

Cleaning River Ganga Will Be India's Biggest Sustainability Project

Cleaning up River Ganga will be the most challenging river renewal project ever undertaken by any country. Just as the project size and resources are mind-boggling, if implemented with earnestness and efficiency, its impact on the eco-system and people will be phenomenal. The good news is that the Modi government appears committed and this is big news for people dependent on the river for livelihood and salvation

By ***Benedict Paramanand***

Here's some statistics to show the colossal nature of the Ganga project. The river provides water to about 40% of India's population in 11 states, livelihoods of over 500 million people in India are dependent upon the river, and one-third of India's population lives within the Ganges Basin. It flows through the most densely populated regions passing 29 cities with population over 100,000, 23 cities with population between 50,000 and 100,000, and about 48 towns.

This, then is a massive sustainability project as well? Firstly, renewal of a river will also mean a better eco-system for flora and fauna to flourish. They in turn help in balancing the river's oxygen levels.



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Purpose : To excite Indian businesses, SMEs, executives and students about the immense business opportunity in not only adopting Sustainability as Strategy in their companies but also inspire them to the possibilities of a big market for innovative sustainability products and services.

Editor

Benedict Paramanand

Editorial Advisors

Madan Padaki

CEO, Head Held High

Vasanthi Srinivasan

Faculty, IIM Bangalore

Chairperson, Centre for

Corporate Governance & Citizenship

Editorial Coordinator

Suchitra Jayaprabhu

Rishabh Media Network

22, 1st A Main, G M Palya, Bangalore - 560 075, India

Phone - 91 80 41126557/9880602275

benedict@managementnext.com

www.sustainabilitynext.in

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The clean-up of the river will change the future of thousands of polluting companies. They have to either adhere to strict norms or close down. Indirectly, this will improve the living conditions of the people around these areas as well as the health of the workers.

The revival plan includes providing affordable toilets in thousands of villages that are on the banks of the river and its tributaries. The impact of this is multi-pronged. It will not only stop sewage from entering the river, it will help in generation of gas from it, if they venture into biogas. Even better, it will improve rural women's health thereby improving the overall vibrancy of rural life. It will also mean lower health costs on poor families, a much-needed saving for investing in things like children's education.

The scientific cremation facilities like electric crematorium will vastly enhance the ecology of the ghats which currently are in a dismal condition. This will minimize use of wood which will help the forests survive longer. It will ensure greater dignity to the dead which, currently, is a luxury especially for the poor.

Ironically, the river runs through some of India's most fertile lands where a majority of India's poor live. The massive eco-tourism potential can help hundreds of thousands of people move up their subsistence living standards. If the proposed navigation channel from Allahabad to Haldia in West Bengal becomes a reality, it could offset a lot of carbon that is currently burned by trucks.

The massive floods that killed thousands of people two years ago were the result of afforestation due to unscientific hydro-electric power stations. Ganga renewal project should also include massive afforestation of the catchment areas by local communities, not government agencies. The temptation to build hydroelectric projects at the cost of the long-term effect on the eco-system should be contained.

The Ganga revival project should be put on a mission mode with the best of minds working on it. Fortunately, foreign technology and experience are available easily. The easily \$15 to 20 billion project will need a decade to see results.

A large degree of openness to different views and keeping the long-term interest of the whole river system will be needed if this project is to succeed. It will require a leader who not only has a missionary zeal but also sound execution abilities. Minister Uma Bharati has the first; but she may have to learn the second quickly.

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Minister Uma Bharati offering prayers at the Ganga

Success of this project will have a massive ripple effect on how India rejuvenates its water bodies which are calling out for immediate help. It will impact on how India evolves as a nation from here. Right now,

India needs a renewal of mindsets of the older generation so that the younger generation can get to drink purer water.

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Sponsorship & Exhibition:

Shyam Chander
shyam.chander@cii.in
+91 40 44185 173

Delegate Registration:

Suresh DPV
suresh.dpv@cii.in
+91 40 44185 165

Veera Chakra
veera.chakra@cii.in
+91 40 44185 163

* Confirmed as on 02.07.2014

BHEL to Set up 10 MW Solar Power Plant in Mandya

Bharat Heavy Electricals Limited (BHEL) has announced its plan to set up a 10MW solar power plant in Shivanasamudram, Belakavadi village in Mandya district of Karnataka. The company had already fixed a 5MW solar power plant at Shivanasamudram in the past.

Rs. 68 crore will be invested to set up the plant for the Karnataka Power Corporation Limited (KPCL). The company stated in a press release that the contract to set up the grid connected solar power plant has been approved, including operation and management of the

plant for three years. BHEL has undertaken similar projects for KPCL, which include a 3MW solar plant near Raichur.

BHEL has fixed major solar plants across the country. The plants, ranging from 2MW to 10MW, have been set up in the states of Maharashtra, Rajasthan, Tamil Nadu, Tripura, Uttar Pradesh and Karnataka.

The company is in the process of setting up the nation's largest solar power plant (15MW) for NTPC at Singrauli in Madhya Pradesh. It is also taking up orders from Neyveli Lignite Corporation,

Electricity Department of Daman & Diu and Orissa Power Corporation Limited.

The photovoltaic systems for the plants are manufactured at its facility in Bangalore. The solar cells manufactured in Bangalore are exported to Germany, Australia and Italy.

The company stated that it is planning to support the Jawaharlal Nehru National Solar Mission (JNNSM) of Government of India, which aims to achieve 22,000MW of Solar Power in the country by the year 2022.

Pathways School Building Earns Highest Rating



Gurgaon-based Pathways School has received the Platinum (highest) certification for Leadership in Energy and Environmental Design for Existing Buildings (LEED-EB) by the US Green Building Council. This is said to be the highest rated green school building in the world.

The US council is a prestigious

non-profit organization that promotes sustainable building design and construction in the world through its leadership of the World Green Building Council.

Director of Pathways School, **Prashant Jain**, says: "At Pathways Schools, we believe that in addition to imparting a well-rounded education, it is our responsibility to raise awareness amongst our students on sustainability and sensitize them towards Nature and its significance. With this in mind, while designing the school building, we emphasized on creating a Green Campus with



Zero Discharge. **We also disproved the notion that green buildings are expensive."**

The school started in October 2010 and has a strength of about 900 students. "Sustainability is a way of life and the only way to ensure a better world tomorrow. So not only we wanted to practice it, but also wanted to sensitize the students who will be the leaders of tomorrow," the director said.

Soon, Pay for Waste

If the central government has its way, citizens may have to start paying for the waste generated in households. The government of India has drafted a manual for municipal solid waste management to help municipal bodies to manage their waste. According to the 74th amendment to the Constitution, urban local bodies can impose taxes and raise funds for public health, sanitation, conservancy and solid waste management.

The draft manual states that it was advisable to levy a dedicated tariff for solid waste services. The government has asked local bodies to consider basic principles while prescribing norms for levying user charge/service fee for solid waste management services.

The first principle is the 'Polluter Pays Principle' which states that those responsible for waste generation should pay for its collection and safe disposal.

Explaining the structure of charges, the government has suggested that user fees should be in proportion to the quantity of waste generated and level of service provided to waste generators.

Variable rates may be prescribed for different categories of waste generators keeping in view their waste generation pattern. A fair user fee will facilitate better compliance. The capacity to pay and affordability of tax payers may be kept in view by the civic bodies while imposing charges, states the manual.



The government is also considering setting up a municipal service regulator who will have the powers to revise user charges regularly. This will avoid the need for significant increases after a long gap.

To ensure compliance, the new government has hinted that central government funds to the municipal bodies will be directly attached with reforms.

iPhone 6 sapphire screens to be made with solar power

Apple used to be accused for poor working conditions in China and heavy reliance on fossil fuels but is now leading other technology companies in controlling its own power supply and expanding its use of renewable energy.

It is converting all of its data centers to clean energy, and is poised to use solar power to

manufacture sapphire screens for the iPhone 6, at a factory in Arizona. Data centers require huge loads of electricity to maintain climatic conditions and run the servers carrying out billions of electronic transactions every day.

Jackson, the front woman for Barack Obama's environmental administrator in Environmental Protection Agency is now leading

the effort to shrink Apple's carbon footprint. With Apple's solar farm, customers

could now be confident that downloading an app or video-chatting a friend would not increase carbon pollution.



Environment is Not a Luxury

Jairam Ramesh, former minister of environment, Government of India, in a session on “Toxic Pollution in India: The Unseen Public Health Menace,” recently makes a case for civil society to get into an action mode to address livelihood and health issues

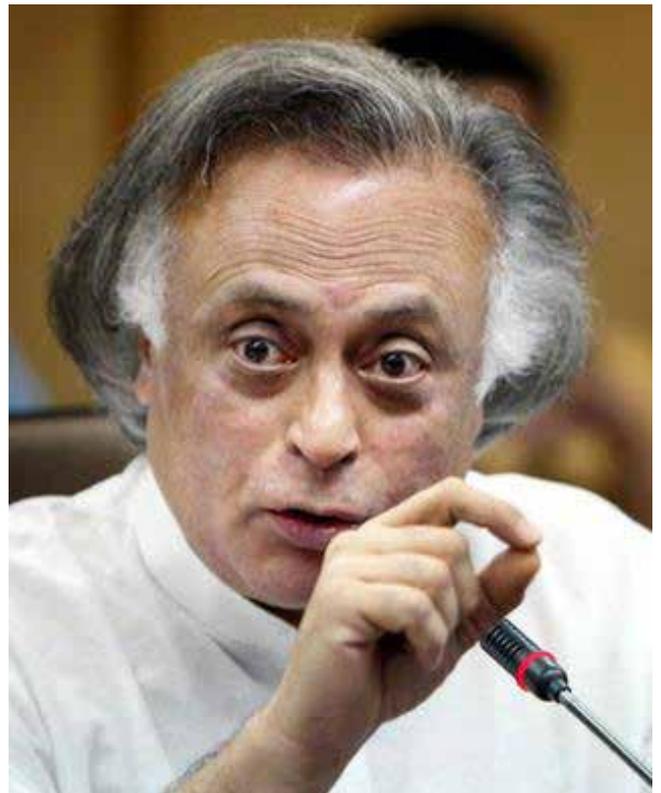
Environment and public health are very important but are neglected issues in India. For too long, environmental issues are being seen to be elitist, middle class life style issues. But in reality, environmental issues in India are livelihood issues.

Unlike in the West where the preservation of lifestyles is at stake but in India the sustainability of livelihood is at stake. So when we read about environmental issues we don't look at them as issue to access to water, land, forests. Much of the agitation that you see in our country is basically issues of people agitating over control of their land and water sources – the bauxite mining issue in Devagiri Hills was basically an issue of the control over the Dongaria community over their cultural traditions.

The Bosco agitation in Orissa was basically an agitation of local villagers not wanting to part with their land in spite of the compensation. The Chipco agitation in Uttarakhand many decades ago was agitation of women against felling of trees

by rapacious contractors. The fishermen agitation against the Jaitapur nuclear power plant in Maharashtra was basically because they were afraid that it would cut into their livelihood.

While it's true that environment and growth must be integrated but the preservation of the environment is not a luxury, it's a necessity. The 'grow now and pay later' which all countries have adopted is not a luxury that we can adopt. We really have to find our own solutions and in the search for these solutions the first recognition must come that the environmental issues today are fundamentally issues of livelihoods of millions of people struggling to maintain



control over their land, water and forest resources.

Public Health

The second dimension is the public health dimension which is not recognized enough. Increasingly, occurrence of asthma or cardio vascular diseases or exposure to chemical contaminants or carcinogenic chemicals like chromium, lead,

mercury is happening all over the country.

Chembur in Bombay has fertilizer plants and so many industries, power plants, refineries etc. A local group of political activists came to me and told me that there are alarming incidents of cancer in this area. The point I want to make is if pollution is an inevitable price we pay for prosperity, pollution is beginning to have very serious health impacts. It's not just air pollution but also water pollution.

In fact most of our public health concerns are from drinking water and sanitation. If we just invest 1/10th of the amount in clean water and sanitation we will have a much bigger impact. All the great mortality declines in western countries took place much before advances in medical technology; it took place because of safe drinking water and sanitation.

So environment is not a luxury issue but a day-to-day public health issue which is having an impact on mortality.

Fly ash sites, manufacturing sites like fertilizer plants, chemical refineries, pesticide manufacturing plants, leather tanneries are all sources of chemical pollution. We produce 120 million tons of fly ash every year, the more coal we produce the more fly ash we produce because our coal is 50%



Cleansing of Sins in Filthy Ganges

ash. The way we dump coal is very hazardous.

The fourth are the mined sites which have not been reclaimed or rehabilitated. Unlike USA or Germany we don't reclaim mined sites, we just strip the area and we don't restore those sites to their original condition. They are left as they are and turn out to be very hazardous to the environment and to the community. And the fifth area of land contamination is the large sanitary landfills in the most unhygienic manner. The number of sites will be running into 1000's.

National Clean Energy Fund

It was announced in the budget of 2010, it imposes a tax of Rs.50/ton of coal produced on either indigenously produced coal or imported coal. This money is deposited into the National Clean

Energy Fund and that fund has to do clean energy projects. We have about Rs. 10,000 crores of which Rs. 5,000 crores have been committed. Rs. 200 crores were allotted for remediation of the contaminated sites and in the first phase we took 6 sites in Andhra Pradesh and 4 in West Bengal.

We no longer have rivers in India we have sewers, the Ganga and Yamuna is an even bigger sewer. Holier they are the dirtier they are. About 70% is because of municipal sewage and 30% is industrial wastes. In the 2500 km of the main stem of the Ganga about 700 km stretch between Kannauj and Varanasi is the most polluted.

Finally, it is not just a government initiative but also an initiative of the civil society. The public must come forward because ultimately its public health that is being impacted.

Karnataka's New Solar Policy Packs Punch



By *Saptak Ghosh*

Saptak Ghosh is a Senior Research Engineer at the Center for Study of Science, Technology and Policy (CSTEP). He graduated from the Technical University of Delft (MS, Sustainable Energy Technologies) in 2011 and before that completed his engineering at R.V. College of Engineering, Bangalore (B.E. Electrical Engineering) in 2006. His research interests are solar Photovoltaics (PV), design of renewable energy systems, clean energy policy, industrial energy efficiency and waste management infrastructures. At CSTEP, he leads a team which performs policy and technology analyses of solar energy in India and municipal solid waste management.

In the first week of July, 2014, the Government of Karnataka revised the state's existing Solar Policy (2011-26) and renamed it as the 'Karnataka Solar Policy 2014-2021'. In the previous version, it was envisaged that 200 MW would be installed by 2016, whereas now the cumulative target for 2016 is 500 MW and 2000 MW for 2021. A minimum of 1600 MW installed capacity is targeted for large scale grid-connected plants by 2021 and a minimum of 400 MW on grid-connected and off-grid rooftop PV (RTPV) projects by 2018. The remaining 200 MW is supposed to come from off-grid installations in remote areas.

This revision shows the aggressive stance that Karnataka is adopting in order to ensure energy security and sustainability within the state.

The primary objective of this revised policy is to achieve 3% contribution

from solar power out of the total energy consumption of the state by 2021. This target is in line with the national Jawaharlal Nehru Solar Mission which mandates that each state should have a minimum of 3% of total electricity mix coming from solar power. This is otherwise known as the Solar Renewable Purchase Obligation (Solar RPO).

Large scale grid-connected solar power installations have already gathered momentum in various states and the fact that Karnataka also promotes large scale solar power plants comes as no surprise. The policy has provisions which will enable state authorities to reserve suitable land packages (>100 acres) for small scale solar parks and provide such land to developers at a lower rate. Developers can either choose to

participate in a reverse bidding process to enter into a long term Power Purchase Agreement (PPA) with the local distribution utility or play the Renewable Energy Certificate (REC) market to ensure bankability and financial viability for projects. **Opportunities to bundle solar power with thermal power and for developers to sell the generated electricity to Open Access Consumers (OACs) also exist.**

Overall, the policy has created a conducive environment for developers to invest in large scale grid-connected solar power in Karnataka. The only drawback emerging from all these initiatives is that the tariffs have not been finalised and depend upon the discretion of the Karnataka Electricity Regulatory Commission (KEREC).

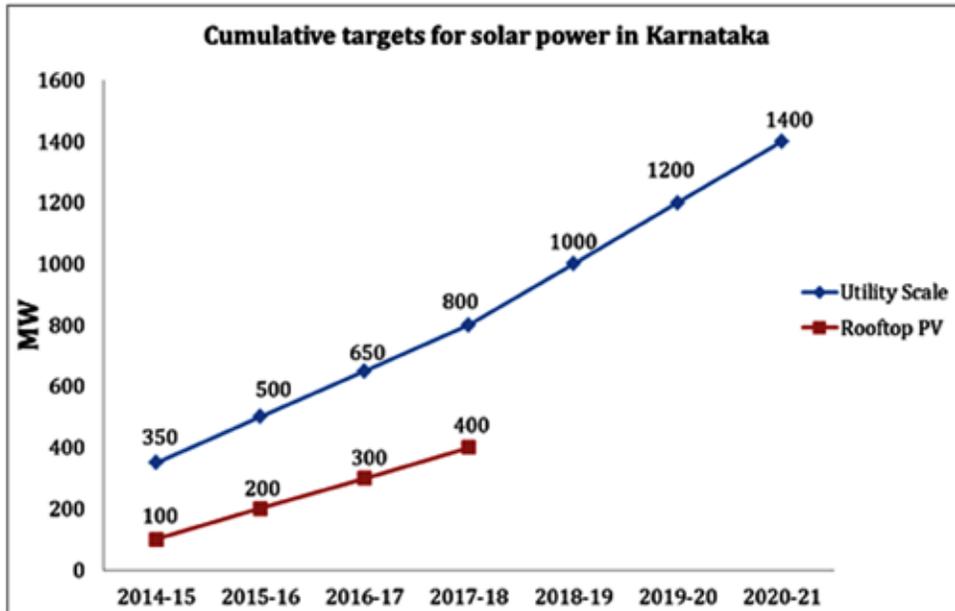


Figure 1: Cumulative Capacity Targets for Karnataka

Big boost to Roof Top Solar Power

The government’s recent change in stance on RTPV systems comes as a welcome surprise. Earlier there were no strict guidelines or targets for such systems. A target of 400 MW within the next four years shows that policy makers in the state have recognised the potential of decentralised distributed generation using RTPV systems. The Bangalore Electricity Supply Company (BESCOM) has recently announced a net-metering scheme for RTPV systems which aligns well with the targets. According to this net-metering policy, an RTPV customer is eligible for monetary compensation if the monthly generation from the system exceeds the monthly consumption.

Limitation of net-metering: Only 70% excess electricity can be

sold (this is because BESCOM encourages self-consumption of solar power and their financial prowess is low). Compensation from net-metering: 70 * Rs. 9.56/kWh or 70 * Rs. 7.2/kWh.

In spite of this limit imposed by BESCOM, research carried out within CSTEP shows that the payback period ranges between 5-7 years with an internal rate of return (IRR) of 11-15%. Such incentives are extremely encouraging for any consumer with available rooftop area to

In spite of this limit imposed by BESCOM, research carried out within CSTEP shows that the payback period ranges between 5-7 years with an internal rate of return (IRR) of 11-15%. Such incentives are extremely encouraging for any consumer with available rooftop area to invest in RTPV systems.

invest in RTPV systems. This in turn will ensure a certain degree of energy security and also lower the peak demand, thereby alleviating BESCOM’s problems by a great extent.

In the off-grid regime, the Karnataka Renewable Energy Development Limited (KREDL) announced that it would provide 20-30% capital subsidy in addition to MNRE’s capital subsidy scheme since the state’s objective is to achieve 100% electrification. New schemes with micro-grids will be explored when the technology reaches a mature state.

The Karnataka Solar Policy 2014-21 comes as a revelation because the solar power sector had reached a point of stagnation within the state. This policy is likely to induce investments in the solar industry (both development and manufacturing), encourage public private participation and promote R&D and innovations along with skill development in the sector. The success of this policy now depends on how KREDL goes about implementing it.

2014 Winners of C K Prahalad Award for Sustainability

On June 17, CEF presented 2014 C.K. Prahalad Awards to Robert B. Carter from FedEx, Global Water Challenge, and Tamara “TJ” DiCaprio from Microsoft. The winners were announced by world-renowned ecologist Dr. Thomas E. Lovejoy, polar explorer Sir Robert Swan and corporate strategist Ernest von Simson



(From left to right) are Sir Rob Swan, polar explorer; P.J. Simmons, Chair, Corporate Eco Forum; Tamara (TJ) DiCaprio, Senior Director, Environmental Sustainability, Microsoft & M.R. Rangaswami, Founder, Corporate Eco Forum

Robert B. Carter, Executive Vice President, Information Services/CIO, FedEx Corporation

Robert B. Carter was recognized for guiding the digital transformation of FedEx through technologies that improve data management

operational efficiency, helping the company lower costs and reduce greenhouse gas emissions. Carter’s accolades include leading his team—in concert with the FedEx Marketing team—in the development and international rollout of SenseAware®, a service that combines sensors and a web platform to track the conditions

of shipments around the world, enhancing efficiency

With his leadership, FedEx has spearheaded groundbreaking efforts to reduce energy use and emissions from IT operations. These include a LEED Certified Enterprise Datacenter in Colorado Springs that is among the most energy-efficient in the United States, and systems that help FedEx operations improve routing efficiencies for package pickup and delivery. **Carter also pushed FedEx to use Bloom solid-oxide energy cells to power a hub in Oakland, California. Along with a large solar array, the Oakland hub is nearly “grid neutral” for electricity consumption.**

Global Water Challenge (GWC)

GWC, a coalition of leading companies and civil society partners with a presence in over 200 countries, was honored for its

progress in inspiring companies and other donors to protect water resources, deliver clean water access, and provide sanitation while sparking social and economic development in areas that need it most.

As a result of GWC's efforts, 418,000 people and nearly 500,000 children have school-based water and sanitation programs

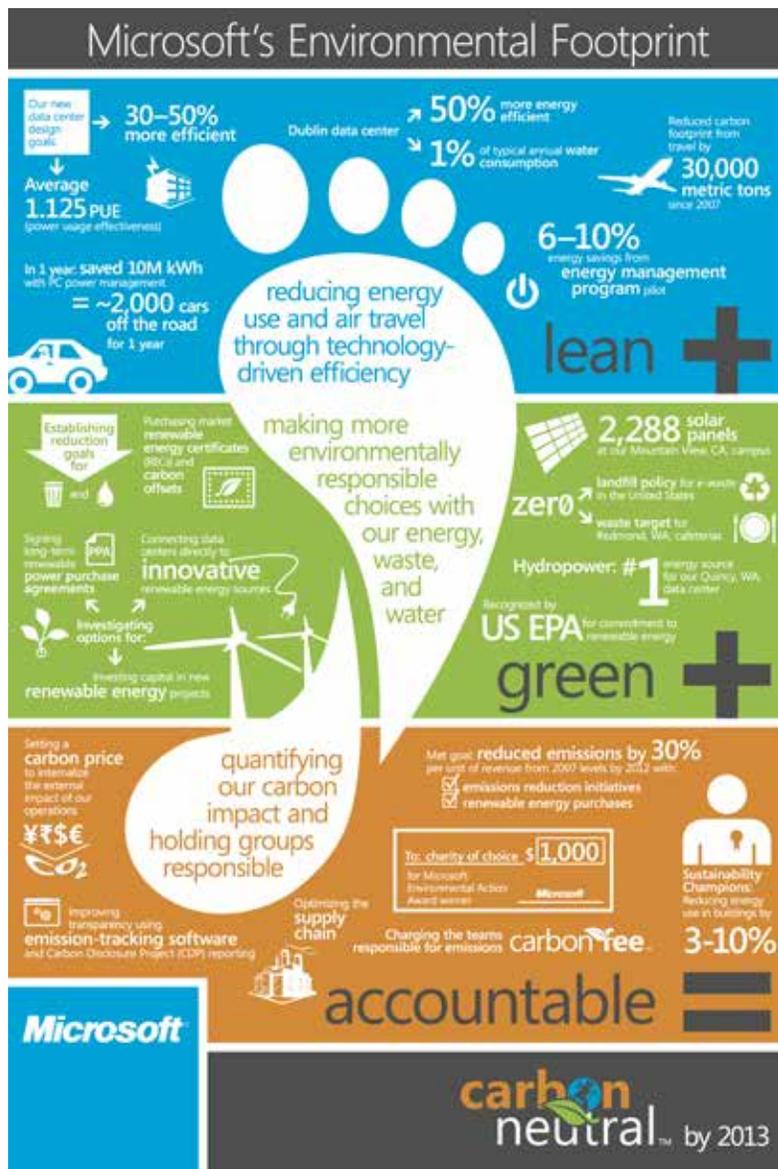
in Kenya, El Salvador, Guatemala, Honduras, Nicaragua, Tanzania, and Mexico; while an additional 32,000 now have safe sanitation. GWC identifies and supports scalable programs that employ innovative financing models to achieve sustainable water and sanitation services in the

communities they serve.

Tamara "TJ" DiCaprio, Senior Director of Environmental Sustainability, Microsoft

TJ DiCaprio was recognized for being the chief architect and driving force behind Microsoft's internal carbon fee program. The program charges business unit for their carbon emissions from travel and electricity use, and then reinvests the proceeds in energy efficiency, clean energy, and carbon offset projects. With a price on carbon, managers are seeing emissions reflected in their budgets for the first time, creating incentives to become even more efficient.

To date, the program has funded 20 offset projects across the globe in places like Mongolia, Peru and Turkey; and has also helped fund a 20-year power purchase agreement for 110 megawatts of wind energy in Texas. **The program has enabled Microsoft achieve carbon neutrality in fiscal year 2013 and become the second largest user of renewable energy in the United States.** DiCaprio has since written the "Carbon Fee Playbook," a five-step guide for other companies to implement their own internal carbon fee programs.



Biogas Rediscovered

How farmers fight the odds and set up a chain of biogas plants in Chittalawadi village

When Vijay Ingle of Chittalwadi village in Akola district decided to install a biogas plant at his dairy in 2010, everyone in his village thought the project was doomed. Biogas had failed to take off in Maharashtra's Vidarbha region despite the government promoting it as the cleanest and cheapest fuel for over three decades and offering subsidies for setting up the plant.

Besides, no one had heard of a biogas plant installed about half a kilometer from the house; it is usually set up in the backyard, close to the kitchen.

In neighboring Tandulwadi village of Buldhana district, farmer Shyamrao Deshmukh had faced similar skepticism. As their joint family grew the Deshmukhs had to relocate their cowshed to the village outskirts, about half a kilometer away. To cut down the growing expenses on liquified gas (LDPG), Shyamrao Deshmukh decided to set up a biogas plant in the cow shed. He too found himself surrounded by people asking him to give up the project. The two farmers however stuck to their resolve and made the plants work. The success turned the critics into believers.

Today, Chittalwadi has 15 working



Sindhutai Tayade adds cow dung slurry to her plant through the feeder

biogas plants. Tandulwadi has four. Several others also plan to install biogas plants and have applied for subsidies.

So far, officials have cited cow dung scarcity in Vidharbha as the reason biogas was not drawing a crowd, despite the subsidies. But farmers setting up biogas plants in these villages do not own large numbers of cattle, disproving the official theory. They have found innovative solutions to the challenges that prevented farmers from accessing bio gas.

Back to the original plan

While struggling to overcome problems evolving distance, Deshmukh approached scientists at Dr Punjarao Deshmukh Krishi

Vidyapeeth, an agriculture university in Akola that offers extension services. He was advised to install telescoping PVC pipe to build pressure in the gas tank and put the pipeline below ground with a gentle gradient for unhindered flow of gas to the kitchen. He was also told to install equipment for removing moisture from the pipeline. Deshmukh realized that to install the pipeline he would have to shell out more than the cost of the entire plant and lower his kitchen floor by around 60 centimeters.

Before deciding to give up, Deshmukh decided to go back to his original plan. He already had constructed a 2-cubic meter (cum) digester tank at Rs 9000 and installed a rubber pipe used for drip irrigation. Instead of laying it underground, he took the pipe to his house by securing it to tree branches overhead. It cost Deshmuk Rs.1000.

To trap moisture, Deshmuk twisted the pipe into a loop at the source and secured it in that position; being heavier than gas, moisture settles within the loop and flows back into the digester. "Moisture, which the university official had warned would be the problem, had not troubled me so far" Deshmukh

says. The plant provides enough gas to cook for his family of six all year around.

Success lies in bifurcation

Ingle too had approached the university for guidance but to no avail. Then he approached an agriculture input dealer, who suggested that he use rubber tubes used in LPG cylinders.” My brother and I had spent Rs.1.75 lakhs for constructing four 6 cum digester tanks,” says Ingle. “Installing that kind of pipe would have cost us another Rs.1.4 lakhs which was impossible.” Like Deshmukh, Ingle used a drip irrigation pipe, running overhead, but he bifurcated it at the source with a T-section.

Apart from providing enough gas for cooking and heating bath water for 22 people, Ingle’s plant also provides enough gas for extra cooking for about 100 people there to four times a year during festivals, processing 100 liters of milk products in the diary everyday and lighting the cattle shed. “We are left with surplus gas and plan to install a generator to supply power to the house,” says Ingle. His joint family now saves Rs 80,000 per year on LPG cylinders. Most of the 15 farmers in Chittalwadi who used Ingles innovation own not more than three to four head of cattle.

“Initially, we were reluctant as the conventional biogas plant design requires large amount of dung”

says Sindhutai Tayade, who owns fours heads of cattle. “But when we found that Ingles plant works just by using dung from 10-12 animals, that too on alternate days, we thought it could work for us too.”

Milind Ingle another farmer from Chilttalwadi, was surprised to find that dung from his three cows was more than enough for his family of three.

The innovations are fast spreading to nearby villages where people are rediscovering bio gas. Manohar Kokate of Shirla village in Akola says some 50 biogas plants were installed in the village in 1980s when the government introduced biogas under a national project. Most of these plants closed down within a decade after cattle numbers dwindled in the arid region. Now, with the government introducing smaller Deenabandhu model of biogas plant and innovations by several farmers, people want biogas again, Kokate adds.

Government must step in

Farmers feel that the guidance for installing biogas plants and associated innovations is a pressing need. One area of improvement is transporting gas from a distance. In most villages, with families multiplying, cattle are located far away from the homestead. “The pressure is influenced by distance, topography, as well as the number



Vijay Ingle stirs the slurry in the biogas digester plant

of twists and turns in the pipeline,” says Ingle.” What works for me may not work for others. It took me two months to work out how often I need to feed dung to the plant to maintain uniform gas pressure. Also there is no guidance on the kind of pipes to use. Metal and PVC pipes are expensive and need to be laid underground” he adds.

The government should also raise the subsidy bar, says Ingle. The current subsidy of Rs 8000 is for 2 cum plant, which generates just enough gas for cooking. To meet all domestic fuel needs of a family of five to seven members, one needs a 6 cum tank.

With rising LPG prices and firewood getting scarce by the day, the number of farmers willing to go for biogas is on the rise in Vidarbha. All they need is a little support from the government and financial institutions.

Reprinted from:
State of Renewable Energy in India: A Citizen’s Report
 Center for science and Environment (CSE)
<http://www.cseindia.org/>

Creating the Schools of the Future

The prevailing system of management has destroyed our people. The destruction starts with toddlers. The fundamental task of leadership is transformation of this system..... {Which is} the same system in education and business - W. Edwards Deming, Pioneer, Total Quality Management

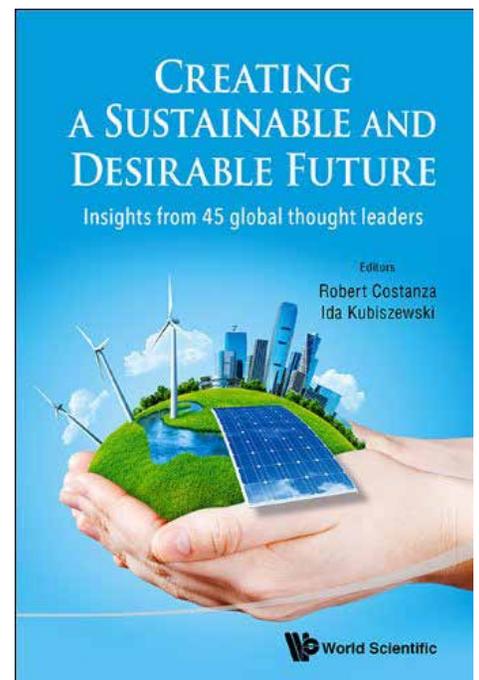
By *Peter M. Senge*

I believe that the Industrial Age system of education that has spread around the world in the past 150 years will change dramatically in the coming decades. The assembly-line progression of grades (first, second, third, etc.) coordinated by a fixed curriculum and headed by teachers in charge of students' learning has grown increasingly out of touch with the realities of today: the global interconnectedness of economics, politics, and culture; the internet, which puts more and more information at students' fingertips; and business that need people who can think for themselves and collaborate effectively in teams to solve complex problems. While mainstream school systems are obsessed with standardized test scores and intense individual competition, education innovators are focused on higher order skills

like systems thinking and creativity in conjunction with basic skills in mathematics and language; personal maturation together with technical knowledge; and learning how to learn together in service of addressing problems that are real in students' lives.

These changes will continue to unfold not because such change is easy. Indeed, as most educators know only too well, few institutions are more immune to innovation than public education. These changes will happen because such fundamental change in the aims and process of education is not only possible but necessary if we are to create healthy societies in the shrinking, interdependent, and stressed world in which we now live.

Ironically, few activists engaged in building more sustainable societies focus on the leverage that could



exist in fundamental innovation in primary and secondary education. Partly this reflects the perceived difficulty of such change, but more deeply it reveals a tragic blind spot. While many focus understandably on business – because business plays a huge role in shaping the current human

footprint – the deep changes in values needed to shift the path of the human journey are unlikely to arise from business alone, or from the current business-government-civil society nexus of institution power. Truly restorative practices and policies

will take multiple generations to bring into the mainstream of our societies. The only institution with a time horizon commensurate with these changes is education, and especially primary and secondary education.

Mindful of this, for almost two decades, radically innovators in K-12 schools have been building the schools of the future, largely unnoticed by mainstream society, which is obsessed with saving a dying and hopelessly outdated education systems.

Their overarching aim is not education reform but recontextualizing the whole vision of education: schools and communities working together to



Students from Lovely Professional University

shape a sustainable future.

Through their particular strategies and tools differ, they all emphasize the following:

- Systems thinking and learner-centered pedagogy: tapping students ‘innate abilities to understand systems by shifting from teacher-centered instruction to designing learning environments that engage students in their own questions and aspirations.
- Education for sustainability: making the context for education our common task of building healthier communities based on social and biological well-being.

- Authentic youth engagement and youth leadership: engaging students as leaders in building healthier communities, within and beyond the school.
- Building schools as learning communities: involving everyone-adults and children-in a mutual learning process of individual and collective development.

Education for sustainability

Education for sustainability builds on systems thinking conceptual skills to establish a context of community responsibility and engagement, integrating ideas and approaches from many

different content areas, including ecological literacy, place-based education, action learning, sustainable economics (the connections between economic, social, and natural systems), and visioning (the ability to envision and invent a rich, hopeful future).

Jaimie Cloud, a national leader in the field for some 15 years, identifies seven primary habits of mind, starting with “Understanding of Systems as the Context for Decision Making” and “Awareness of Driving Forces and Their Impacts,” and including the following:

- Intergenerational responsibility: taking responsibility for the effect(s) of one’s own actions on future generations.
- Protecting and enhancing the commons: reconciling the conflicts between individual rights and the responsibilities of citizenship to tend to common resources on which all depend.
- Paradigm shifting: recognizing mental models and paradigms as guiding constructs that shape action but that can change over time with new knowledge and applied insight.

Education for sustainability is more than just a new curriculum. It is about how the content and process of education can be interwoven with real-life contexts

to create opportunities for young people to take the lead in building sustainable communities and societies.

The real question

None of these ideas represent simple changes that will be achieved by a few bold school leaders. Rather, they will take leadership from innovative teachers, committed principals, and dedicated central administrators. They will take community leadership: parents, school board members, civic and business leaders. All must work together to help create new relationships and expectations.

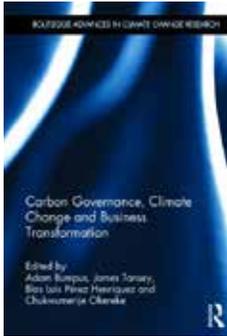
And it will take leadership from the very place that looks to least frequently—the students themselves. Make no mistake. The students are ready for the change.

A few years ago at a large community gathering in Saint Louis, part of the SOL Education Partnership national learning community, and an audience of 250 people heard a series of student presentations on their sustainability projects. Few will forget Annalise, a 12-year-old who spoke about the wind turbine she and her classmates had gotten built at their middle school. The project started with class sessions

where their science teacher talked about energy and the need to move more rapidly to renewable energy sources. She and four of her classmate – she gave each of their names – talked with the teacher about what they could do, and that is when the wind turbine idea was born. They then enlisted parents to help them sort out the different engineering and investment options. They presented their idea to the school principal and then to the mayor of the local town: “I was worried that our presentation did not go too well with the mayor-she really didn’t say anything when we presented our ideas.”

But they were later called back for a second presentation to the mayor and members of the town council. Annalise closed her remarkable story, which took all of 3 min to share, with a photograph of the vertical wind turbine now standing in front of the school.

Having by now captured the undivided attention of the adult audience, Annalise set aside her notes and standing calmly, some 75 pounds of fierce determination, said, “We children are often hearing that ‘you children are future.’ We don’t agree with that. We don’t have that much time. We need to make changes now. We kinds are ready, are you?”



Carbon Governance, Climate Change and Business Transformation

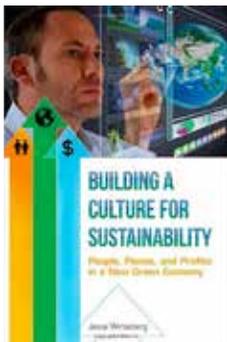
Edited by Adam Bumpus, James Tansey, Blas Luis Pérez Henríquez, Chukwumerije Okereke

Routledge July 2014

Transformation to a low carbon economy is a central tenet to any discussion on the solutions to the complex challenges of climate change and energy security. Despite advances in policy, carbon management and continuing development of clean technology, fundamental business *transformation* has not occurred because of multiple political, economic, social and organizational issues.

Carbon Governance, Climate Change and Business Transformation is based on leading academic and industry input, and three international workshops focused on low carbon transformation in leading climate policy jurisdictions (Canada, USA and the UK) under the international Carbon Governance Project (CGP) banner. The book pulls insights from this innovative collaborative network to identify the policy combinations needed to create transformative change. It explores fundamental questions about how governments and the private sector conceptualize the problem of climate change, the conditions under which business transformation can genuinely take place and key policy and business innovations needed.

Broadly, the book is based on emerging theories of multi-leveled, multi-actor carbon governance, and applies these ideas to the real world implications for tackling climate change through business transformation. Conceptually and empirically, this book stimulates both academic discussion and practical business models for low carbon transformation.

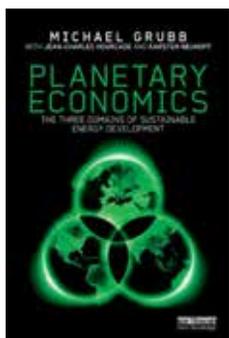


Building a Culture for Sustainability: People, Planet, and Profits in a New Green Economy

By Jeana Wirtenberg

Praeger, January 2014

In their own words, leaders, managers, and employees from nine global companies explain how they are turning their visions into reality. Sustainability and human resources expert Jeana Wirtenberg describes how these companies are transforming challenges into opportunities by opening their minds to the megatrends that will define the future. The vast majority of today's CEOs consider sustainability essential to their company's success, yet most do not know how to embed it into their company and its culture. This book guides firms of all types and sizes—from those organizations just starting their journey to sustainability, to those seeking to accelerate their positive impact on people, reduce their negative environmental impact, and improve their bottom line. Wirtenberg shows readers how extraordinary results are possible by engaging the hearts and minds of employees throughout the organization.



Planetary Economics

Energy, Climate Change and the Three Domains of Sustainable Development

By Michael Grubb

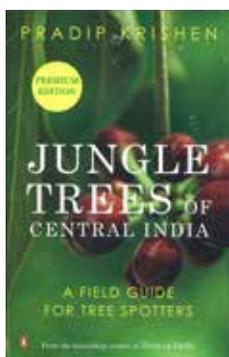
Routledge, March 2014

How well do our assumptions about the global challenges of energy, environment and economic development fit the facts?

Energy prices have varied hugely between countries and over time, yet the share of national income spent on energy has remained surprisingly constant. The foundational theories of economic growth account for only about half the growth observed in practice. Despite escalating warnings for more than two decades about the planetary risks of rising greenhouse gas emissions, most governments have seemed powerless to change course. *Planetary Economics* shows the surprising links between these seemingly unconnected facts. It argues that tackling the energy and environmental problems of the 21st Century requires three different domains of decision-making to be recognized and connected. Each domain involves different theoretical foundations, draws on different areas of evidence, and implies different policies.

The book shows that the transformation of energy systems involves all three domains - and each is equally important. From them flow three pillars of policy – three quite distinct kinds of actions that need to be taken, which rest on fundamentally different principles. Any pillar on its own will fail.

Only by understanding all three, and fitting them together, do we have any hope of changing course. And if we do, the oft-assumed conflict between economy and the environment dissolves – with potential for benefits to both. *Planetary Economics* charts how.



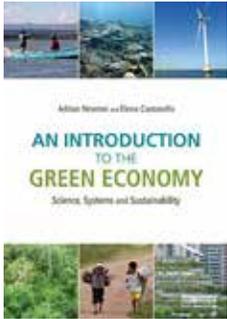
Jungle Trees of Central India

By Pradip Krishen

Penguin Books India, 2014

Covering an area larger than France, and including five of India's most-visited tiger reserves, the forests of Central India are one of the country's most iconic wildscapes. *Jungle Trees of Central India* is a lavishly illustrated and user-friendly field guide to every wild tree you are will see in this entire region.

A culmination of four years of research, the book has over 2000 photographs with thumbnail keys to all the bark, flowers, fruit and leaves. An ideal companion for your travels in the region, this book will turn you into an expert tree spotter and take your enjoyment of wild places to another level.



An Introduction to the Green Economy

Science, Systems and Sustainability

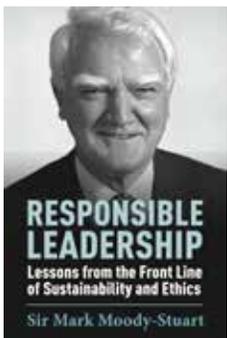
By Adrian C. Newton, Elena Cantarello

Routledge, August 2014

The green economy is widely seen as a potential solution to current global economic and environmental crises, and a potential mechanism by which sustainable development might be achieved in practice. Considerable investments are now being made into the development of green technology, renewable energy, biodiversity conservation, resource efficiency, recycling of materials and green infrastructure.

This textbook provides a comprehensive introduction to the green economy, using a strongly interdisciplinary approach based on environmental science, rather than treating it as a sub-set of economics. The scientific principles of sustainability are presented, which provide the foundations of the green economy, with a particular focus on systems-based approaches. Examples of real-world case studies are used to illustrate how the green economy can be achieved in practice. In this way, the authors provide a thorough overview of both the principles and practice of the green economy, drawing from a wide range of disciplines including ecology, geography, social science, psychology, sustainability science, environmental science, law and economics.

The emphasis is on presenting results of the latest research, derived from leading scientific journals. Rather than focusing on a single definition of what constitutes a 'green economy', the book introduces readers to the diversity of opinion that exists, and engages them in what is an active, on-going debate. This reflects the fact that many aspects of the green economy and sustainable development more generally, are currently contested. In particular, the book will help readers to strengthen their ability to critically evaluate the evidence for and against the views presented, and to actively contribute to the future development of the green economy.

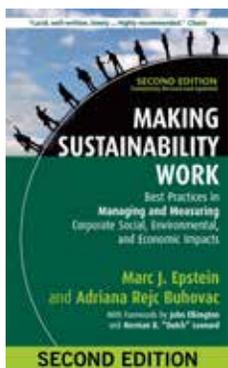


Responsible Leadership: Lessons from the Front Line of Sustainability and Ethics

By Mark Moody-Stuart

Greenleaf, March 2014

As Chairman of the Royal Dutch Shell Group from 1991–2001 and of Anglo American plc from 2002–2009, Sir Mark Moody-Stuart is as qualified as anyone on the planet to discuss the realities, dilemmas and lessons to be learned from the last 20 years of corporate engagement with sustainability, ethics and responsibility. In this unique book – part memoir, part confessional, part manifesto for leadership – we hear a unique voice from the front line of corporate responsibility. Moody-Stuart retraces the steps of a remarkable journey from being a postgraduate geologist to being at the helm of two of the largest corporations in the world.



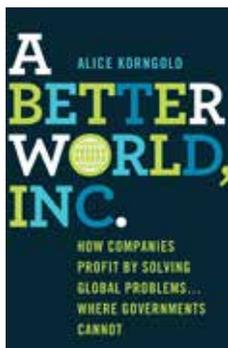
Making Sustainability Work: Best Practices in Managing and Measuring Corporate Social, Environmental, and Economic Impacts

By Marc J. Epstein, Adriana Rejc Buhovac

Berrett-Koehler Publishers, April 2014

Most companies today have some commitment to corporate social responsibility, but implementing these initiatives can be particularly challenging. While a lot has been written on ethical and strategic factors, there is still a dearth of information on the practical nuts and bolts. And whereas with most other organizational initiatives the sole objective is improved financial performance, sustainability broadens the focus to include social and environmental performance, which is much more difficult to measure.

Now updated throughout with new examples and new research, this is a complete guide to implementing and measuring the effectiveness of sustainability initiatives. It draws on Marc Epstein's and new coauthor Adriana Rejc Buhovac's solid academic foundation and extensive consulting work and includes best practices from dozens of companies in Europe, Asia, North America, South America, Australia, and Africa. This is the ultimate how-to guide for corporate leaders, strategists, academics, sustainability consultants, and anyone else with an interest in actually putting sustainability ideas into practice and making sure they accomplish their goals.



A Better World, Inc.: How Companies Profit by Solving Global Problems... Where Governments Cannot

By Alice Korngold

Palgrave Macmillan, January 2014

In *A Better World, Inc.*, Korngold shows companies and their executives how to profit by developing solutions to the world's most daunting challenges – those that governments cannot and have not addressed. Using case studies of various global companies from Nike to Pfizer to Vodafone and GlaxoSmithKline, *A Better World, Inc.* delineates best practices for corporations to maximize profits, decrease costs, and build the longer-term value of their companies by ensuring a more sustainable and humane world.

In declaring that 'only global corporations have the resources, global reach, and self-interest to build a better world,' Korngold shows how to ensure that this is a mutually beneficial and equitable relationship for business and society. *A Better World, Inc.* provides a roadmap to success, including stakeholder engagement; partnerships among businesses, NGOs, and governments; measurement, accountability and reporting; and effective corporate governance. Korngold also discusses the most powerful drivers for companies to further intensify their innovations in solving global challenges: consumers, employees, and investors.

5th World Renewable Energy Congress

Aug 21 - Aug 23, New Delhi

<http://www.wretc.in/#sthash.ACj9hTz8.dpuf>

National Seminar on Management of Urban Biodiversity-Challenges, Issues and Solutions

1st to 2nd September, Bangalore

<http://www.christuniversity.in/uploadimages/National%20Seminar%20Zoology%20dept.%20copy.pdf>

Renewable Energy India Expo

Sep 3 - Sep 5, Greater Noida

<http://www.renewableenergyindiaexpo.com/#sthash.E5NqODEw.dpuf>

Green Building Congress

2 - 6 September 2014, Hyderabad

www.cii.in

Common Criteria: Meeting the Technology Challenges

9-11 September, 2014, Hotel Lalit, New Delhi

www.cii.in

Watertech India 2014

Sep 10 - Sep 12, New Delhi

<http://www.watertechindia.com/#sthash.G6XqlcHb.dpuf>

4th India Smart Utilities Week

Sep 16 - Sep 18, New Delhi

<http://www.wsgcindiaweek.com/>

Light India

Sep 18 - Sep 21, New Delhi

http://www.messefrankfurt.com.hk/other/country_list.aspx?country_id=12

India renewable energy summit

9th & 10 October, Gujarat

<http://www.indianrenewableenergysummit.com/>

Energy Efficiency Summit

29 October - 1 November 2014, Hyderabad

www.cii.in

Greenco Best Practices Award and Waste Management Summit 2014

20-22 November 2014, Pune

www.cii.in

National Conference on Environment and Biodiversity of India

Oct 4 - Oct 5, New Delhi

<http://www.ebiconference.com/#sthash.uRohmm2V.dpuf>

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<http://www.indiawaterportal.org/events/invitation-training-course-solar-powered-pumping-systems-sustainable-solution-drinking-water>

Training programme on SOCIAL IMPACT ASSESSMENT

<http://www.cseindia.org/content/training-programme-social-impact-assessment-0>

Solar Energy Course

<https://www.edx.org/course/delftx/delftx-et-3034tu-solar-energy-1996#.U61J7LHNk69>

Science and Management for Sustainable Living

www.bhoomicollege.org

Post Graduate Diploma Course in Sustainable Development (PGDM-SD)

<http://bimtech.ac.in/>

M.Sc. in Sustainable Development - Distance learning Course + information

The Global Open University

<http://nagaland.net.in/>

Post-Graduate Certificate in Sustainable Enterprise

Indian Institute for Sustainable Enterprise

<http://theiise.net/pgcertinse.html>

Postgraduate in Sustainability Management

Silver Bright Institute of Management

<http://www.htcampus.com/college/silver-bright-institute-management-sbim>

Post Graduate Dip. in Sustainability (Distance learning)

Chhattisgarh University

<http://www.cguniversity.com/>

Post Graduate Diploma

IGNOU- Indira Gandhi National Open University

<http://www.ignou.ac.in/>

Master of Architecture (Sustainable Architecture)

Bharati Vidyapeeth Deemed University

<http://www.bharatvidyapeeth.edu/Campuses/Pune/default.aspx>

MBA and MA in Sustainability Management

TERI University

<http://www.teriuniversity.ac.in/>

M Tech, MSc Environmental Science

Thapar University

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PG Diploma

Entrepreneurship Development Institute of India

<http://www.ediindia.org/>

M Tech in Environmental Engineering

The National Institute of Technology, Tiruchirappalli

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Dr Babasaheb Ambedkar Marathawada University

<http://www.bamu.net/dept/environment/>

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<http://www.vpmthane.org/polywebnew/courses.html>

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Punjab University

<http://puachd.ac.in/>

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School of Environmental Sciences / Jawaharlal Nehru University

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<http://www.siib.ac.in/programmes.aspx>