



# Green Growth and Development Quarterly

Volume 1 • Issue 4 • July 2013



The Energy and Resources Institute

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### **Editor-in-chief**

R K Pachauri, Director-General, TERI

### **Editorial team**

Shailly Kedia, Associate Fellow, TERI

Ritu Singh, Research Associate, TERI

Ritika Sehjpal, Research Associate, TERI

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### **Acknowledgements**

We gratefully acknowledge Department for International Development (DFID) for providing support for this newsletter. We acknowledge Rajiv Sharma, Santosh K Singh, R K Joshi, Hemambika Varma, Roshni Sengupta, and Shilpa Mohan from TERI Press. We thank Manish Anand for editorial input. We acknowledge M K Bineesan from the Green Growth and Development Division for his support at various points.

### **Published by**

The Energy and Resources Institute (TERI)

TERI Press

Darbari Seth Block

IHC Complex

Lodhi Road

New Delhi – 110 003 / India

**Tel.** 2468 2100 or 4150 4900

**Fax** 2468 2144 or 2468 2145

India +91 • Delhi (0) 11

**Email** [teripress@teri.res.in](mailto:teripress@teri.res.in)

**Web** [www.teriin.org](http://www.teriin.org)

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## FOREWORD BY EDITOR-IN-CHIEF

I am glad that this issue of the Green Growth and Development Quarterly is focussed on the subject of green innovation. Human society has come a long way by creating and benefiting from a multiplicity of innovations. Our earliest ancestors were able to create fire, which was a revolutionary discovery, the full benefits of which are seen all around us in the way human society has evolved. Another major innovation was the discovery of the wheel, which has influenced many activities that human beings are involved in and thrive on day in and day out. In a lighter vein, as I have said elsewhere, the invention of the wheel itself is just as important as the innovation to use it in a baggage that we carry. It was not too long ago that all of us had to carry loads of baggage and those who were physically unable or reluctant to do so, had to seek the services of a porter.

Today, the world needs a new series of innovations, which would lead us to a green economy. One could ask what a green economy is and why should the world move towards it. There are various reasons why the process of economic growth and development needs to move in a direction, which can be labelled as green. The truth is that human activities have exploited the global commons to an extent where several negative impacts are being felt all over the world. These include pollution at the local level, a result of which the air we breathe and the water that flows in our rivers has reached levels of pollution which is harmful for the health of not only human beings but all species. At the same time, the level of acidification of our oceans has reached to such an extent that concerns related to the sustainability of marine life and ecosystems are being voiced on a valid basis. Most importantly, an increase in the concentration of greenhouse gases in the earth's atmosphere has caused climate change, the impacts of which are being felt in a variety of ways all across the planet.

It is also true that population of this earth has increased rapidly in the past century or so reaching a level that exceeds 7 billion today. It must be noted that with higher incomes—patterns of consumption and production will replicate what has happened in those countries that have reached high levels of prosperity—demand for several resources will grow to an unprecedented level. This would include fossil fuels, mineral resources, metals, biomass, and other resources essential to human life and modern

## Foreword

economic systems. The competition for these resources has already become intense, and could lead to tensions and problems in the future. For these and several other reasons, economic growth has to proceed in the direction of resource-use efficiency, and doing more with less, so that the growth in demand for resources can be moderated and the impacts of pollution and the negative externalities imposed by the production and consumption of goods and services can be minimized.

The concept of a green economy embraces all these aspects; its realization rests extensively on innovation by which new products, processes, and practices can be created resulting in reduced negative externalities on the environment and more efficient use of natural resources. The document finalized and agreed on at the UN Conference on Sustainable Development in 2012, generally referred to as the Rio+20 Summit, clearly highlights the importance of a green economy. In para 58d of this document, it affirms green economy policies in the context of sustainable development, and poverty eradication should promote sustained and inclusive economic growth, foster innovation and provide opportunities, benefits, and empowerment for all and respect of all human rights. This clearly provides an ethical, social, and economic framework for innovation and some rules of the game governing innovative activities and directions. An enormous amount of intellectual power would now be required to define and direct innovation for the benefit of society at large.



**R K Pachauri**

Director-General

The Energy and Resources Institute

## INTERVIEW



### Bharrat Jagdeo on Guyana's Low Carbon Development Strategy (LCDS)

*H.E. Mr Bharrat Jagdeo, President of the Assembly, GGGI (Global Green Growth Institute) and Former President, Co-operative Republic of Guyana*

The Global Green Growth Summit was organized by the Global Green Growth Institute on June 10-11, 2013 in Seoul. The conference focused on "The Future of Green Growth: Finance, Innovation and Policy". Shailly Kedia interviewed H.E. Mr Bharrat Jagdeo who is the President of the Assembly, Global Green Growth Institute (GGGI) and Former President, Co-operative Republic of Guyana.

**TERI:** I quote you, "...we want to be part of a global coalition that stimulates innovation and creativity to enable us to leapfrog over the high carbon development path that today's business-as-usual trajectory suggests we must follow..." What were the key factors behind your vision?

**HE Bharrat Jagdeo:** A key driver behind Guyana's Low Carbon Development Strategy (LCDS) vision came from the realization that in the policy space, there exists a distance between required action to address climate change and provisioning of finance. In 1997, I was with the Ministry of Finance in Guyana; this was the same year the Kyoto Protocol came into existence. At the time, the Kyoto Protocol was looked at purely from environmental perspective.

Over the last few decades alone we have realized that finance and climate vulnerabilities should not be seen in isolation. In 2005, excessive floods caused damages equivalent to 60 per cent of Guyana's GDP for which significant public funding had to be spent for environmental remediation. The Intergovernmental Panel on Climate Change (IPCC) clearly gave recognition that climate change will have localized impacts. Hence, it is in interest of domestic policies that climate change should be integrated into development planning for building adaptive infrastructure such as drainage systems.

While there was a lot of rhetoric about problems, there was less discussion about solutions. Globally deforestation has been recognized as key factor of GHG emissions. Guyana is a forested country and has 85 per cent forest cover. The Kyoto Protocol and associated mechanism had a gap in terms of recognizing the role of forests as carbon sinks. We as a country wanted to advocate for forests, so that forests are duly recognized in the second phase of the Kyoto Protocol.

Guyana got into a bilateral agreement with Norway before Copenhagen Climate Summit in which USD 250 million over 5 years was to be given to the country for forest conservation. Payments received for conservation and sustainable management of its forests and forest services would then be utilized for alternative low emission economic activities generating green jobs. These include hydro power development at Amaila Falls situated in Guyana's interior that will meet 90 per cent of Guyana's domestic energy needs, titling of Amerindian lands and supporting alternative livelihood projects.

The vision was to develop a model for an inclusive low carbon development mechanism for forested country/regions. Such a model was intended to consider concerns of indigenous people to take into account the existing multilateral mechanism to have transparent system of payment and also design Measurement Reporting and Verification (MRV) systems. It was a vision to develop a replicable model for other countries considering mechanisms such as the Reducing Emissions from Deforestation and Forest Degradation (REDD). In terms of the larger international debate, the vision has a strong intent to move the conversation around forest by demonstrating a strong viable model.

**TERI:** *Do you think leapfrogging is possible? How should the government prioritize?*

**HE Bharrat Jagdeo:** By leapfrogging we mean not taking the developed country pathway but rather following a development path for Guyana that develops based on clean energy (non-fossil fuels) and benefits from ecosystem services, i.e., from our rich forests. There were many questions that were raised in terms of prioritization. These included: Would the aspirations of people be compromised on? Would payment for ecosystem services be utilized in a transparent manner? We devised a government mechanism that would be inclusive and represented by various departments, community representatives, and international experts. Innovative means were used to involve stakeholders in the formulation and evolution of Guyana's LCDS. There were 400 community meetings that were held on briefing people about LCDS and also soliciting their feedback. SMS was also sent to citizens of the country and hence Information and Communication Technology (ICT) was used to solicit feedback. Translations of the policy paper of 2009 were made available and would follow principle of 'free prior and informed consent' (FPIC).



The funds derived from the bilateral agreement with Norway would also be used in low emission sectors, such as ecotourism, improving climate resiliency, and environmental education. Priority investments will be in: Amaila Falls equity; Amerindian Development Fund; Amerindian land titling; MSE and vulnerable groups sustainable livelihoods; International Centre for Biodiversity Research, and Cunha Canal rehabilitation. Thus Guyana's LCDS considers development needs of people considering global environmental issues.

**TERI:** *Four years have now passed since Guyana's LCDS. Can you share some of the challenges that you faced in terms of implementing reforms for the low carbon economy? What were the domestic and the international challenges?*

**HE Bharrat Jagdeo:** Domestic challenges have always been focused around risk associated with partisan politics. The LCDS was discussed not only in the parliament but with stakeholders including regional community. Initially there were also concerns around the delivery of a multilateral system. There were challenges associated with designing a financial architecture that would not only be transparent but also replicable. This led to initial slow implementation of Guyana's LCDS. Payments are made through a financial mechanism, the Guyana REDD+ Investment Fund (GRIF) with the World Bank as Trustee. International financial institutions and development agencies serve as partner entities to support implementing the LCDS projects. For the LCDS oversight body, a Multi-Stakeholder Steering Committee (MSSC) was formed and chaired by the President of Guyana in his Office. This Committee represents a broad cross-section of stakeholders that include representatives from government, forestry, mining, indigenous NGOs, international NGOs, academia, youth, women, private sector, and civil society.

**TERI:** *Do you think bilateral mechanisms have a greater role than multilateral mechanisms in terms of 'operationalizing' country specific initiative around LCDS?*

**HE Bharrat Jagdeo:** Bilateral mechanisms are a good option but the ideal scenario would be an ambitious global agreement supplemented with private funding.

**TERI:** *How do you envisage Guyana playing a role in South-South cooperation to inspire similar scalable, replicable models around the world?*

**HE Bharrat Jagdeo:** Guyana has been in the forefront for setting institutional frameworks for South-South cooperation between forest countries; for instance Guyana has recently signed an MoU with Congo to share experiences on policies related to forest conservation and sustainable development.

**TERI:** *What role do you envisage for global Institution such as the Global Green Growth Institute (GGGI)?*

**HE Bharrat Jagdeo:** GGGI can work with countries having limited resources and prepare them for being availing support from the Global Climate Fund (GCF). GGGI can thus insure that poor countries have access to GCF funds. GGGI can also work through its analytical strength to understand options and priorities for green growth and development in countries. GGGI is already a partnership of 20 countries that can act as a global coalition to aggressively advocate for an ambitious global agreement for current and future generations.

## INTERNATIONAL CASE STUDY

## Clean Energy Initiatives in Uganda, Botswana, and Gambia

This article<sup>1</sup> is an outcome of a participatory exercise undertaken with government delegates from Africa as part of a course module on green technological interventions in a training programme supported by Department of Science and Technology (DST) and Ministry of External Affairs (MEA), Government of India. The training programme had interdisciplinary modules to meet the needs of early/mid-career government/non-governmental officials on issues of energy, environment, and sustainable development, supplemented by extensive study tours. The programme was held from 22 April, 2013 to 10 May, 2013 at Gual Pahari, Haryana.

At the outset, we would like to acknowledge all the participants—Kuvare Venjonoka (Department of Energy, Botswana); Moshe Meshack Mangole (Department of Energy, Botswana); Stephen Mopalo (Ministry of Environment, Wildlife and Tourism, Botswana); Emmanuel Molemogi (Ministry of Agriculture, Botswana); Asegedech Kebede Mengesha (Ministry of Water and Energy, Ethiopia); Edrissa Ken-Joof (Ministry of Energy, Gambia); Moussa Coulibaly (Nationale de l'Énergie, Mali); Gadage Aboubacar (De Environment, Niger); Douka Mahaman Sanoussi (Direction de l'Aménagement, Niger); Ibrahima Mounkaila Ridouan (Ministry of Hydraulics and Environment, Niger); Malami Muhammad (Federal Ministry of Environment, Nigeria); Osewa Temitope Ifeoluwa (Ministry of Environmental, Department of Climate Change, Nigeria); Abdelrahman Mohamed Ahmed Alkhalifa (Ministry of Environment, Forest and Physical Development, Sudan); Hafiz Mohammed Elhabib (Forest National Corporation, Sudan); Mohamed Mongi Ben Yaiche (Ministry of Industry, Tunisia); Emmer Rava Musiime (Ministry of Energy and Mineral Development, Uganda); Justine Akumu (New and Renewable Sources of Energy Division, Ministry of Energy and Mineral Development, Uganda); Topher Arinaitwe (Minister of Water and Environment, Uganda); Katwesige Issa (Minister of Water and Environment, Uganda); Stephen

<sup>1</sup> The faculty for the course were Shailly Kedia and Manish Anand. The article was compiled by Ritika Sehjpal, Aparna Vashisht, and Rinki Jain.

Zingwena (Forestry Commission, Department of Environmental Affairs, Zimbabwe); and Dickson Madziwa (Zimbabwe Parks and Wildlife Management Authority, Zimbabwe).

The second largest continent in the world, Africa, and particularly many African countries are facing significant development challenges, including access to energy, which has impacted its social and human progress. Only 42 per cent of Africans have access to electricity and in Sub-Saharan Africa, the electricity access rates—around 31 per cent—is the lowest in the world.<sup>2</sup> The continent has abundant sources of renewable and non-renewable energy; with these endowments largely remaining unutilized at present. It is, hence, essential that necessary interventions and policies are introduced with regard to clean energy. This article showcases the initiatives undertaken in countries, such as Uganda, Botswana, and Gambia.

### Biogas Programme in Uganda

Uganda is a landlocked country located in east Africa; bordered by Kenya in the west, Democratic Republic of the Congo in its east, Sudan in its south, and Rwanda and Tanzania in its north. About 80 per cent of the populace is employed in the agriculture sector. The energy consumption of the country is very low; however, firewood is the most commonly used source of energy by households (about 81.6 per cent), followed by charcoal (about 15.4 per cent). The country has been facing extreme environmental threats for some time now. Increased deforestation due to harvesting of firewood for domestic and commercial purposes has been adding to the degradation of the natural resource base.

The Energy Policy for Uganda of 2002 (GoUG, 2002) clearly emphasizes the need to fulfill the energy needs of the country in a sustainable manner and promotes the use of new and renewable sources of energy. In line with this, the Government of Uganda (at the Nairobi Conference of 2007) committed itself to the “Biogas for Better Life: An African Initiative”. The Uganda Domestic Biogas Programme (UDBP) is part of the same initiative and is being implemented by the Directorate General for International Cooperation (DGIC) in a public-private partnership with Humanist Institute for International Development Cooperation (HIVOS) for fund raising; Stichting Nederlandse Vrijwilligers (SNV), Netherlands for technical assistance; and Heifer International for the overall implementation. The World Bank has provided the seed funding of US\$6.8 million from Uganda Energy Credit Capitalization Company (UECCC) to facilitate credit financing that could be used to manage refinance funds for

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<sup>2</sup> African Energy Minister Conference Proceedings Report, Road to Durban: Promoting Sustainable Energy Access for Africa, Johannesburg, South Africa, 15–16 September, 2011

the biogas sector. UDBP is aimed to improve the livelihoods of the rural and peri-urban farmers in Uganda through utilizing the market and non-market benefits of domestic biogas. The UDBP has been offering several benefits to the Ugandan population, including the benefits of clean biogas for cooking and lighting purposes; and use of bio-slurry, which increases agricultural productivity. The ultimate goal of the UDBP is to establish a sustainable and commercially viable biogas sector in Uganda.

Effective implementation of the UDBP requires a wide range of functions to be executed in a very comprehensive manner. Smooth coordination between different actors and stakeholders has been ensured to carry out the functions of UDBP, including promotion and marketing; financing; construction; after sales operation; and maintenance; quality control; training and extension; research and development; monitoring and evaluation; and programme management (SNV, 2009).

Ministry of Energy and Mine Development (MEMD) has been providing the overall policy guidance and catering to the capacity building needs for the entire programme. The local authorities have been helping to mobilize masons from the villages to be trained for construction of domestic biogas units and to provide for after sale service. These local authorities also help in establishing the link between the NGOs and the village communities. Technological training and other scientific help is being provided by the Makerere University and the East Africa Energy Technology Development Network (EAETDN).<sup>3</sup>

Uganda Biogas Association (UBA) broadly brings together members of the business and industry community and it has been providing a platform to the members—Biogas Construction Enterprises (BCEs)—for promotion and marketing; and market regulations. The private sector stakeholders, being referred to as the BCEs, have been engaged to enable the development of the biogas construction sector and also to provide after sales services (ASS). The business development service to the BCEs was provided by the Private Sector Foundation Uganda (PSFU). The trade unions have not played a very prominent role in the UDBP. Three NGOs, namely HIVOS, SNV, and Heifer International have played an elementary role in implementation of the UDBP. Apart from these, there have been several other NGOs (including Send A Cow Uganda), which have actively participated in promotion, awareness, extension, and demonstration activities of the programme.

Broadly, the beneficiaries of the programme comprises individual households, women self-help groups, and the farmer community. Since it is the women and girls who spend maximum time cooking in households, the programme envisages the women's groups to be the largest beneficiaries of UDBP. The training workshops organized for

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<sup>3</sup> EAETDN is a membership organization with members ranging from the academic world to the private sector.

the biogas users, masons, supervisors, managers of BCEs, and loan officers of financial institutions saw participation from a large number of women's groups—roughly 50 per cent. Other beneficiaries include youth groups, trade unions, and indigenous people. These beneficiaries have been also important from the point of view of needs assessment and spreading awareness about the activities related to the programme (Sengendo *et al*, 2009).

The National Biogas Steering Committee (NBSC)<sup>4</sup> has been responsible for the complete programme management of the UDBP. MEMD has been chairing the NBSC to ensure that there is continuous support being provided to the programme for its implementation activities. As large as 70 per cent of the target biogas users require financial support to help them construct bio-digesters. Several Micro Finance Institutions (MFIs) were encouraged to provide credit, especially to the domestic biogas digesters. NBSC has been taking initiatives to encourage the participation of international and UN credit agencies to provide for biogas-related loan products.

The programme is targeted to install and bring into use about 12,000 quality biogas plants up till 2014 (beginning in 2009) across the targeted groups in Uganda. However, so far only about 3,000 biogas digesters have been installed under the UDBP (GVEP and ADP, 2012). As the programme is expanded to cover more households, there would be a need to establish biogas technology standards and also to set up credit institutions to finance the biogas programme. The success achieved by UDBP so far is attributed to the appropriate institutional arrangement that has been demonstrated in Uganda between the national and local governments, private sector, NGOs, and civil society groups. Clear division of roles and responsibilities amongst each of the group actors involved in the UDBP and accountability accrued to them sets an example for good governance.

## Renewable Energy in Botswana

Located in Southern Africa, the Republic of Botswana, with a population of over two million, is one of the world's most sparsely populated countries. It is mostly dominated by the Kalahari Desert, which covers up to 70 per cent of its land surface. After gaining independence from United Kingdom in 1966, Botswana has emerged as one of the fastest growing economies in the world. The economy is mainly driven by mineral extraction, principally diamond mining, along with tourism emerging as a growing sector due to the country's conservation practices and nature preserves.

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<sup>4</sup> Members of the NBSC represented government, relevant line ministries, civil society, end-users, financial institutions, National Implementing Agency (NIA), programme donors, UDBP Programme coordinator, and the private sector.

In Botswana, fuel wood continues to be the major source of energy for many households, especially in rural areas. It is the principal energy source used for cooking in 46 per cent of the households nationally; and in 77 per cent of households located in rural areas (Central Statistics Office, 2008).<sup>5</sup> Majority of the demand for electricity of the region is met through imports. Given that other regions in Southern Africa are also experiencing energy shortages, Botswana's proportion of imported electricity has reduced with implications for increasing local energy production (UNDP, 2011). The National Energy Policy has a target of providing 80 per cent access to the country as a whole and 60 per cent access in rural areas by 2016. It aims at improved access, security, and reliability of energy supply to all sectors of the economy, particularly the low income and marginalized through effective institutional arrangement and service delivery.

Botswana's Vision 2016 recognizes the potential role that solar energy can play in meeting the energy requirements of rural communities not served by the national grid. The Government of Botswana has implemented several strategies to advance the use of renewable energy in Botswana. These include renewable energy feed-in tariffs (REFIT) to encourage greater private sector investment in renewable energy technologies. Under this programme, solar and bioenergy have been identified as major technologies. With regard to solar energy, Botswana has a very high potential with the country receiving over 3,200 hours of sunshine per year with an average insulation on a horizontal surface of 21MJ/m<sup>2</sup>.

The Renewable Energy Based Rural Electrification Programme for Botswana (RE Botswana) is a major programme that was implemented under an agreement between the Government of Botswana and Global Environment Facility (GEF) managed by United Nations Development Programme (UNDP). The objective of the programme is to reduce Botswana's energy related carbon dioxide (CO<sub>2</sub>) emissions and promoting renewable and low greenhouse gas (GHG) technologies as a substitute for fossil fuel utilized in rural areas. Électricité de France (EDF) was also active in the generation, transmission, and distribution of electricity. Moreover, Programme for Basic Energy and Conservation (ProBEC), a regional programme implemented by the German Agency for Technical Co-operation (GIZ) helped in the piloting and rollout of energy services in Botswana.

As stated in a UNDP-GEF project document, the time-frame for the project was 2006-10, with the project being extended by two years (UNDP-GEF, 2011). The proposed strategy was to deliver the products and services under institutional model

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<sup>5</sup> [http://www.cso.gov.bw/index.php?option=com\\_content1&parent\\_id=370&id=428](http://www.cso.gov.bw/index.php?option=com_content1&parent_id=370&id=428). Last accessed on 14 May, 2013.

## International case study

of a business franchise, for which BPC Lesedi (Pty) Ltd was formed by the Botswana Power Corporation as a 100 per cent subsidiary. The approach for implementation was a “fee for service” with a business franchise model. BPC Lesedi targets mainly households, agribusinesses, government facilities, and rural businesses that are unable to connect to the grid. These include customers in grid connected villages, offgrid villages, and households outside the village boundary or in localities. BPC Lesedi has a target of approximately 50,000 households in 10 years. The country has been divided into six regions and the national rollout will be phased moving through the country region by region, but also by taking a few villages from all other regions to test the market and product uptake.

The Programme aims to remove barriers to the utilization of renewable and clean energy in Botswana, with subsidized infrastructure and provide more extensive energy services using solar power supplied to end users on a fee-for-service basis. The franchise model provides integrated energy packages of solar home systems, solar lanterns, wood-efficient cookstoves, heat-retention cooking bags, solar water heaters, and stand-alone electricity-generating stations powered through a hybrid of solar and biogas.

As part of the programme, to facilitate basic services, Regional Support Centre (RSC) and Franchise Support Centre (FSC) have also been set up in a town or large village facilitate the servicing of the territories within the region. FSC provides support in the initial selection, training, and extensive assistance with the setting-up of the franchisee’s business, ongoing training, mentoring, and quality control. Botswana Technology Centre and Rural Innovation Intervention Centre provided support in terms of technology improvement.

Thus, from the experience and lessons learned through the existing programmes, implementation of renewable energy-based rural electrification programmes and promotion of low GHG technologies has been planned throughout the country.



**Figure 1: A BPC Lesedi Energy Shop (left), People using wood efficient stoves (right)**

Source: <http://www.bpclesedi.co.bw/>. Last accessed on 9 May 2013



Such a programme would help in further contributing towards the achievement of both national and global development objectives.

## Wind Energy-based Refrigeration for Fishing Communities in the Gambia

Republic of the Gambia is the smallest country on the African continent. The main features of the Gambian economy are its small size, narrow economic base, and heavy reliance on agriculture, with limited number of cash crops, mainly groundnuts. In Gambia, 15.4 per cent of the population earn their livelihood from the fisheries sector (OECD, 2008).<sup>6</sup> The fisheries sector comprises the industrial and artisanal fisheries sub-sectors and contributes about 12 per cent towards the GDP. The sector produces food-fish (which is the major source of animal protein for the majority of Gambians) for local consumption and for export to earn foreign exchange. Fish consumption is higher than other sources of protein (livestock and poultry). As the population continues to expand in Republic of the Gambia, fish demand is going to increase (UNFCCC, 2008). Energy required for cold storage for the fish produce was being sourced from the main grid.

A host of factors continues to impede growth and development of the fisheries sector. The cost of electricity to the industry is deemed to be too high, which is making Republic of the Gambia a high cost destination (IMF, 2011).<sup>7</sup> Not only are communities finding it difficult to pay electricity bills, but there are increasing concerns about the reliability of the electricity supply.

Fishermen in Albreda and Juffreh in the North Bank Region have been lamenting the lack of an ice plant in their area. The Ministry of Fisheries and Water Resources is currently engaged in efforts to get wind turbines for them. Wind turbines would generate electricity for the ice plants.<sup>8</sup> In 2008, a license was issued to Batakuku Village for the generation and supply of electricity through the use of a windmill with a generating capacity of 150 kW.

The Ministry of Fisheries and Water Resources with assistance from the Japanese government has been implementing a project, which utilizes wind energy for cold storage purposes. The project aims to develop cold storage facilities along the coastal areas of the Tanki village in Republic of the Gambia. The programme has been recently initiated in the village and if found technically and economically viable would be extended to other villages of the country. This is a unique model in which 30 per cent

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<sup>6</sup> <http://www.oecd.org/greengrowth/green-development/42440224.pdf>

<sup>7</sup> IMF Country Report No. 11/27. January 2011. The Gambia: Poverty Reduction Strategy Paper

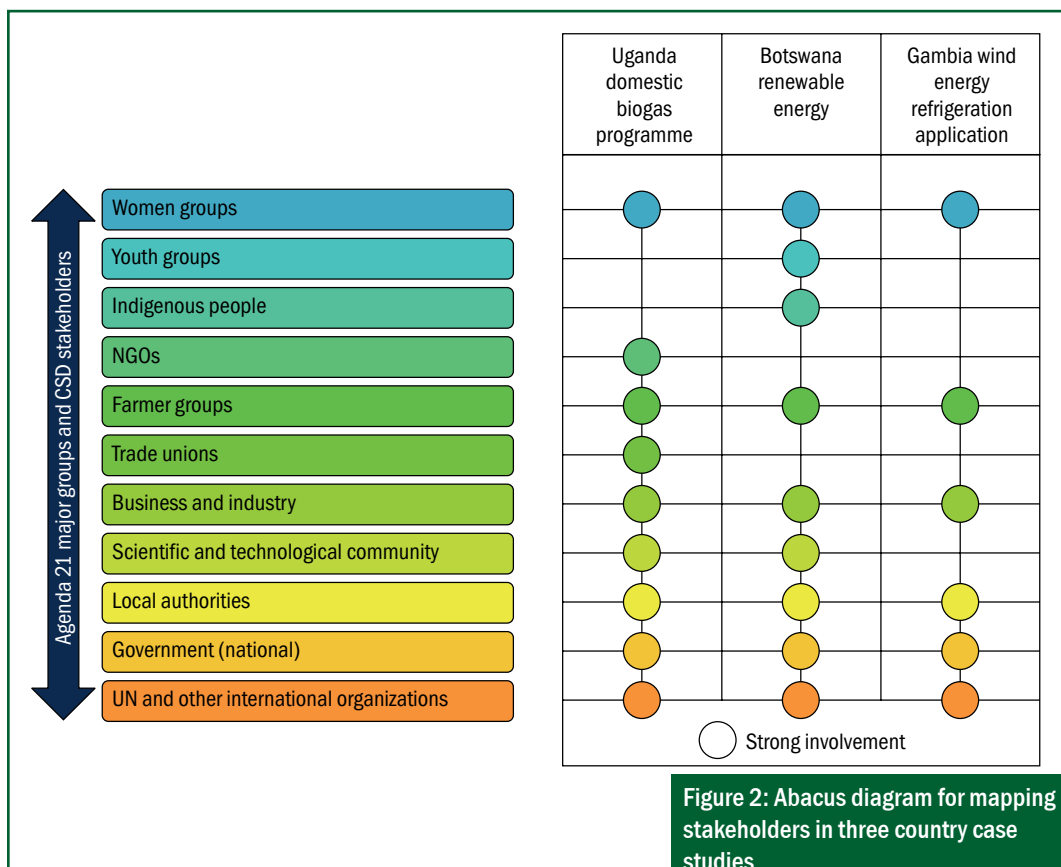
<sup>8</sup> <http://www.foroyaa.gm/burning-issues/12909-interview-with-gambia-s-minister-of-fisheries>

## International case study

of the funds are provided by the GEF-UNIDO agency, 60 per cent by the business community, and the remaining 10 per cent by the village development community. The initiative, albeit small is a step forward towards improving livelihoods, while embarking on and development path that considers environmental sustainability as a natural ally.

### Summary

A summary of stakeholder engagement in the three international case studies are summarized in the abacus diagram (see Figure 2). It is clearly seen that these initiatives have involved multiple stakeholders. A deeper enquiry would however be required with regard to the capacities of each stakeholder, especially institutional actors, such as the village development communities, self-help groups, and local authorities.



## Bibliography

Prospects for the African Power Sector. Scenarios and Strategies for Africa Project. 2011. International Renewable Energy Agency (IRENA). Abu Dhabi.

Botswana Export Development and Investment Authority (BEDIA). 2010. *Botswana Statistics*. Botswana: BEDIA.

GoUG. 2002. *The Energy Policy for Uganda*. Kampala: Ministry of Energy and Mineral Development; Republic of Uganda.

Embassy of France in Botswana. <http://www.ambafrance-bw.org/Solar-energy-launching-of-BPC>. Last accessed on 14 May 2013.

EDF undated. Solar energy: launching of BPC Lesedi, project of rural photovoltaic electrification, supported by Electricité de France-EDF

BPL Lesedi (Pty) Ltd. website: <http://www.bpclesedi.co.bw/>. Last accessed on 9 May 2013. Government of Botswana.

Specialized Solar Systems. Last accessed on 10 May 2013. George, South Africa. website: <http://www.specializedsolarsystems.co.za/>.

Sengendo M, Turyahabwe E, Christopher K, Muganzi M, Kamara E, Rugumayo A, et al. 2009. *Programme Implementation Document for Uganda Domestic Biogas Programme*.

Humanistisch Instituut voor Ontwikkelingssamenwerking (HIVOS); HEIFER International Uganda; and Stichting Nederlandse Vrijwilligers (SNV).

SNV. 2009. *Institutional arrangements for the Uganda Domestic Biogas Programme*. The Netherlands: Stichting Nederlandse Vrijwilligers (SNV).

UNDP. 2011. *Reflecting on the Challenges of Attaining a Green Economy for Botswana*, Botswana Energy Sector Policy Brief. Seanama Conservation Consultancy. Gaborone, Botswana.

GVEP and ADP. 2012. *Uganda Market Assessment: Intervention Options*. Washington, DC: Global Village Energy Partnerships (GVEP) International; and Accenture Development Partnerships (ADP), supported by Global Alliance For Clean Cookstoves.

UNDP-GEF. 2011. *Terminal Evaluation of the Renewable Energy-based Rural Electrification Programme for Botswana*. United Nations Development Programme and The Global Environment Facility. Botswana.

## The Logic for Green Innovation: A Commentary

*Jonathon Porritt*

It is hard not to be downcast by the difficulties that politicians of all political parties seem to have in basing policy on scientific evidence. Without a natural, logical flow from evidence-based policy design to policy implementation, it is very difficult to create the right conditions in which innovation can really thrive.

So here is the logic on low-carbon innovation, for instance. On the basis of today's climate science, world leaders have already committed (theoretically) to doing what needs to be done to ensure that the average temperature increase between now and the end of the century stays below 2 °C. In essence, that means reducing emissions of CO<sub>2</sub> and other greenhouse gases as fast as possible—the imperative of “radical decarbonization”.

There are many different roads to radical decarbonization, but they all depend on pricing the principal externality involved here—namely CO<sub>2</sub> itself. Apart from a few ineffective trading schemes in the European Union (EU) and elsewhere, and an important, but somewhat tentative carbon tax in Australia, no governments have moved from theoretical support for the 2 °C target to practical policy design and implementation.

From a business perspective, this is deeply unhelpful. Political risk remains a massive barrier to early-stage and venture capital, and the cost of capital is inevitably influenced by chronic political inconsistency and “capture” by today's incumbent players.

Fortunately, however, there are other drivers for innovation in this space—namely, high energy and commodity prices, and governments' growing concerns about energy security. By the same token, Finance Directors in companies are increasingly keen to invest in energy efficiency and demand management innovation to help drive down the cost of energy more effectively. Even a relatively simple innovation like voltage optimization can save companies a huge amount of money.

So despite all the disconnections that exist between the state of science and policy responses of the government, this is still an area where business innovation is booming. One may track this through the revolution in trade fairs and exhibitions in the built environment sector, in many different countries. If you go to the website for the United Kingdom's Eco-Build exhibition, for instance, you can see the dramatic growth, over a ten-year period, providing an unparalleled showcase for multinational companies (like Siemens, Schneider, and Skanska) all the way through to small start-up companies in new building material, water efficiency, lighting, renewables, insulation, demand management, and so on.

It has been several years since the *Harvard Business Review* (2009) highlighted the significance of sustainability in pushing forward the innovation agenda:

"Our research shows that sustainability is a mother lode of organizational and technological innovations that yield both bottom-line and top-line returns. We find that smart companies now treat sustainability as innovation's new frontier."

There are all sorts of barriers that still prevent exciting technology innovation moving through the innovation pipeline and coming to the market. It often requires a brave "first mover" to get out there and blaze a trail with a new product, to make space for others to bring in competitor innovations.

In the field of small-scale, affordable water purification systems, for instance, Hindustan Unilever's Pureit device rapidly demonstrates both the potential scale of the market and the incredible health and educational benefits that such systems bring in. Hot on Pureit's heels have come competitive products from some of the big players (Tata, Procter & Gamble, and so on), and a host of smaller start-up and medium-sized companies with purification technologies that are getting smaller, cheaper, and even more effective.

And, it is not all about technology either. Process and system innovation can be just as important. One of the reasons I have chosen to get involved in a new start-up called Whole World Water is to try and sort out a critical part of today's crazy bottled water industry. It is a different story in countries where mains to water either does not exist and cannot be trusted, but across the world, billions of plastic and glass bottles of water are used once and then thrown away—the total environmental footprint (in terms of waste, energy, carbon, and so on) is horrendous.

Big hotel chains are huge users of bottled water. So Whole World Water has set out to persuade them to invest in their own water purification kit and re-usable bottles, and massively reduce their use of branded bottled water, saving themselves huge amounts of money. They then commit to contributing 10 per cent of that financial benefit to the Whole World Water Fund, through which investments will be made in a

whole host of brilliant non-governmental organizations delivering practical solutions to water-stressed communities all around the world.

Bottled water in hotels is just one tiny part of a much, much bigger system. But the genius of business-led innovation means that one can get traction and scale very quickly in such a sub-system—simply because there is no financial downside. Unless, in this case; you are a bottled water company!

In field of pro-sustainability enterprise (sometimes captured under the concept of “The Green Economy”), the innovation pipeline is bulging. But business on its own cannot open up that pipeline; it needs the right kind of regulatory framework, supportive public policy, and capital markets that are sufficiently confident about future revenues to overcome what can otherwise be a crushing incumbency bias.

Nowhere is that incumbency bias more apparent than in today’s energy system. A new report<sup>1</sup> from Carbon Tracker and the Grantham Research Institute titled, “Unburnable Carbon 2013” shows just how devastating this can be for the prospects of humankind as a whole, let alone for business innovators in sustainable energy.

The report demonstrates that if all the hydrocarbon reserves (oil, coal, and gas) already invested, were to be fully developed and burned; we would be crashing through that 2 °C threshold well before the end of the century, with a 3 °C or even 4 °C average temperature increase on the cards.

But, every year financial regulators allow the big energy companies to book new hydrocarbon reserves on their balance sheet as “real assets”—to the tune of an astonishing US\$674 billion in 2012 alone. And that is creating a vast “carbon bubble” at the heart of the global economy: either we go ahead and burn those reserves (in which case investors get their dividends, but we overhead the planet in the process), or governments eventually wake up to the terrifying prospect of a 4 °C world and belatedly intervene with panic policy measures—such as an all-but instant high price on every tonne of CO<sub>2</sub>. In which case, the carbon bubble bursts, leaving trillions of dollars written off in stranded carbon assets all around the world—crashing the global economy in the process!

In a less obvious way, one can detect the same incumbency bias in the world of biotechnology. If one takes a medium-term perspective, it is clear that we need to source all the basic feedstock needed by the chemicals industry from biological sources rather than from petrochemicals. There are already plenty of smart innovators out there developing new processes to provide those bio-feedstocks—and the race is

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<sup>1</sup> Carbon Tracker and the Grantham Research Institute. 2013. *Unburnable Carbon 2013*.

on for what could be multi-billion dollar markets in a far shorter period of time than, what people can actually anticipate.

China is already investing massively in new industrial parks with a strong emphasis both on biofuels and bio-based products—particularly for biodegradable plastics. India is not far behind; Japan and South Korea are already leading in certain key areas. Brazil’s Bio-Ethanol Science and Technology Lab have set ambitious targets to ensure that Brazil keeps its lead on sugar-based Industrial Biotechnology developments.

There is as yet no coherent policy framework in the EU to support Industrial Biotechnology bio-based materials in general. It is true that private sector companies are dependent on the public sector to raise the necessary funds from investors to take forward their own innovations and development opportunities. But those investors are more cautious than they might otherwise be for lack of a coherent, appropriately ambitious policy framework. These barriers are covered in some detail in a report on “*Financing Industrial Biotechnology in the UK*” by the National Endowment for Science, Technology, and the Arts (NESTA).<sup>2</sup>

This points to a more proactive role for governments, in which they are less dependent on the perverse influence of incumbent industries (the fossil fuel companies in this instance) and more entrepreneurial in the way they support potentially high-growth areas even before that potential is fully seized upon by the private sector.

So, it remains a frustrating time for businesses seeking to bring forward new solutions to today’s sustainability problems. Some are getting bolder. For example, AkzoNobel has just announced that it will commit its entire research and development (R&D) budget to produce products and services that are more resource efficient, whilst others seem to be confused and demotivated by high levels of political risk. And those risks will not be eliminated until politicians start acting on the scientific evidence rather than on ideological prejudice.


***Jonathon Porritt is Founder Director of Forum for the Future  
www.forumforthefuture.org  
E-mail: JPOffice@forumforthefuture.org***

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<sup>2</sup> NESTA and the Technology Greenhouse. 2011. “Financing Industrial Biotechnology in the UK”, October.

# Green Innovations and Green Supply Chain Management

Alok Raj Gupta



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Climate change is real and simply making efforts to mitigate the impacts is no more an option. Every individual on the planet must take serious action in this direction. However, voluntary action in this case has been uncommon. Therefore, the most important factor, while we chalk out green strategies is designing the incentive (and disincentive) frameworks that encourage individuals, communities, and business corporations to make their actions accountable to the environment. This gets extremely crucial in the case of corporations, where business decision-making is based on the profitability quotient and has over the past century been hit by myopia. green strategies focusing on emission reduction by corporations need to bear in mind that we live in the age of capitalism, where large expenditure on philanthropy and altruism may make little sense. Now, this leads us to the following consideration:

For business-centric policies to be effective and sustaining, focus must be laid on returns and gestation period of those returns on investments towards environmental protection. It is alright if environmental benefits are positive externalities of some efforts and not an outcome of programmes focused directly on climate change, for example.

Therefore, we need options that overlap between activities that improve profitability and efforts that improve environment. One approach that caters to aforementioned consideration is “Green Supply Chain Management”. It is not hard to understand the origin of the concept. The traditional concept, which was first coined by the *Financial Times* in 1982, became a buzzword in the 1990s among operation managers and the most essential approach among corporations looking at aligning various steps involved before final delivery, is Supply Chain Management (SCM). Quite simply, therefore, supply chain management that leads to improvements in the environment is called Green Supply Chain Management (GSCM)—an approach to improve performance of the processes and products, ensuring that environmental damages are minimized. It covers all phases of the product’s life cycle from design, production, and distribution



phases to the use of products by the end users and its disposal at the end of its life cycle.

A large number of multinational corporations are investing in research and development of green products, establishing standards on cutting down the use of environmentally hazardous substances, and requiring supply chain partners to provide inputs that are free from hazardous materials at all levels of the supply chain system. GSCM has been adopted by some of the largest companies in the world like Texas Instruments, Dell, HP (Hewlett Packard), IBM (International Business Machines), Pepsi, Unilever, and Toshiba, who have made significant economic gains. For example, Texas Instruments saves about US\$8 million each year by reducing its transit packaging budget for its semiconductor business through source reduction, recycling, and use of reusable packaging systems (20 per cent annual savings). General Motors saved more than US\$30 million in six years through its resource productivity programme, they also reduced waste volume by 40 per cent. Pepsi Co. saved US\$44 million by switching from corrugated to reusable plastic shipping containers for one litre and 20-ounce bottles, conserving 196 million pounds of corrugated material. Pepsi also invested ahead of time to manage sustainability risks associated with speculated water scarcity. As a business critical raw material, water impacts input costs, competitiveness, and the ability to maintain production. The firm aims to reduce water usage intensity by 20 per cent between 2006 and 2015 across all manufacturing operations. Other than mitigating the production risk due to water scarcity, any move towards conservation would lead to community social welfare, and consequently improved brand perception. Apart from the leading companies, the list of modern age companies adopting green supply chain practices is constantly growing. This is a clear indication that corporations are now beginning to realize that integrating environmental considerations with business decisions can be a source of competitive advantage.

The prime reason why GSCM approach is gaining quick popularity is because it can promote efficiency and synergy among various entities (supplier-supplier, supplier-buyer), help in enhancing environmental performance, and reduce waste to achieve cost savings. All these lead to only one thing that a company cares about—improved margins in the foreseeable future. Ever since the industrial revolution, corporations continued to consume natural resources exploitatively and polluting the environment, even though they might have had the sense that their own action may have negative consequences on the business at some point in the distant future. However, because companies' decision-making has increasingly been based on shortened time horizons, they did not pay any heed to incorporating green principles in the business. For them

to care about it enough, they must know the measurable benefits of changing their traditional framework. Green supply chain offers strategies that lead to economic value addition (EVA) that can be experienced in the form of increased profit margins and higher revenue in the short-to-medium run.

Companies should identify where they lack and formulate the right GSCM strategy to generate greater benefits vis-à-vis working with the traditional SCM approach alone.

- **Rationalization:** This strategy directly focuses on managing the operational costs through SCM in order to achieve price competitiveness in the market, leading to greater sales and increased margins. Environmental considerations at every stage, integrated with cost reduction pursuits need to have programmes, such as waste reduction, energy efficiency, and resource optimization in place.
- **Synchronization:** It focuses on achieving reliable and efficient supply chain execution to ensure that the right product reaches the right destination at the right time, which depends upon how well every component within the chain [suppliers (one or more tier), manufacturer, distributors, and retailers] is co-ordinated to meet the just-in-time (JIT) schedule. To achieve better synchronization with regard to green supply chain management, it is essential that Environmental Management Systems (EMS) tools are developed and then integrated with the existing Enterprise Resource Planning (ERP) framework. The key element of synchronization strategy is that it leads to better planning with regard to existing assets and production schedules. What is achieved eventually is the overall optimization of the supply chain that leads to increased productivity with less wastage, and thus greater competence.
- **Customization:** This strategy focuses on achieving excellence in building unique products aligned with the need of customers. Offering products aligned to the consumers' needs raises customers' "willingness to pay", thus, boosting gross margins. Many studies have suggested that greener products (customized to the taste of growing environmental conscious consumers) lead to greater sales. Philips' Green Products sales reached US\$15 billion in 2012, which was 45 per cent of total sales.
- **Innovation:** The focus of this strategy is to increase the presence of the brand by means of introducing rapid, frequent, and effective new products. Climate change and other ecological concerns have changed the market dynamics changing more than ever before. Green innovation is not limited just to new products, but also the development of new resource efficient techniques of production.

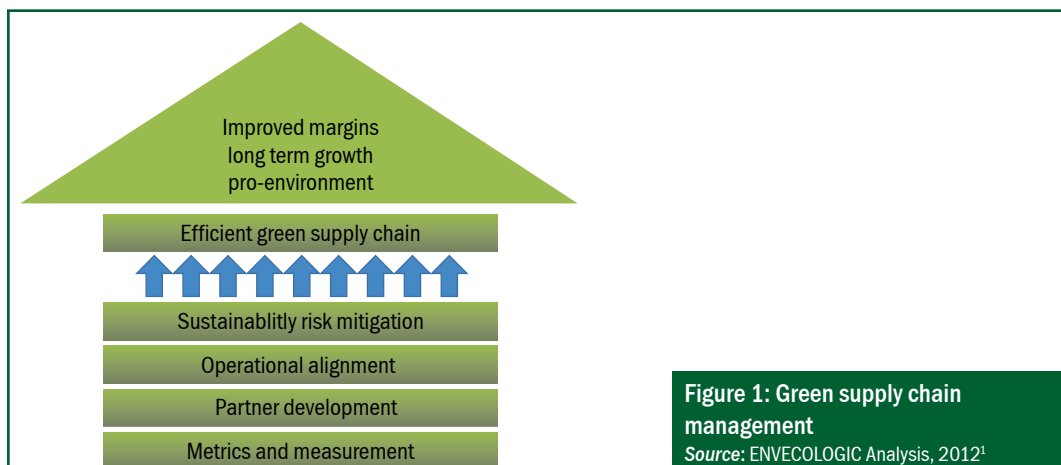
Table 1 highlights GSCM strategy that leads to outcomes in terms of product uniqueness or differentiation, specialized products targeting specific markets, and net profit margin and gross revenue.

While laying solid foundations of the GSCM framework for a company, it is particularly critical to:

- have the right set of metrics determined in order that robust data management framework helps in better analysis and planning
- identify partners specializing in green services that fills in the green gap in the company’s existing supply chain framework
- optimize the operation achieving both rationalization as well as synchronization, and

Table 1: Outcomes of GSCM strategy adoption				
Outcome	Rationalization	Synchronization	Customization	Innovation
Product Differentiation	X	X	√	√
Specialization	X	X	√	X
Net Profit Margin	√	√	X	X
Gross Revenue	X	X	√	√

Source: Jacoby (2009)



<sup>1</sup> ENVECOLOGIC Analysis. 2012. See website [envecollogic.com/services/green-supply-chain-management/](http://envecollogic.com/services/green-supply-chain-management/)

- formulate strategies to mitigate future sustainability risk appearing in terms of government compliances, for example.

The relevance of adopting green supply chain practices is greater in India than anywhere else. The current contribution of the manufacturing sector to the total GDP is 16 per cent. India has ambitious plans of increasing this share to 25 per cent by 2022. This critically hinges on the assumption that the sector operates efficiently, which is currently not the case. The Small and Medium Enterprises (SME) sector will be a significant contributor to the growth of manufacturing sector in India. Currently, SMEs contribute nearly 45 per cent share of manufactured output, accounting for 40 per cent in overall exports of the country. But, unfortunately the SME sector rates terribly on the efficiency scale. Rising input costs, including energy costs, unavailability of resources (especially power, fossil based fuels, etc.), poor logistics management, and lack of skilled labour force are some of the challenges that limit the sector from flourishing. If these companies are to survive, greening of the supply chain in the SME sector needs to be taken more seriously in India than ever before. Cost rationalization, by simple methods, such as energy conservations in sugar units of India could bring down operation costs and could have helped the industry survive.

Among barriers to the adoption of GSCM in India, lack of willingness to move away from the traditional practice is the most crucial, not just in the SME sector, but in large scale corporate houses as well. Only the top management can make such strategies, but their lack of knowledge or unwillingness to do so act as deterrent to the implementation of the strategies. Besides the willingness factor, the government can go a long way in encouraging GSCM practices in the Micro, Small, and Medium Enterprises (MSME) sector in India by means of offering incentives to build the required green supply chain infrastructure within the companies, training them on GSCM techniques, and so on. Corporations, in general, must also start incorporating sustainability or environmental risk in their overall risk analysis. Unless companies see environmental risks entering the business value chain, they will never be able to move from traditional supply chain management practices to green supply chain management practices.

In an age where markets are extremely dynamic and staying ahead of the competitors has become more challenging than ever, what adds to the existing complexities is the ever rising threat of climate change and fast depleting natural resources. Given such a scenario, adopting Green Supply Chain Management Practices

will not only help companies mitigate risk, but also enable them to transform risks into opportunities. GSCM will provide resilience to stand the test of the changing market dynamics by improving the company's adaptability to the changing times when much of the market and policy uncertainties are rooted in environmental issues.

## Reference

Jacoby D. 2009. *Guide to Supply Chain Management: How getting it right boosts corporate performance*. Economist Books.

***Alok Raj Gupta is an expert in the area of energy, environment, and sustainability economics and founder of ENVECOLOGIC***

***www.envecologic.com***

***E-mail: agupta@envecologic.com***

A project<sup>7</sup> titled, “Innovations for Green Growth in India” aimed at testing two hypothesis for OECD (Organization for Economic Co-operation and Development) and non-OECD countries. The datasets used included patent applications to the European Patent Office (EPO) in environment related technologies in 2008. The datasets were accessed from OECDstat.com. The findings are only indicative and we acknowledge the limitations of using patents as an indicator for innovations.

### **Hypothesis – 1**

Innovations for green growth in countries will be directed to sectors having competitive advantage.

#### ***Theoretical Basis***

Krugman (1979) argued that countries, rather than strictly aiming for least-cost solutions would prefer to adopt strategic behaviour, aiming for competitive advantage.

#### ***Findings***

It can be observed for OECD countries, for instance, that in Germany and Japan percentage share of innovation in the automotive sector is greater as compared to other patents in environment-related technologies. However, in case of non-OECD countries, no such conclusions can be drawn. Thus, for OECD countries competitive advantage plays an important role.

### **Hypothesis – 2**

Innovations for green growth in non-OECD countries would be directed more towards sectors that would contribute to human development.

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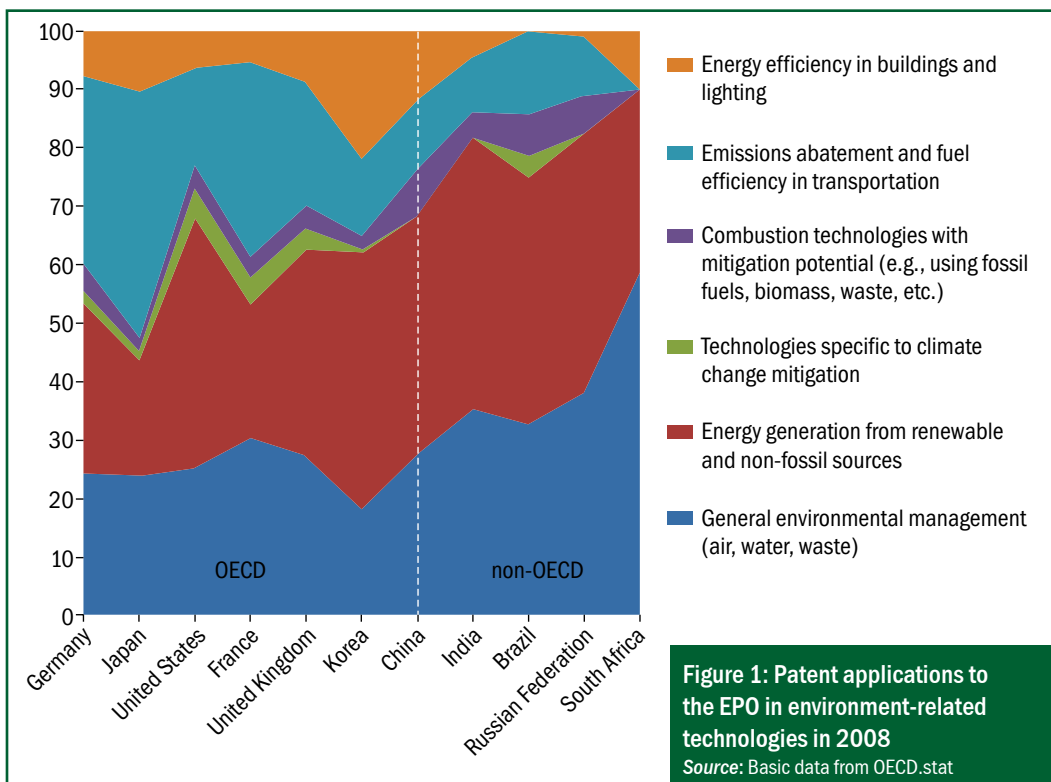
<sup>7</sup> We acknowledge UK-Aid for supporting the project titled, “Innovations for Green Growth in India”.

## Theoretical Basis

The link between natural environment and quality of life has been a treatise of recent schools of thought, such as ecological economics and sustainability sciences (Shafik, 1994; Dasgupta, 2004). The relationship between energy and human well-being is depicted in the relationship between per capita energy use and the Human Development Index (HDI) (UNDP, 2001; Najam and Cleveland, 2008).

## Findings

It can be observed, very clearly that for developing countries, including India and China, the percentage share of patents of the country in categories of general environmental management (air, water, waste) and energy generation from renewable and non-fossil sources is high. This could also be attributed to other factors, such as existing policies and institutions for local environment in non-OECD countries.



## Bibliography

Shafik N. 1994. "Economic development and environmental quality: an econometric analysis". *Oxford Economic Papers*: 757–773.

UNDP. 2001. "Energy and Human Well-being". United Nations Development Programme (UNDP): [hdr.undp.org/en/reports/global/hdr2001/.../goldemberg-energy-1.pdf](http://hdr.undp.org/en/reports/global/hdr2001/.../goldemberg-energy-1.pdf). Retrieved 29 September 2012.

Krugman P. 1979. "Increasing returns, monopolistic competition, and international trade". *Journal of International Economics* 9(4): 469–479.

Dasgupta P. 2004. *Human Well-Being and the Natural Environment*. USA: Oxford University Press.

Najam A and Cleveland C. 2008. "Energy and sustainable development at global environmental summits". *Encyclopedia of Earth*. P Bartelmus (Topic Editor) and C Cleveland (Editor). Washington, D.C.

***Shailly Kedia and Manish Anand, Associate Fellows,  
Green Growth and Development Division, TERI  
E-mail: [shailly.kedia@teri.res.in](mailto:shailly.kedia@teri.res.in); [manand@teri.res.in](mailto:manand@teri.res.in)***



## GREEN SHOWCASE

# Green Growth Best Practice (GGBP) Initiative

*GGBP Project Office*



The Green Growth Best Practices Initiative (GGBP) – [www.gGBP.org](http://www.gGBP.org) – is an effort to assess green growth planning and implementation practices around the world and find what works best under what circumstances, to assist policy makers and practitioners to improve the quality of green growth efforts.

GGBP comprises of a team of 73 authors representing all regions of the world, levels of government and diverse stakeholder groups in the assessment process.

GGBP will actively share the lessons and best practice with the wider communities through tailored outreach activities. The assessment result will be informed through a range of products including a synthesis report, a living handbook, briefing papers and other outputs tailored to users' needs which will be made available from November 2013.

### Partnership

Launched in October 2012, the GGBP is supported by three organizations - Climate Development and Knowledge Network (CDKN), European Climate Foundation (ECF) and Global Green Growth Institute (GGGI). Technical support for the project is provided by Ecofys (the Energy Research Centre of the Netherlands), the Joint Implementation Network (JIN), and the US National Renewable Energy Laboratory (NREL).

Fifteen organizations and initiatives serve on the Steering Committee providing strategic guidance and fostering linkages with their own programmes and other related initiatives.

GGBP is an affiliated programme of the Green Growth Knowledge Platform and the Low Emission Development Strategies (LEDS) Global Partnership.

## Priority Topics

Topics for the assessment are determined in consultation with more than 100 green growth policy makers and practitioners from around the world and refined by GGBP authors. They are:

Work streams	Topics
<b>Planning and Coordination</b>	<ol style="list-style-type: none"> <li><b>1. Planning and Coordination Processes</b> – What green growth planning approaches can best/ have proven to achieve long-term transformation, government agency and stakeholder buy-in, and mainstreaming with development programs?</li> <li><b>2. Monitoring and Evaluation</b> – What are the best practices with design and implementation of green growth monitoring and evaluation programs and feeding evaluation results into policy learning and implementation?</li> <li><b>3. National and Sub-National Integration</b> – What approaches have proven most effective for advancing green growth through coordinated programs at national and sub-national levels and across governments?</li> </ol>
<b>Analysis and Framing</b>	<ol style="list-style-type: none"> <li><b>4. Benefits and Building Support</b>- What approaches have been most/proven effective in building a case for a country or region to embark on a green growth plan and in evaluating and communicating development benefits to build decision-maker and stakeholder support?</li> <li><b>5. High-Level Vision, Targets, and Baselines</b> – What are the most successful approaches that countries have used in establishing well defined Green Growth targets and baselines and using these goals to drive design of green growth programs?</li> <li><b>6. Prioritization of Options and Pathways</b> – How have different approaches and tools been used to analyze and prioritize Green Growth options and pathways in order to effectively inform Green Growth Planning and Implementation?</li> </ol>
<b>Policies and Programmes</b>	<ol style="list-style-type: none"> <li><b>7. Policy Design</b> - What types of green growth policies and approaches to policy design and implementation have proven to be most effective at achieving concrete benefits through near-term wins and long-term social and economic transformation through green growth?</li> <li><b>8. Public and Private Collaboration</b> – What approaches have been most successfully used in green growth planning and implementation to engage with the private sector and to mobilise private sector leadership and action?</li> <li><b>9. Financing Strategies</b> - What measures are/proven most effective at mobilizing finance from domestic, international, and private sector sources for green growth?</li> </ol>

## GGBP Update, June 2013

Since January 2013, nine author teams have outlined the priority topics, recruited all chapter authors, defined the assessment methodology, conducted thorough literature reviews, identified cases for review and analysis, and produced the first draft results. Recently, a second author workshop was held on 30–31 May 2013. The author teams gathered to take key decisions on how to progress with the assessment of their chapters.

In the next few months, the author teams will finalise the first draft of their chapters for the launch in November 2013.

GGBP has established partnerships with more than 20 major international organizations and institutes, and conducted policy dialogues in key international events such as at the COP18, the African Green Growth Workshop held by the AfDB and OECD, the LEDS Global Partnership Annual Conference, and the Global Green Growth Summit. GGBP also launched an expert network to engage practitioners in the assessment.

## **Ways to Get Involved**

### **Join the expert networks and stay informed**

GGBP has established networks for each assessment topic to engage experts in identification of case studies and data sources, review of draft results, and dissemination of final results. Please contact Sangjung Ha—[sj.ha@gggi.org](mailto:sj.ha@gggi.org) if you would like to join these expert networks and be added to our distribution list to stay informed and get engaged with the project.

### **Engage as international partner**

GGBP is establishing strong linkages with other international green growth programs to collaborate in evaluating green growth best practices and disseminating and applying results to inform green growth planning and implementation. Please contact Ron Benioff—[ron.benioff@nrel.gov](mailto:ron.benioff@nrel.gov) if you would like to collaborate with GGBP.

*Contributed by  
Green Growth Best Practice Assessment Project Office  
Sangjung Ha, Project Officer, GGBP  
Global Green Growth Institute  
E-mail: [sj.ha@gggi.org](mailto:sj.ha@gggi.org)*

# Water and Energy Solutions for Sub-Saharan Africa

*G R Narsimha Rao*

The region below the Sahara desert is known as the sub-Saharan region. The cities of the sub-Saharan region are facing a serious environmental crisis. Deforestation, desertification, depletion of soil fertility, loss of biodiversity, and air and water pollution are few of the challenges faced by the region. Other than these, inadequate water for consumption as well as sanitation is a chronic problem. The UN statistics indicate that about 40 per cent of the urban population lack access to clean drinking water and 70 per cent lack water for sanitation in the region. A tremendous disparity is evident among the different cities in terms of water supply. The ground water is constantly depleting and the municipalities are highly undercapitalized.

The UN-HABITAT, known for its initiatives to promote healthy and safe living for the masses, in association with TERI, carried out a study in the sub-Saharan region and came up with a plan of action to improve water and sanitation facilities.

This project focused on three cities of sub-Saharan Africa namely, Accra, Ghana; Addis Ababa, Ethiopia; and Jos City, Nigeria. The main objective of the project was to:

- Improve system efficiency in municipal water systems, reducing costs, and adverse environmental impacts, while expanding water and wastewater services to the region's poor populations, specifically targeting the three cities, Jos, Accra, and Addis Ababa.
- Build capacity of municipalities, water utilities, private sector companies, and NGOs in the three cities focussed on urban infrastructure development.
- Create efficiency models based on capacity building partnerships with local water and wastewater municipal entities to ensure sustainability in the cities of Jos, Accra, and Addis Ababa.

One of the reasons identified for the deteriorating energy and water conditions of these cities was the inefficiency of the municipal corporations in the region. There were discrepancies in the utilization of resources and energy consumption patterns. It was found that by merely focussing on the elimination of energy-related inefficiencies



in water utility operations, the quality and quantity of water services to the sub-Saharan cities could be dramatically improved and increased.

The main focus of the project was identification of practical, sustainable, and economically viable energy saving opportunities in all pumping stations, after studying and analyzing the technical parameters in detail. TERI first established benchmarks for measuring improved energy efficiency in local water utility operations in all the three cities. Various types of data was collected and analysed in detail. This included energy consumption data, energy audit data, calculation of energy balances, energy efficiencies in water utility operations, etc. An elaborate mapping of the existing water system was conducted, in collaboration with the water supply organizations.

The energy audit consisted of energy assessment of water pumps, pump performance parameters, piping system characteristics, and also selecting the appropriate pump with respect to the system, identifying energy efficient opportunities for water pumps, computing projected energy savings, and most importantly, implementing these measures in the relevant water supply companies. The audit involved use of wide range of sophisticated and portable diagnostic and measuring instruments to generate refined data and facilitate complex analysis, to provide a reliable basis for evaluation of energy saving potential and economic viability.

During the study, there was continuous interaction with the pumping station personnel. All the recommendations were thoroughly discussed with the concerned officials and also in group meetings. There was close involvement with senior officials, which ensured the necessary co-ordination required to complete the study effectively. TERI helped to realize energy savings in the target cities with the help of the successful implementation of these activities. In the city of Accra, which is the largest city in Ghana, the energy saving potential was quite significant. Identified savings potential of as much as GH¢. 722,299<sup>7</sup> (US \$357,223) could be achieved by an investment of

<sup>7</sup> GH¢.(Ghanaian Cedi) is the currency of Ghana.



Figure 2: (From left) Electrical power measurements at Mexico Booster works, Addis Ababa; Demonstration of flow measurements using ultrasonic flow meter

about GH¢. 1,481,863 (US \$732,877). The total annual energy cost saving potential was calculated to be 18 per cent of the annual energy cost in Accra, which would improve the situation to a great deal. In Addis Ababa, the energy saving potential was about 200 kW of the total estimated pumping load of 3.27 MW. It worked out to be 6 per cent of the annual energy consumption. This was equal to a saving of Birr.<sup>2</sup> 1.12 million (US \$59,838), which could be achieved by an investment of about Birr.3.2 million (US \$170,968). The audit found out that a cost saving of Naira.6.12million (US \$37,988) could be achieved by an investment of about Naira 33.5 million<sup>3</sup> (US \$20,794) in Jos city. The total annual energy cost saving potential was 10.2 per cent of the annual energy cost.

An important aspect of this project was to strengthen the technical capacity of the local staff for carrying out energy audits of water and sanitation service providers. The energy audit helped in increasing awareness on energy issues at various levels of personnel in most of the pumping installations. Majority of the pumping installations were appropriately sized, based on the quantities at which they operate and the number of headers they serve. Water and electricity tariff were understood at various levels, and corrective actions were taken for the same. TERI recommended that it was necessary to form an “Energy Management Group” among the staff members to review and manage the energy issues. A guidebook on *How to do Energy Audits in sub-Saharan African water utilities* was prepared along with a course module to successfully carry out energy audits in future.

Improvement of water and sanitation facilities is extremely necessary for sustainable growth and development of a nation. An economy can progress only when the fundamentals are correct. Safeguarding water and energy facilities is important for a stable economy.

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<sup>2</sup> The Birr is the unit of currency of Ethiopia.

<sup>3</sup> The Naira is the currency of Nigeria.



Regions that suffer from inadequate water facilities, directly impact the health of the population. United Nations warns the world that about 80 per cent of diseases and about 30 per cent of deaths in developing countries are attributable to water. Sub-Saharan Africa is exposed to extreme climatic conditions as compared to other regions and hence, needs strengthening at the earliest. Thus, improved water-storage facilities and operations of water municipalities, along with efficient plant functioning is bound to bring in positive changes in the region.

***G R Narsimha Rao is Associate Director,  
Industrial Energy Efficiency Division, TERI  
E-mail: [grrao@teri.res.in](mailto:grrao@teri.res.in)***

# Krishi-Dhan 2011: A Multi-Stakeholder Forum to Showcase Contemporary Dimensions in Agrarian Sector

*Swati Tomar and Prathmesh Chourey*

**A**griculture and its allied sectors have predominantly been regarded as the backbone of the Indian economy. In the race towards urbanization and development, agriculture and its related activities are often not given the importance they merit. The percentage share from the agriculture sector to national Gross Domestic Product (GDP) has declined steeply from 30 per cent in the year 1990–91 to a mere 12.3 per cent in the year 2010–11.

We often tend to associate only farmers with agriculture. Although they are an indispensable part of the agrarian system, there exists a complex and symbiotic relationship between the farmers and the other links in the supply-chains and allied industries. Considering the tremendous potential in the agrarian sector, opportunities in this sector need to be tapped. At the same time, youth are constantly on the lookout for new avenues and keep exploring new options. Keeping this in mind, TERI developed the concept and designed a forum to offer an insight into the future dimensions and contemporary business opportunities in the agricultural sector under the banner of “Krishi-Dhan 2011”. It was a first-of-its-kind endeavour designed to offer an insight into the future dimensions and business opportunities in the modern agri-sector. The central theme of Krishi-Dhan 2011 was tag lined “Green-to-Evergreen” with an intention of introducing eco-friendly and energy-efficient concepts to ensure sustainable agricultural practices.

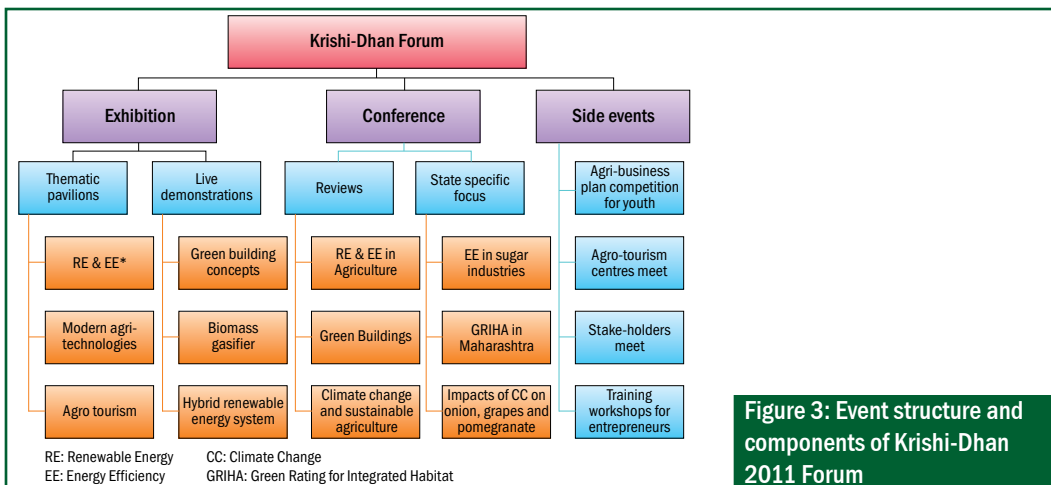
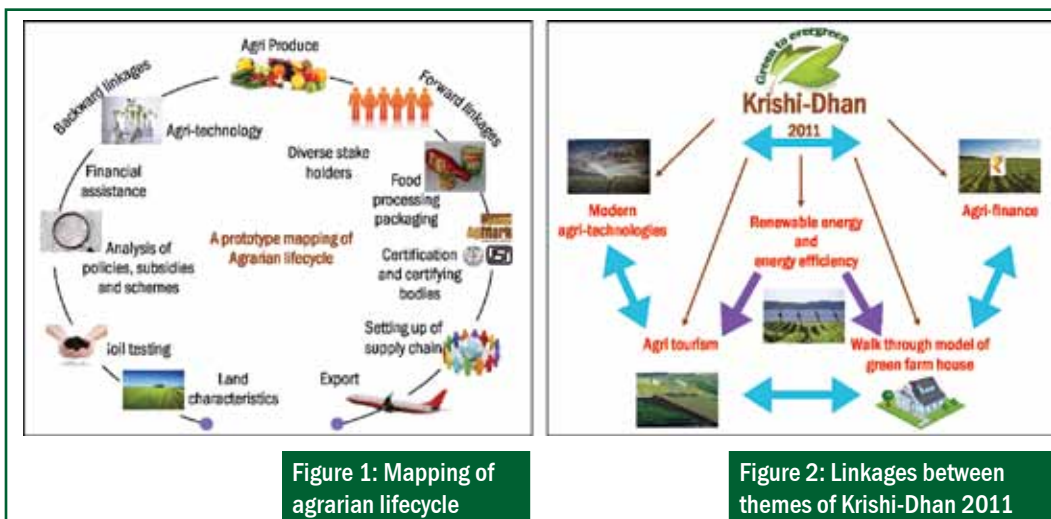
Main objectives of Krishi-Dhan (2011) were as follows:

- To create awareness and capitalize on—
  - Existing options for diversification in the agri-business sector like any other mainstream profession
  - Opportunities for additional revenue generation
  - “Sunrise sectors” like the agri-tourism and renewable energy sector
- To inspire and attract the Gen Next and budding entrepreneurs to the modern agri-sector.



- To showcase several success stories across India.

The forum provided an interactive platform involving diverse stakeholders, including farmers, entrepreneurs, policy experts, environmentalists, architects, scientists, members of academia, youth, and so on. The thematic event and their linkages are depicted in Figure 2. Through this programme, TERI showcased and introduced the integration of various technologies, such as applications of renewable energy, green building concepts, and modern techniques aimed at revolutionizing the traditional agricultural practices. A list of diverse cross-sectoral events was organized under the forum of Krishi-Dhan 2011 (depicted in Figure 3).



**Figure 3: Event structure and components of Krishi-Dhan 2011 Forum**

## Green Showcase

To impart technical know-how and create awareness about energy-efficient infrastructure and green building material, a walk-through model of a green farmhouse was constructed at the Krishi-Dhan 2011 exhibition. GRIHA<sup>1</sup> as well as all the resource efficient and pro-environment yet cost-effective options like eco-friendly paints, Bureau of Energy Efficiency (BEE) star-labelled efficient electrical appliances, solar cookers, smokeless *chulha*, solar pumps, fibre cement boards, roofing sheets made from 100 per cent recycled material, water-efficient closets, faucets, and so on was highlighted.

Similarly, a working model of TERI's patented biomass gasifier technology was set up at the exhibition to demonstrate how biodegradable waste like coconut shells, tree prunes or dry biomass from agricultural waste can be utilized to generate energy, which could be further used for electrification, pumping, thermal applications, and other decentralized power generation projects. The plant generated 5.7 kW of energy through a feed of 9.8 kg/ hour of dry biomass (coconut shells and wood chips) and was used for running a water pump on site. The concepts showcased through this live demo could easily be adopted at an individual or organizational level and could be extrapolated while developing the stand-alone residential units, farm houses, new agri-tourism centres, and hotels.

Introducing youth to the sunrise sector was again the central focus and several events like agri-business management competition, training workshops on new avenues of agriculture, and showcasing of agri-tourism concept were organized.



Figure 4: Walk through model of a “Green Farm House” based on GRIHA criteria

<sup>1</sup> Green Rating for Integrated Habitat Assessment (GRIHA) is developed by TERI and adopted by the Ministry of New and Renewable Energy as a national building rating system.



Figure 5: Working model of TERI's Biomass Gasifier

Feedback of the Krishi-Dhan event revealed that the forum provided an interactive platform for the stakeholders. The technology partners who showcased their new and innovative products, be it health drinks, or waste as resource, received positive response and were able to bridge the gap between research and commerce. The agri-tourism centres learnt about the alternative Renewable Energy technologies, which helped them to add a new dimension to their existing business.

Agriculture being a core sector of the Indian economy, should not be neglected. Such initiatives will help to introduce sustainable practices and inculcate interest among the youth to ensure security of the agricultural sector as a whole.

***Swati Tomar and Prathmesh Chourey, Research Associates,  
Sustainable Habitat Division, TERI  
E-mail: [swati.tomar@teri.res.in](mailto:swati.tomar@teri.res.in); [prathmesh.chourey@teri.res.in](mailto:prathmesh.chourey@teri.res.in)***

The Energy and Resources Institute launched an initiative<sup>1</sup> on clean energy based interventions for livelihood generation in rural areas under the Norwegian Framework Agreement 2008. The objective is to create knowledge for effective decentralization of energy projects and specifically for the 2,000-MW off-grid solar projects planned under the Jawaharlal Nehru National Solar Mission (JNNSM) in India. The project was initiated in 2010 and currently clean energy systems have been installed in the states of Assam, Odisha, and Uttar Pradesh. Installation of systems in Madhya Pradesh will be completed by August 2013. Two main technology configurations have been implemented, the Solar Multi Utility (SMU) and the Solar DC Micro Grid (SMG). The SMU has been implemented in one site in Assam, three sites in Odisha, and is to be implemented in two sites in Madhya Pradesh. The SMG has been implemented in 34 sites in Uttar Pradesh. The project focuses not just on technology, but other crucial aspects of sustainability, including capacity and institution building as well as business models. This article aims to highlight the institutional processes for the four project sites where SMUs are providing clean energy access to rural communities for livelihood generation activities.

Through extensive livelihoods assessment exercises, a variety of options, such as grinding, food processing, manure mixing, de-husking, fruit pulp processing, refrigeration, water purification, TV/DVD services, and so on have been identified. At each site, different stakeholders, including local NGOs, Self Help Groups (SHGs), Farmer's Associations, local banks, and entrepreneurs have been consulted to decide the most suitable livelihood activities. Additionally, members from each of the above stakeholder groups have been collectively organized to form village energy associations

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<sup>1</sup> Acknowledgement: The author gratefully acknowledges support received for a range of activities under the Framework Agreement between the Norwegian Ministry of Foreign Affairs (MFA) and The Energy and Resources Institute (TERI) through Royal Norwegian Embassy and Department of Economic Affairs (DEA), Ministry of Finance, Government of India.

or committees for owning and overseeing the operations of the entire power plant and associated activities. In some cases, monetary contributions from the community have been sourced in order to create greater ownership and to validate the possibility of different business models. Institutional models followed in the four states are provided in Table 1.

As an on-going action research project, several challenges and solutions are encountered during project execution. Some of these lessons learnt and areas of work for the future is summarized as follows:

- Advances in technology to improve reliability even at a slightly higher cost are important in rural and remote locations where service networks are weak.
- Systems should be designed such that they are grid compatible to ensure no loss in the solar plant operator’s business on the arrival of the grid or better electricity supply.
- Efforts need to be made to develop guidelines on design of distributed generation systems, including guidelines on tariffs and grid interconnectivity.
- On the design side, replication, rather than scale up is important—that is, customizing technologies to suit user needs, experience with technology, and future demands is essential to project.

This project highlights crucial aspects of sustainability that include capacity building, business models, and institution building for the four project sites. The project followed

Table 1: Business and institutional models				
Features	States			
	Assam	Odisha	Madhya Pradesh	Uttar Pradesh
Type of System	SMU	SMU	SMU	SMG
Local Institutions	NGO, SHGs, Cooperatives	NGO, SHGs, Farmer’s Associations and Producer Company	NGO, SHGs, Village Development Committee	Individual entrepreneur
Model	100 per cent grant. Community/SHGs pay varying service charges.	20 per cent contribution from the NGO and community. Community/SHGs pay varying service charges.	20 per cent contribution from the NGO and community. Community/SHGs pay varying service charges.	45 per cent contribution by the entrepreneur. Links with banks established to take loans. Customers pay Rs 5/- per day or Rs 150/- per month.
<i>Source:</i> Author compilation				

an interdisciplinary mode by bringing together people with different skill sets, different knowledge domains, and differing views of development. The process has been challenging, but this initiative is a step forward, and a step in the right direction to realize sustainable development through inclusive green growth.

### CAPACITY BUILDING THROUGH TRAINING ON LIVELIHOOD GENERATION ACTIVITIES

Training is an essential aspect to facilitate decentralization and developing the capacities of the local community to not just utilize technology in an appropriate manner, but also to use the technology to produce better products and market them. As part of the project, an extensive training and capacity building schedule has been planned and is currently being executed in states where the installation is complete. Training is provided on operations of technology (Solar PV), use of livelihood generation appliances (such as grinders and mixers), and management of energy businesses. For example, training was provided to SHG members in Baunsadiha Village of Odisha to use the SMU to grind *sattu*, which is a nutritional food mix sold to schools for the mid-day meal programme of the government. In another capacity building activity, SHG members were trained to use SMU to pump water for starting a nursery.



Training of SHG members for using grinding appliances



Training of SHG members for using water-pump

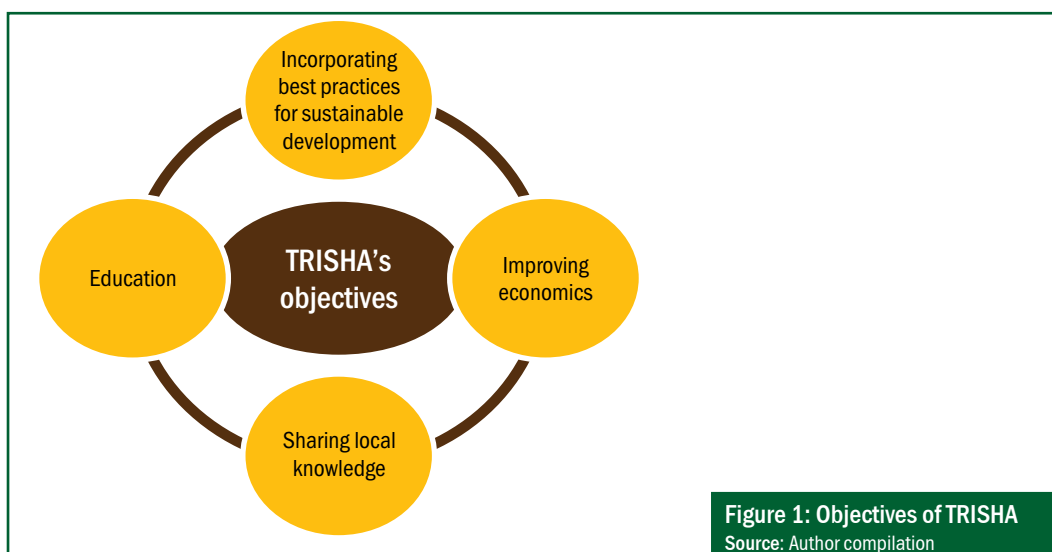
***K Rahul Sharma is Research Associate,  
Energy Environment Technology Development Division, TERI  
E-mail: k.sharma@teri.res.in***

## The Story of P.E.O.P.L.E: Determination to Achieve Sustainable Livelihoods

*Nidhi P Chanana and Nidhi Mehra*

The farmers of Ramgarh and Dhari blocks of Nainital district, Uttarakhand grow traditional crops like potato and other vegetables. The crops often fail either due to lack of precipitation or unpredictable and incessant rains leading to major pest infestation. Besides, these being input intensive crops, small farmers get poor yields due to their inability to afford the input costs. In addition, small fragmented land holdings and difficult terrain make matters worse. This leads to meagre returns. Human-animal conflict further aggravates the situation. Hence, such hardships have been compelling the rural community to either survive on subsistence agriculture or shift to other lucrative occupations or eventually migrate for better opportunities.

TERI has initiated efforts by establishing TRISHA<sup>1</sup> (TERI's Research Initiative at Supi for Himalayan Advancement) at Supi in Nainital district of Uttarakhand in 2003,



<sup>1</sup> The TERI team consisted of Dr Nidhi P Chanana, Ms Nidhi Mehra, Dr Alok Adholeya, and Mr Girdhar Sharma.

where 7.5 hectares of land was provided on lease for 30 years to the farmers by the Government of Uttarakhand. Since agriculture is the main occupation, research and extension has been largely undertaken to improve the livelihoods of local farmers.

In 2007, TERI initiated work on improving livelihoods through bio-innovations with support from Department of Biotechnology, Government of India, and subsequently, NABARD (National Bank for Agriculture and Rural Development).

The aim was to develop the aromatic and spice crop value chain as a viable approach for providing financial security to the marginal farmers of the selected villages.

### Efforts Towards Self-sustainability

As the farmers were looking for respite from these tribulations, they were keen to adopt new crops/technologies that could minimize risks emanating from weather extremities. The crops that were initiated into farming were scented geranium, parsley, oregano, rosemary, and garlic. Planting material was provided to farmers for cultivation in their under-utilized land. These crops were introduced as they could be grown on fallow land and that too almost round the year; and required less water and agriculture inputs. Moreover, animals do not damage these crops; hence providing better income in small and fragmented land holdings. TERI also provided market linkages to the farmers by arranging buy-back of the produce.

Besides, providing the farmers with innovative solutions to address problems related to water scarcity. The initiative also ensured local participation on a larger scale and fortified the backward linkages of the entire value chain. Providing roof-top precipitation harvesting infrastructure linked to low-cost tanks proved highly relevant and was able to meet the water requirement of the crops grown by farmers. It solved the problem of seasonal requirement of water. Artificial recharge by roof-top harvesting is an option to store water during the months, and surplus water is available to be used, especially during months of water scarcity. Another innovation was the use of drum kit type drip irrigation technology. Being gravity based and hence apt for the hilly terrain, it minimizes the initial capital cost with no electricity requirement. Hence, this technology provided critical irrigation to the aromatic crops and increased the water use efficiency by almost four times.

For essential oil extraction from scented geranium, two oil distillation units have been established in Supi and Satbunga villages. Currently, farmers bring the herbage of scented geranium from their fields and extract the oil.

With this vision, TERI facilitated farmers to establish a self-help group called P.E.O.P.L.E. (Promotion of Essential Oil Production for Livelihood Enhancement), which



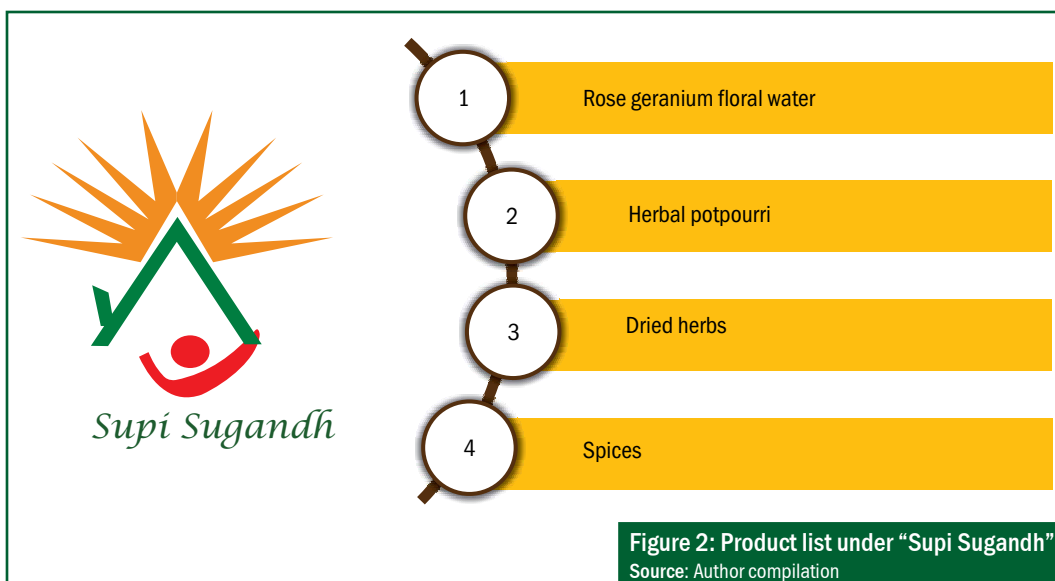
is responsible for development of value added products from medicinal and aromatic plants, such as dried herbs, oil, and hydrosols. Products are being sold under the umbrella brand of “Supi Sugandh”.

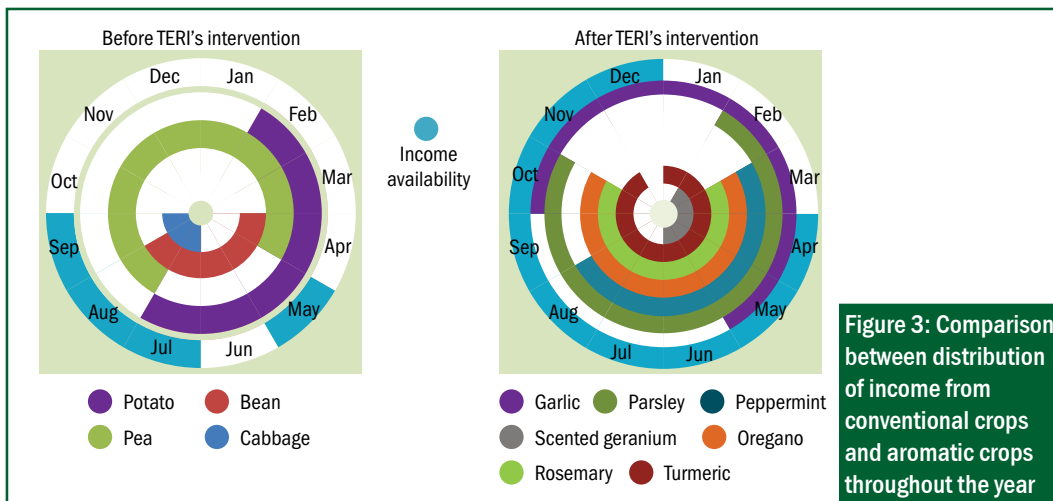
### Waves of Change: Payback of Sweat

**Employment generation:** The project has heralded new employment opportunities for local youth as they got acquainted with new farming systems and water management technologies to go beyond their conventional systems. They were sensitized towards micro-entrepreneurship to earn better livelihoods for their families.

**Standard of living:** As women were involved in most of the operations of this value chain, they got an opportunity to participate and gain knowledge about new activities. This, in turn, boosted their confidence and even helped reduce their drudgery.

**Income of the rural people:** The increase in herbage and subsequently essential oil through efficient water management led to better returns. The farmers attained additional remuneration from the cultivation of the aromatic herbs. On an average, the farmers received ₹75,000–200,000 per hectare annually from cultivation of parsley, oregano, rosemary, and geranium cultivation. Besides, cultivation of aromatic crops assures well distributed income throughout the year in comparison to conventional crops.





**Environment conservation:** The initiative led to conservation of environment through efficient use of water. Water use efficiency increased four times due to the use of drum type drip irrigation. Around 1 to 1.5 lakh litres of rainwater was harvested annually using roof-top water harvesting system per household depending upon whether the roof is sloping or flat. TERI's interventions brought fallow/under-utilized land under cultivation and led to water saving by 50 per cent through cultivation of aromatic herbs vis-à-vis that of potato. Lesser use of chemical and fertilizer and use of bio-inputs, such as vermicompost helped enhance soil productivity.

## Conclusion

Our vision throughout this initiative has been to develop a self-sustaining system for the farmers, which can perform against challenges and can assure better returns. The concept is easily replicable because of the low costs involved. Hence, we are working for scaling it up so that more and more marginal farmers can participate and can gain benefits from this initiative.

*Dr Nidhi P Chanana, Fellow,  
Biotechnology and Bioresources Division, TERI  
E-mail: nidhi@teri.res.in*

*Ms Nidhi Mehra, Research Associate,  
Biotechnology and Bioresources Division, TERI  
E-mail: nidhi.mehra@teri.res.in*

## BOOK REVIEW

# Human Development Report 2013 – The Rise of the South: Human Progress in a Diverse World

*Ritika Sehgal*

The Human Development Report 2013 is the 22nd publication commissioned by United Nations Development Programme (UNDP). The report focusing on “The Rise of the South,” provides interesting insights on how the developing countries in recent years had significant human development gains, turning them into dynamic, major economies. The key factors leading to this fast paced growth are, sustained investment in education, health care, and social programmes, along with continuous engagement with the outside world. Further, the report also highlights that economic growth alone does not automatically lead to advances in human development, but to sustain the pattern of development, the essential ingredients are pro-poor policies and sizable investments in peoples’ capabilities, such as education, nutrition, and health.

The report examines the varied aspects of the “rise of the south” and its implications for human development. The analysis of the HDI values on both income and non-income criteria for the past ten years have shown significant progress in the fields of education, health, and income generation, particularly for developing economies. An interesting result to learn is that with the remarkable transformation of a large number of developing countries, it has been projected that by 2050, the combined output of three leading developing countries—Brazil, China, and India—will account for 40 per cent of the global output. The report also identifies about 40 countries that have gone beyond expectations with respect to human development.

Given that in the past few years there has been focus on technical innovation and creative entrepreneurship in the South; the private sector in the South can capitalize on opportunities and innovate with products and processes that are better suited to local needs. The second chapter in the report expounds details of how the countries in the South have become significant players in the world economy leading to their transformation,

## Book review

both locally and globally. Other chapters lay stress on the drivers, strategies, and future challenges for the world, particularly for developing countries. In conclusion, the report talks about the future era of partnerships—through regional arrangements and bilateral partnerships—as the emerging economies will also be influencing culture, science, and environmental peace and security, resulting in a more diverse global civil society. The report provides useful insights on the next phase of global development. This report is a must read if you are a close observer of the progress being made by emerging countries.

## Reference

UNDP. 2013. *Human Development Report 2013 - The Rise of the South: Human Progress in a Diverse World*. New York: United Nations Development Programme.

***Ritika Sehjpal, Research Associate,  
Green Growth and Development Division, TERI  
E-mail: ritika.sehjpal@teri.res.in***

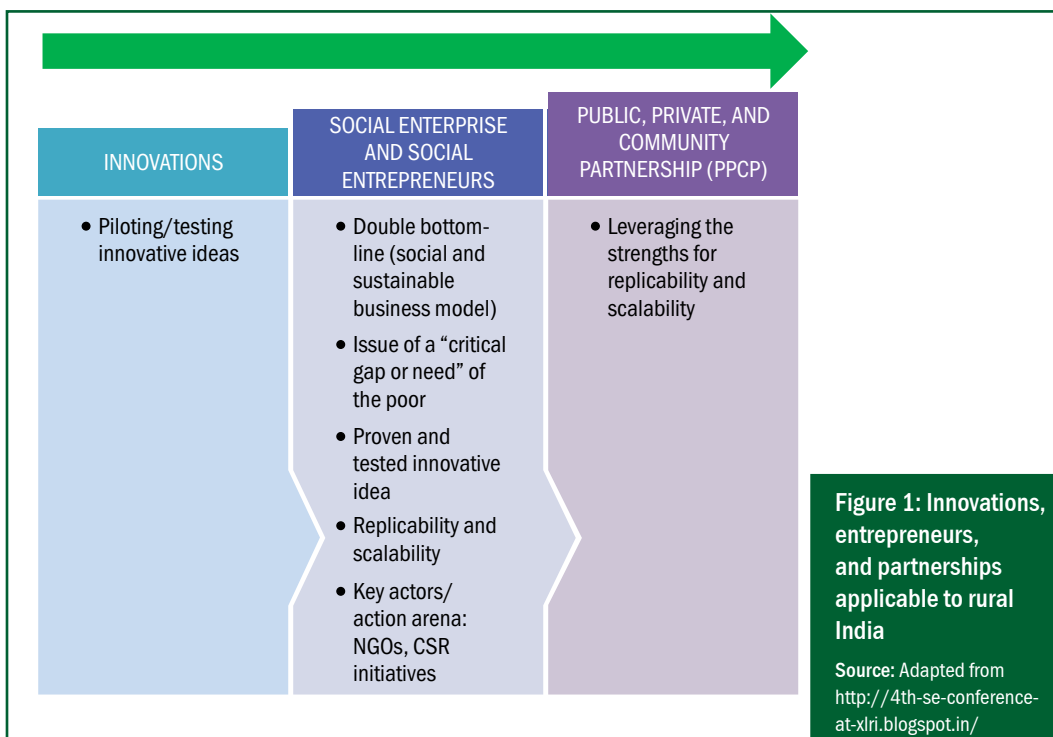
# GREEN GLOSSARY

## Green Skills

Green skills are the knowledge, training or experience as they relate to technologies or materials that minimize environmental impact (ECO, 2010). In context of rural development in India, as highlighted in a recently released report by the United Nations Development Programme (UNDP) and the Ministry of Rural Development (MoRD), green skills would entail targeting groups, including masons, farmers, and natural resource managers. The National Rural Livelihood Mission (NRLM) under the MoRD pays special emphasis on building skills of self-help groups.

## Green Entrepreneur

A green entrepreneur can be either making her business “green” or simply entering a “green business”. In other words, green entrepreneurship could be defined in terms



of the technology used for production in any sector of the economy, or in terms of the sectors in which the firms are active, in which case our attention is restricted to parts of the economy producing specific types of output (OECD, 2011). The NRLM programme<sup>7</sup> aims at fostering entrepreneurship in rural India through identification and mobilization of potential entrepreneurs.

### References

OECD. (2011). "Entrepreneurship at a Glance 2011". Chapter 2: Measuring Green Entrepreneurship

ECO. (2010). Environmental Careers Organization, Labour Market Research Study: Canada

OECD. 2011. "Entrepreneurship at a Glance 2011". OECD Publishing, [http:// dx.doi.org/10.1787/9789264097711.en](http://dx.doi.org/10.1787/9789264097711.en) Measuring Green Entrepreneurship

ECO Canada. 2010. Profile of Canadian Environmental Employment Labour Environmental Careers Organization, Labour Market Research Environmental Careers Organization of Canada

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<sup>7</sup> <http://www.aajeevika.gov.in/Best-Practices/Rural-Entrepreneurship-thru-RSETIs.pdf>. Accessed on 6 June 2013.

## GREEN UPDATES

### **Green Growth Strategy of the United Arab Emirates (18 May 2013)**

The UAE Government is pursuing a holistic policy development approach in formulating its green growth strategy. UAE's action plan on green growth will be targeted for sectors including oil and gas, water and electricity, transportation, buildings, waste management, industry and agriculture. The UAE government is of the view that green growth has the potential to generate sustainable energy and enhance economic competitiveness by generating more jobs and investment in green industries.

More: <http://gulfnews.com/news/gulf/uae/environment/uae-to-announce-action-plan-for-green-growth-strategy-by-end-of-this-year-1.1184015>

### **World's Biggest Coal Company, Coal India Gets into Solar Power (27 May 2013)**

The largest coal company in the world, Coal India has decided to set up solar power projects across the country, the first of which would come up at Sambalpur in Odisha. Coal India has been producing 90 per cent of India's coal, and with its move to get into solar power, it is setting an example of an efficient business practice. Coal India plans to pursue not only commercial solar power plants, but is also keen on installation of rooftop solar panels at its own mining research centres and staff colonies with the goal to reduce the company's energy bills.

More: <http://www.dnaindia.com/money/1839903/report-coal-india-gets-into-solar-power>

### **Global Energy Forum in Vienna (28 May 2013 – 30 May 2013)**

Heads of State, ministers, energy experts, representatives of international and non-governmental organizations, academia, civil society, and the private sector came together to participate at the Global Energy Forum in Vienna, Austria. The theme of the event was "One year after Rio+20: The Energy Future We Want"; and the participants addressed a range of issues including energy access, financing of energy future and development of energy sustainable development goals.

More: <http://www.unido.org/media-centre/upcoming-events/vienna-energy-forum-2013.html>

**“Think, Eat, Save” the Theme of World Environment Day 2013 (5 June 2013)**

5th June was declared as the World Environment Day on the recommendations made by UN Conference on Human Environment in 1972. The UNEP through the celebration of World Environment Day spreads awareness and gets citizens’ support for environment protection across the globe. The theme for this year’s World Environment Day was “Think, Eat, Save”. The campaign calls for minimizing waste of food at all stages of the food chain, from farm to fork.

More: <http://www.moef.nic.in/content/think-eat-save-moef-observes-world-environment-day>

**Bonn Climate Change Conference (3 June 2013 – 14 June 2013)**

The UN Climate Change Conference in Bonn, Germany took place from 3–14 June 2013. The “Ad Hoc Working Group on the Durban Platform for Enhanced Action” (ADP), asked to design the new agreement and to raise near-term global ambition to deal with climate change, was meeting for the second time this year. A key focus of the ADP negotiation in Bonn was on how to transform the world’s energy systems quickly enough towards low-carbon, including renewable energy, energy efficiency and the consideration of carbon capture and storage.

More: [http://unfccc.int/meetings/bonn\\_jun\\_2013/meeting/7431/php/view/press.php](http://unfccc.int/meetings/bonn_jun_2013/meeting/7431/php/view/press.php)

**Global Green Growth Summit in South Korea (10 June 2013 – 11 June 2013)**

The third Global Green Growth Summit jointly organized by South Korean government and the Global Green Growth Institute (GGGI) took place in Seoul, South Korea. The summit focused on the nexus between finance, innovation, and policy. Discussions also revolved around the Green Climate Fund with GGGI being a sister agency. The summit witnessed participation from the top economic and environmental policymakers; and representatives from various environment-related non-governmental organizations and civil society groups.

More: <http://www.gggsummit.org/>



## INVITATION FOR CONTRIBUTIONS FOR VOLUME II, ISSUE 1

*Green Growth and Development Quarterly* aims to facilitate knowledge and learning processes which will help in enhancing the capacity on emerging 'green' policy concepts. It is a step towards a forward looking knowledge process for new opportunities linked with growth and sustainable development. The quarterly showcases new research and innovative practices through engaging with stakeholders from government, business & industry, and research & academia. We invite contribution for the fourth issue of the quarterly under following sections:

Type of contribution	Description	Length (approx.)	Illustration
<b>Articles</b>	Covers analysis through original research, reviews and commentaries on topics of policy relevance	2000-2500 words	As required
<b>Green Analysis</b>	Features qualitative analysis or fact sheet for policy issues around environment sustainability	800-1000 words	One supporting exhibit
<b>Green Showcase</b>	Features research, good practices and initiatives	600-800 words	Preferably 1
<b>Green from the Grassroots</b>	Features insights from initiatives that involve interaction with communities and people	600-800 words	Preferably 2 photos

## Other specifications

### Schedule

For consideration in Volume II (Issue 1), submissions are required with illustrations latest by 20 August 2013, to [ggd@teri.res.in](mailto:ggd@teri.res.in)

## Language & Style

The language should be factual, experiential, crisp and clear. Authors are prompted to avoid academic, bureaucratic or politicized terminology. Your text will be style edited by a professional editor. However you are kindly asked to consider the following style guide:

- Use British English spelling.
- Use Oxford style ([http://www.askoxford.com/dictionaries/compact\\_oed/?view=uk](http://www.askoxford.com/dictionaries/compact_oed/?view=uk)).
- Use only metric units.
- In the text put numbers in numerals.
- When using acronyms for the first time, spell them out and put the abbreviation in parentheses.

## Illustrations

Include any credits and permissions to print that may apply to illustrations.

Illustrations should have the following format:

- Photographs should be high resolution (jpeg format).
- Graphs and figures should be submitted separately with excel sheet.

## References

Please provide complete references and citation in APA style. It should be listed in alphabetical order at the end of the article.

## NOTES



# Green Growth and Development Quarterly



Green Growth and Development Quarterly aims to understand the many facets of inclusive and green growth. It is a step towards a forward looking knowledge process for new opportunities linked with growth and sustainable development. Volume I (Issue 4) of the quarterly showcases new research and innovative practices through engaging with stakeholders from government, business & industry, and research & academia.

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## For more details, please contact:

### Editorial team

Green Growth and Development Quarterly  
The Energy and Resources Institute  
Darbari Seth Block, India Habitat Centre, Lodhi Road, New Delhi – 110 003, India  
Email: [ggd@teri.res.in](mailto:ggd@teri.res.in)



The Energy and Resources Institute

