes and reservoirs. Even less is extracted for consumption purposes. Of the water that is extracted for human purposes, on average, 70% is used for agricultural purposes; 20% for industry; and 10% for direct human consumption purposes.<sup>17</sup>
- The resolution of global water supply problems is heavily dependent upon the degree to which agricultural water use can be improved. Irrigated land produces 40% of the world's food and as populations grow, more, not less, irrigated agriculture will be necessary.<sup>18</sup>
- All water sources need to be considered in water planning and water resource management. In particular, rainfed agriculture currently represents 60% of production in developing countries.<sup>19</sup> Given its highly decentralised nature, as well as limited negative environmental impacts, rainwater harvesting has the potential of significantly augmenting domestic water use.
- Around 700 million people live under conditions that give them access to less than 1,700 cubic meters of water per year. By 2025, the number of people predicted to be living in these conditions is expected to have increased by a factor of four to around 3 billion people.<sup>20</sup>
- By 2030, water scarcity is expected to become a phenomenon that will challenge governments. The reasons for the emergence of this scarcity include population increases, governance arrangements, increasing living standards, over-exploitation, declining water quality and climate change.
- By 2030, if there is no improvement in the efficiency of water use, water supply is expected to fall to 40% short of demand.<sup>21</sup> Opportunities to close this gap include increased supply, increased investment in ecological and physical infrastructure, more efficient use and better demand management. In some cases, people will need to migrate to areas where water is more abundant. Considerable water policy reform will be necessary.

<sup>17</sup> UNESCO (2009). *The 3rd United Nations World Water Development Report: Water in a Changing World*, based on Comprehensive Assessment of Water Management in Agriculture, 2007.

<sup>18</sup> Hansen, S. and R. Bhatiam. *Water and Poverty in a Macro-Economic Context*. Royal Norwegian Ministry of the Environment, 2004

<sup>19</sup> FAO, *Agriculture, Food and Water*, 2003.

<sup>20</sup> *Human Development Report 2006: Beyond Scarcity: Power, Poverty and the Global Water Crisis*, UNDP, 2006.

<sup>21</sup> 2030 Water Resources Group. *Charting our Water Future: Economic Frameworks to Inform Decision Making: The Economics of Water Resources*. McKinsey and Company, 2009.





## Enabling Conditions

As nations transition to a set of greener economic arrangements, there are a number of reforms which, if adequately implemented, make it easier to manage water while addressing poverty alleviation.

**Input subsidies** – Many existing subsidies, for instance on energy in agricultural areas, encourage people to increase water use. If these subsidies were phased out, pressure on water resources would be reduced.

**Pricing carbon and other externalities** – Carbon pricing can be expected to discourage investment in energy-intensive desalination plants and increase interest in less expensive water supply and demand management options. Increased use of natural ecosystem processes to maintain clean water supplies, control floods, and so forth can be expected. In irrigation areas, carbon pricing can be expected to speed adoption of irrigation scheduling systems and the development of water trading. In urban areas, it would encourage investment in leakage reduction and the purchase of more water efficient appliances.

**Protecting low-income water users** – Ensuring low-cost access to clean water supplies for urban and rural poor can shield them from unnecessary economic costs and protect low-income groups from possible price increases associated with expanding clean water supply. It also produces tangible social benefits by reducing infant mortality and avoiding productivity losses associated with recurrent water borne diseases and ailments.

**Secure property right regimes** – When property rights are insecure, or enforcement systems lacking, the incentive to take a long-term perspective is weak. When property rights are well-defined, much more sustainable forms of resource use can be expected. Early investment in the development of land registers and other similar processes is a simple way to speed transition to a Green Economy.



## Case Study: Micro-scale infrastructure provision in Western Jakarta

In cities like Jakarta, Indonesia, a significant proportion of the population lives in informal settlements. While the government does not want to legitimize the occupation of land, it recognizes the need for the provision of access to safe water and sanitary conditions. A private water utility, Palyja, is responsible for water supply in Western Jakarta and is expected to supply water to all people who live in this area, including those in informal settlements.<sup>22</sup>

As part of this process, Palyja is trialling the provision of access to groups of informal houses by establishing community-based organizations. Each organization is given access to a single master water meter and is responsible for the management of the community's water supply infrastructure as well as paying for the volume of water taken. MercyCorps has helped connect 38 households to a single meter, while USAID's Environmental Service Programme (ESP) has brought 58 households together.

Once established, the community signs a supply contract with Palyja, with a special tariff arrangement to account for the fact that many households are using a single meter. Under this arrangement, both sides benefit: the community gets reliable access to an affordable water supply, while Palyja supplies a large number of houses with water at much lower overhead and administrative costs.

<sup>22</sup> Fournier V. et al., *Palyja Water for All Programmes in Western Jakarta*, prepared for the Green Economy Report, 2010.



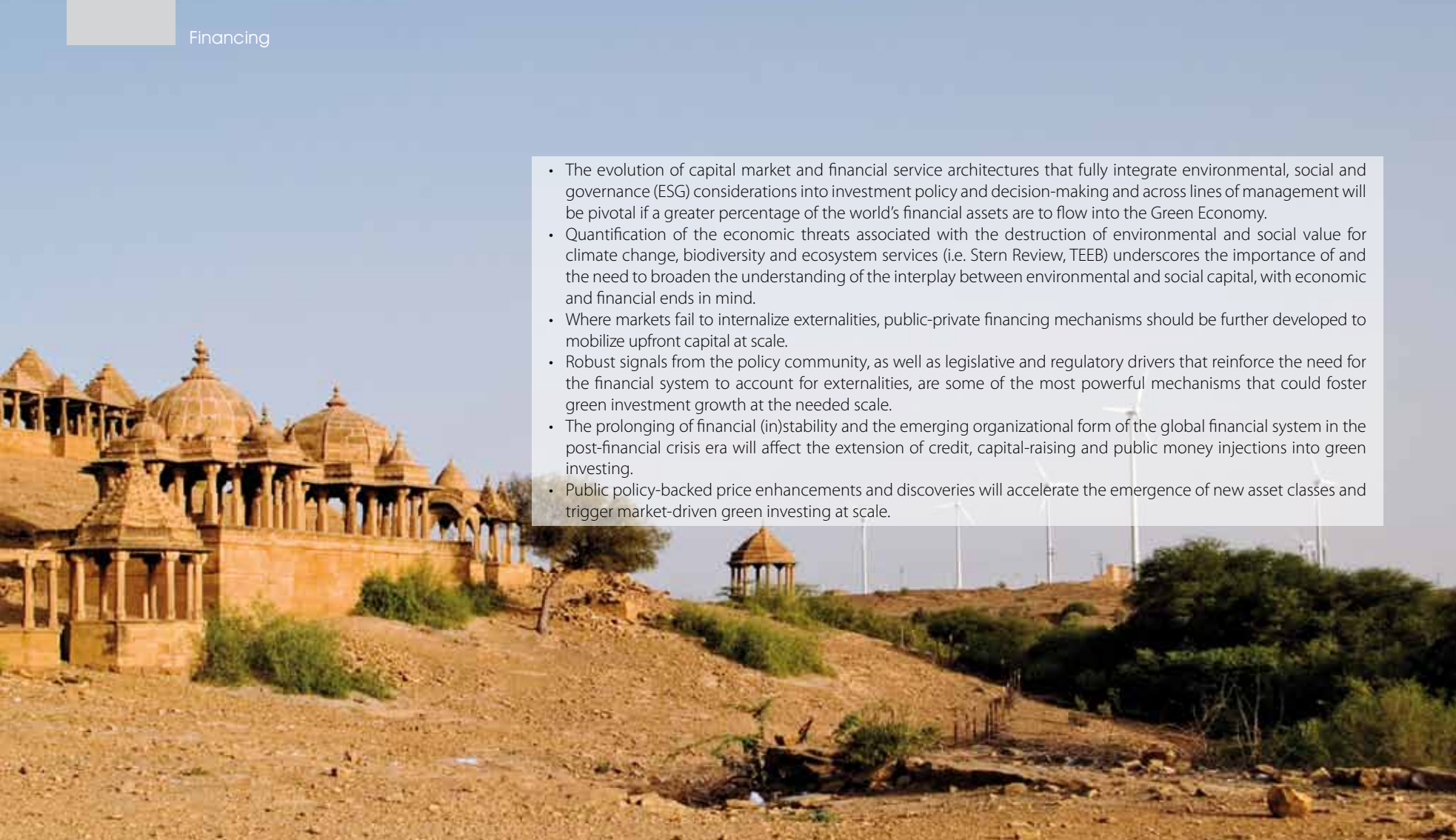
# FINANCING THE GREEN ECONOMY



- The ability to balance return on investment with the responsibility of investment will be key to the emergence of a Green Economy. If approaches based on sustainable finance and responsible investment are adopted and integrated by mainstream financial and capital markets, greening of economic sectors will follow.
- Financial inclusion of more than 2 billion people at the “bottom of pyramid”, and the valuation, integration, and sound management of ecosystems and biodiversity that underpin so much of our global economic and social activity need to be an integral part of mainstream financial services in order to achieve full transformation to a Green Economy.



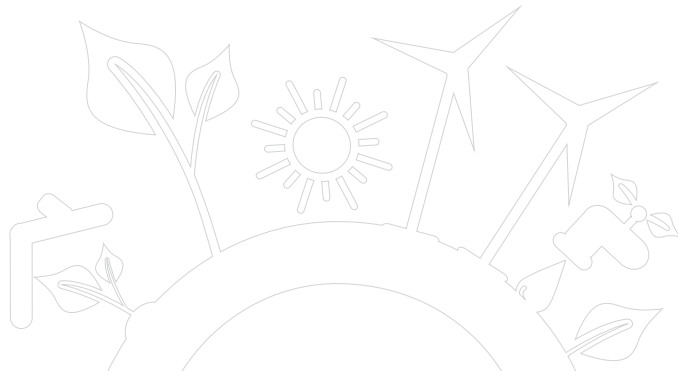
- The evolution of capital market and financial service architectures that fully integrate environmental, social and governance (ESG) considerations into investment policy and decision-making and across lines of management will be pivotal if a greater percentage of the world's financial assets are to flow into the Green Economy.
- Quantification of the economic threats associated with the destruction of environmental and social value for climate change, biodiversity and ecosystem services (i.e. Stern Review, TEEB) underscores the importance of and the need to broaden the understanding of the interplay between environmental and social capital, with economic and financial ends in mind.
- Where markets fail to internalize externalities, public-private financing mechanisms should be further developed to mobilize upfront capital at scale.
- Robust signals from the policy community, as well as legislative and regulatory drivers that reinforce the need for the financial system to account for externalities, are some of the most powerful mechanisms that could foster green investment growth at the needed scale.
- The prolonging of financial (in)stability and the emerging organizational form of the global financial system in the post-financial crisis era will affect the extension of credit, capital-raising and public money injections into green investing.
- Public policy-backed price enhancements and discoveries will accelerate the emergence of new asset classes and trigger market-driven green investing at scale.



# Case Study: Mobilizing private investment into sustainable energy in India

**Meeting complex needs with an orchestrated approach.** India is a good example of why the advancement and expansion of sustainable energy options makes sense in a developing country context, both in environmental but also in economic and energy security terms, and why the enabling potentials of the private financial services sector must be unleashed through a suite of targeted and well-orchestrated policies. According to REN21, India – the second leader after China among developing countries in initiating a series of sustainable energy disciplines – had installed wind power and renewable capacities by the end of 2008.

- In 2008 alone, new investment activity in India grew by 12% reaching \$3.7 billion, with asset finance taking the largest share amounting to \$3.2 billion (25% up from the previous year).
- The venture capital space saw a phenomenal growth of 270%, amounting to \$493 million. Indian companies are also looking at foreign and domestic exchanges as sources of fundraising to an estimated \$756 million and \$646 million, respectively.



# Investing in the Green Economy

The costs of externalities currently have not been assessed, priced or accounted for in the traditional economic system. These externalities fail to be internalized partially because of the omission of ESG issues in the investment policy-making and decision-making processes of mainstream investment institutions.

- The 3,000-listed companies that were analysed generate environmental costs averaging about \$2.2 trillion annually.<sup>23</sup>
- The companies in the MSCI All Country Index are associated with more than \$1 trillion in environmental externality costs annually.<sup>24</sup>

Embedding ESG materiality into the investment portfolios of pension funds (\$29.5 trillion), global equity markets (\$34 trillion), public and private debt securities (\$77 trillion), high net worth individuals (\$32.8 trillion), sovereign wealth funds (\$2-3 trillion), hedge funds (\$1.5 trillion) and private equity (\$1.3 trillion) across firms, sectors and regions will allow control of the costs incurred by environmental and social externalities. More than 700 institutional investors representing in excess of \$20 trillion in assets, and who back the UN Principles of Responsible Investment (PRI), have been committed to responsible investment. This sends a strong signal to the rest of the investment community and is an indication of the direction of capital towards low-carbon and resource-efficient activities of the future.

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<sup>23</sup> UNEP FI/UN PRI, forthcoming.

<sup>24</sup> Ibid.



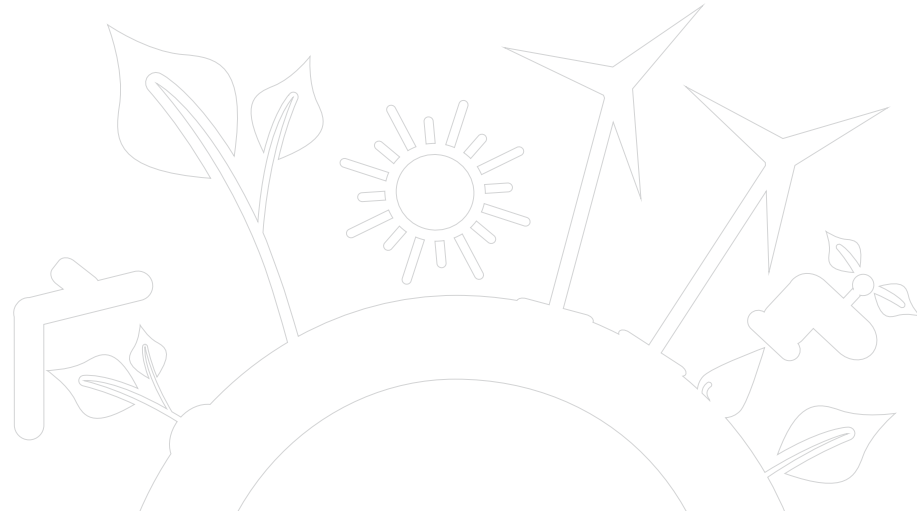


## Banking the Green Economy

The banking sector remains a critical intermediary for the provision of equity financing, the delivery of essential banking services at the household level, and as a gatekeeper to broader investment and finance for the overall economy. Positioning the banking sector with respect to sustainable finance is critical for the transformation to a Green Economy.

- Bank deposits reached \$61 trillion in 2008
- By June 2009, more than 80 banks representing some 85% of global project finance volume had signed the 10 principles that cover environmental and social issues related to projects with a total capital cost above \$10 million
- Approximately 2.8 billion people with some level of discretionary income are not in any formal financial system, while many hundreds of millions remain at subsistence level

Embedding ESG considerations in the global banking regulatory and supervisory landscape, broadening risk radars, mainstreaming the ESG practice across policies and lending operations, addressing some of the fundamental shortcomings regarding valuation, and assessment and information gathering on ESG issues are some of the significant steps towards reengineering a banking sector that would serve the Green Economy.



# Insuring the Green Economy

The insurance community, with their expertise in assessing, pricing and managing risk and enabling the flow of risk capital, can play a critical role in supporting the emergence of a Green Economy agenda across business, industry and the markets. By virtue of their risk transfer and risk management mechanisms and functions, insurers carry out loss prevention and loss mitigation measures in conducting their business, and thus have an unparalleled capacity to understand and engineer approaches and mechanisms to manage emerging ESG risks.

- The emergence of insurance-linked securities (e.g. catastrophe bonds) allowing securitization of, for example, the accumulated risk exposure in a specific territory that is prone to natural hazards such as windstorm, flood or earthquake.
- New insurance products and services that address environmental impairment liability, ageing populations and lifelong income, modern day health risks and index insurance covering climatic and natural hazards for farmers, local communities, countries and national governments, including innovative solutions based on public-private partnerships.
- The emergence of the macro-potential of micro-insurance – insurance for low-income people – as both a prime business opportunity and a powerful tool for financial inclusion and sustainable development.
- New sustainable markets in the making include insurance for emerging manmade health risks and for the protection of natural resources, in particular, biodiversity and ecosystems (e.g. forests) and water.

Insurance is the largest industry in the global economy with global assets under management – \$19.8 trillion as of 2007. As such, insurance has enormous leverage potential for transition to a Green Economy. For example, the insurance and reinsurance community were among the first financial service organizations to engage in and explain the long-term economic risks posed by climate change. In addition to the threats posed by global warming, insurers today are communicating strong risk signals stemming from a wide range of ESG issues such as biodiversity loss, ecosystem degradation, water scarcity, poverty, emerging manmade health risks, ageing populations, child labour and corruption.



The image is a composite. The background shows a family of four—a man holding a child, a woman in a pink sari, and another woman in a brown sari—standing on a concrete rooftop. The foreground shows a man in a white patterned shirt and dark shorts, seen from the side, kneeling and working on a blue solar panel array. A semi-transparent white box with green text is overlaid on the middle of the image.

## Delivering on the Green Economy: Advisory Services

Providing sound advice and support to governments, businesses and civil society is essential to achieving a global transition to a Green Economy and is an integral part of the Green Economy Initiative. UNEP is committed to advancing national green economy initiatives through its advisory and technical assistance services that are available on demand. These services include assisting in the development and assessment of green economy reforms, providing analytical and research support, drawing on international experience and best practices, as well as strengthening analytical capabilities at the national level, in particular in developing countries. In delivering such advisory services, UNEP is working in partnership with other UN agencies and a network of leading policy research institutions and think tanks from around the world to generate timely data, information and analysis to support informed policy-making. These services are geared towards specific requests by countries pioneering or considering green economy reforms.

# Delivering on the Green Economy: Working in Partnership

Achieving a transition to a Green Economy will only be possible through the collective vision, creativity, action and support from a broad cross-section of society, including governments, the private sector and consumers. UNEP is committed to engaging with, and stimulating collaboration between, these stakeholders in the realization of a low-carbon, resource-efficient future.

UNEP's Green Economy Initiative is the result of a joint effort by numerous experts from UN organizations, academic institutes, think tanks, businesses and environmental groups. The Initiative works with a range of partners to: develop research products; harmonize green economy policy messages; provide and coordinate regional and country level advisory services; and identify financial and human resources to undertake green economy activities.

For example, UNEP partnered with the International Labour Organization, the International Confederation of Trade Unions and the International Organisation of Employers in the development of a Green Jobs Report.

UNEP has also been working with a number of UN agencies and other intergovernmental partners to harmonize green economy policy messages. In June 2009, UNEP, together with more than 20 UN agencies, the IMF and the World Bank, issued a joint statement, which noted that the current financial and economic crisis requires a collective response from the global community for laying a solid foundation for shared growth and sustainable development.

UNEP has also been working closely with civil society and the business community. UNEP supported the establishment of a Green Economy Coalition, which is comprised of environment, development, business and labour groups, and has been instrumental in focusing the global political agenda on the issue of transitioning to a Green Economy.





**For more information on the Green Economy**  
**[www.unep.org/greeneconomy](http://www.unep.org/greeneconomy)**

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# GREEN economy



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