



India – Post 2015: Investing in Sustainability

Resource Efficiency
for an
Urbanising India

Building Resilience
in Agriculture for
Food Security

Energy Driving
Low Carbon
Local Economies

REPORT

7-10 October 2015

Development Alternatives Headquarters, New Delhi
Delhi, Madhya Pradesh and Bihar
INDIA



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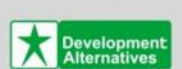
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Acknowledgement

TARAGram Yatra (TGY) team 2015 conveys its gratitude to all the participants whose support helped to make the event a huge success. TGY team is also grateful to all its speakers whose substantial inputs and knowledge lead insightful discussions on three distinct themes of TGY. We are especially grateful to all the Sponsor Partners - HBF, Oxfam, GIZ, CANSA, TARA, All India Radio and Rural Connect who lend their immense support throughout the event.

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Chairman's Message

Dr. Ashok Khosla

Founder - Chairperson, Development Alternatives Group and Co-Chair International Resource Panel, UNEP

TARAGram Yatra is designed to discuss and understand real and relevant needs of different sectors in the country. The year 2015 is a turning point as more than 180 heads of states will sign a document for global agenda on which they will make commitments to eradicate poverty, hunger and other issues of concern. These commitments may not be achieved but global leaders coming together and acknowledging the issues is a crucial move. The emergence of Sustainable Development Goals (SDGs) from Rio Earth Summit - 1992 directs the world to take action to live in a sustainable manner. Formulated in a very participatory process involving more than 180 countries NGOs, business and governments the goals will reaffirm the idea of living in harmony with nature. These goals will improve three things:

- Fulfillment of human need without damaging natural resources
- Making earth better by building resilience in systems
- Social justice and equality



TARAGram Yatra helps to become a powerful influence on our government to act as per the identified goal and required budget to achieve it.

Executive Summary

Prepared in 1999, the Millennium Development Goals with eight Goals, 19 Targets and 40 indicators were conceptualized to sustain our future. Today with 17 Goals, 169 Targets, India as a nation requires an estimate of one trillion US dollars per annum to achieve the Sustainable Development Goals to work towards the Global agenda 2030 compared to five - seven trillion US dollars per annum required by the entire world. Our destination is human wellbeing and together every Civil Society, Industries etc. have to work towards it. Speaking at the TGY Launch, Development Alternatives President - George Varughese explained that to work on Prime Minister's vision of 'Sabka Saath Sabka Vikaas' we have a responsibility to find an Indian Narrative through partnership and transparency on the following four segments.

1. **Public awareness** - of Global 2030 Agenda
2. **Lifestyle choices** - consume and produce in a sustainable manner
3. **Technology choices** - invest in Innovations and boost Make in India
4. **Financial Priorities (Multiplier Effect)** - Invest in People, Women Literacy, Public transport and regeneration of wasteland



He emphasised that to maintain a balance between environment and development we need to determine our priorities. As it is the priorities will play a decisive factor to drive the path towards human wellbeing through SDGs.

India's Status Quo with respect to the SDGs is critical because of the choices that India makes to achieve economic, social and environmental well-being. It will in turn have implications on the world economy and planetary well-being. Over the last two decades, India had a consistent average GDP (constant prices) of around six per cent and this economic growth has allowed India to reduce the proportion of the population living in extreme poverty from an approximately 65 per cent in the 1950s to 22 per cent today. Credited with the creation of 100 billionaires in the last 25 years, the overall assessment of India's social, economic and environmental conditions is not healthy. TARAGram Yatra (TGY) 2015 became a constructive exercise to evaluate the gap in achieving the 17 development goals of India. It helped to realize the need to reset universalised SDG goals in the national context regionally where the right to prioritise indicators is with the institutions of local governance. This would help to include and enhance equity and social justice into the fabric of SDG implementation. The following presents the emerging perspectives in the three different themes of TGY 2015.

The 2015 TARAGram Yatra explored these issues and questions of development in detail. The speakers explored areas of energy needs, development models, technology and knowledge transfers among other issues. *Mr. Ralf Fücks, President, Heinrich Boell Foundation* emphasized on the need to "redesign growth." Addressing inequality is an important dimension of development with pertinent implications for economic growth and poverty eradication. Rising wage inequalities, gender discrimination, inequitable access to basic goods and services and environmental resources etc. are all different facets of the challenge. The vulnerabilities of historically marginalized groups are further aggravated by new resource stress and scarcities. India still has a long way to go for eradicating poverty, propelling economic growth and facilitating access of its large population to meet its basic needs like food, water, energy and shelter. This thought resonated throughout the plenary discussion with Arunish Chawla, Jt. Secretary, Ministry of Finance stating that India's growth model has progressed globally at every step. It has evolved over the years as faster, more inclusive and sustainable.

The above issues along with many more are required to be addressed to ensure that growth and development is to be implemented in an equitable, transparent, sustainable and holistic manner in the country.

The measures of transition already initiated by the government, for example of building 'resilience to climate change- ensuring food security', guide urban growth through 'Smart City' and Atal Mission for Rejuvenation and Urban Transformation (AMRUT) initiatives and enabling economic growth through the 'Make in India' programme are ambitious attempts to address all the three contours of sustainable development – social, economic and ecological. Amongst other things, these require strategic partnerships and investments. In this context, it is useful to learn from global experiences on this front Frameworks and metrics to assess and track the progress of the poorest and excluded communities?

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Introduction to TARAGram Yatra

TARAGram Yatra (TGY) is an annual event led by the Development Alternatives (DA) Group designed to deliberate on issues of development and sustainability in policy and practice. Through this event DA brings together top-level practitioners and policy makers from across the world to build hope and create space for transformation. With a mix of dialogue and field visits, the *Yatra* provides a platform to address the complex challenges of sustainable development. It is designed to encourage new ideas and innovative solutions that facilitate the exchange of knowledge, experience and perspectives between multi-stakeholders.

The Journey So Far

Development Alternatives has successfully conducted six significant TARAGram Yatras from 2010 to 2015. The following presents a brief overview of the TGYs held before. The first Yatra (2010) titled 'Towards Green Economies: Scalable Solutions for People and Our Planet' prioritised specific issues of transition towards renewable energy, sustainable construction, water management, water recycling and sustainable agriculture. It also communicated Indian and South Asian perspectives to inform the Global discourse on Green Economy.

The second Yatra (2011) titled 'Resource Efficiency and Green Transformation: Driving Change in Asia', brought together practitioners and policy makers from across South Asia to explore good practice cases and develop action strategies for resource efficient and climate responsive economic models.

The third Yatra (2012) titled 'Sustainable Development in South Asia: Women Driving Change' focused on the role of women in leading the world towards sustainable livelihoods, green enterprises and the policies required to develop capacities and skills of women across South Asia. The discussions focused on the role and potential of women led interventions that would nurture and revive our ecosystems, enhance security of food, water, energy and livelihood and construct self-reliant societies.

The fourth Yatra (2013) titled 'Safe Water for All and Always: Science - Policy – Markets' became a platform to familiarise policy makers and practitioners with emerging concepts and models for sustainable development. It emphasised on access to safe drinking water for all in South Asia.

The fifth Yatra (2014) titled 'India Post – 2015: A Country in Transition' explored the transitions that India is making and needs to make in its economic strategies, social processes and environment management systems to achieve human wellbeing on a healthy planet.

The sixth Yatra (2015) titled 'India Post – 2015: Investing in Sustainability' identified three themes to address - growth of local economies through energy access, food and livelihood security and urbanisation in a resource stressed nation. The discussion focused on the kind of investments required for the movement towards sustainability, how to maximize the impact of these investments, and the role of public and private stakeholders.

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TARAGram Yatra 2015 - India Post 2015: Investing in Sustainability

India's Status Quo with respect to the SDGs is critical because of the choices that India makes to achieve economic, social and environmental well-being. It will in turn have implications on the world economy and planetary well-being. Over the last two decades, India had a consistent average GDP (constant prices) of around six per cent and this economic growth has allowed India to reduce the proportion of the population living in extreme poverty from an approximately 65 per cent in the 1950s to 22 per cent today. Credited with the creation of 100 billionaires in the last 25 years, the overall assessment of India's social, economic and environmental conditions is not healthy. India is still home to 680 million people who cannot meet essential needs like food, water and shelter. We are using resources at a rate of 70 per cent above its bio-capacity. The surging energy demand that is fuelling the six per cent economic growth has propelled India to the top three carbon polluters. 25 per cent of India's total land is undergoing desertification while 3 per cent is facing degradation. India also finds itself in the midst of a dramatic journey of urbanisation. By 2050, some 700-800 million people i.e. 50 per cent of the nation's population will live in cities. Given the growing demand for resources from different sectors, there are increasing stresses on our ecosystem with over- utilisation of natural resources.

The challenges are not just due to the bulk and intensity of the problems such as poverty, climate change, degradation of natural capital, inequalities, vulnerability and exclusion, institutional overlap/failures, but also the intertwined nature of these challenges.

Objective:

TARAGram Yatra 2015 has identified three priorities areas that provide synergetic solutions on a broad spectrum instead of trade-offs amongst different goals and targets.

1. Resource Efficiency for an Urbanising India
2. Building Resilience in Agriculture for Food Security
3. Energy Driving Low Carbon Local Economies

The following key issues were discussed :-

- How can we play up the synergies and optimise trade-offs for resource consumption across sectors?
- What kind of investments will trigger the movement towards sustainability?
- What is the ecosystem required for these investments to have maximum impact?
- What role will different public and private stakeholders play in realising these investments?

Agriculture is and must be of core interest to any society. The most industrialised nations in the world award primacy to food security and food sovereignty. Even though agriculture is the largest area of human activity in India, the government has failed to meet the aspirations of the children of farmers. There is a need to recast and re-imagine the narrative of agriculture in India because if the agricultural sector is not attractive and viable to the next generation of farmers, the legacy of farming will not survive.

- Suman Sahai



Emerging Perspectives

TARAGram Yatra (TGY) 2015 became a constructive exercise to evaluate the gap in achieving the 17 development goals of India. It helped to realize the need to reset universalised SDG goals in the national context regionally where the right to prioritise indicators is with the institutions of local governance. This would help to include and enhance equity and social justice into the fabric of SDG implementation. The following presents the emerging perspectives in the three different themes of TGY 2015.

Resource Efficiency

India is a rapidly urbanising country and home to around 340 million urban people. By 2030 there will be an estimated 590 million people living in the cities that is almost 40 % of the Indian population (McKinsey, 2010). The future trends show that by the year 2030, India would require almost 9500 million square meters of built up area, of which housing will cover almost 70% (NRDC, 2012).

For the next couple of decades small cities and towns would become the focal point for development and urbanisation. Out of 67.8 billion tonnes of renewable and non-renewable materials consumed globally, India consumes 7.1% or 4.83 billion tonnes while hosting around 14% of the global population and if India continues its economic development in a similar way, it will triple the resource consumption within the next two decades, taking in as much materials as the OECD countries consume at the present time (IGEP, 2013).

Resource Synergies and trade-offs across sectors

Resource shortage in construction sector in India is an established fact and this has already started to impact and slow down the Indian construction sector (Hindu, 2012). Construction sector has exhibited an upward trend in resource use. The resources are finite and take long time to replenish. Majority of the resources used in construction are utilised to manufacture bricks, cement and steel. With over 70 percent of the construction by 2030 yet to be built, demand and pressure on limited stocks of these materials are expected to increase tremendously. The criticality of resources on the basis of the triple bottom line, i.e., economic, social/cultural and environmental viability can be assessed on the basis of a multitude of factors mentioned below:

- **Economic Factors:** These factors include the cost of the resources and the perceived scarcity of resources due to the high cost of few resources.
- **Environmental Factors:** Environmental impacts of extraction, production and processing of resources to manufacture building materials, embodied energy i.e. the energy consumed during extraction, production and transport of materials and the potential reuse and recycle as well as use as secondary raw material are essential. Life cycle approach should be used to assess the impacts associated with the use of material.
- **Social/Cultural Factors:** This includes risk of limited supply of resources due to political, physical, cultural, legal issues.



Policy

The intent to promote resource efficiency in the construction sector in India has already been gaining momentum with the National Housing Policy advocating the use of alternate technologies and a holistic approach to sustainability. Both the 12th Five Year Plan (2013-2017) and the National Action Plan on Climate Change have identified resource efficient buildings and construction as a focus area. However, despite several policy mandates; the translation to plans and schemes has been minimal.

- **Metrics and Methodology:** In order to formulate policy that promotes resource efficiency, understanding the resource criticality within a region and/or sector is imperative. There is a need to develop tangible metrics that help assess the criticality and severity of resource constraints. The framework developed by Development Alternatives provides a foundation to assess the importance and identify the key resources that need to be addressed to develop resource synergies, across regions and sectors.
- **Standards and Certifications:** Adopting a compelling set of codes and standards for building materials to maintain quality control and quality assurance is vital. Although such regulations may be difficult to enforce at first, they are instrumental for resource efficient solutions. These codes and standards have a greater influence on public procurement. The quality of the materials used is ensured by the codes and standards set, however, there needs to be flexibility in the design and applicability of these materials. There is a need to set guidelines that allow different materials and processes to be adopted, depending on the requirement of the location and need for construction.
- **Tendering and Preferential Procurement:** Government as the largest buyer can influence the market. Preferential procurement can help new/recycled products create a niche in the market along with creating a ripple effect to other private (institutional and individual) buyers by building confidence in the product.
- **Laws and Regulations:** Setting by-laws and regulations that make the application of these norms to be made mandatory is necessary. Bureau of Indian Standard (BIS) publishes codes and standards for building materials but these norms are adopted on a voluntary basis. Similarly National Building Code of India (NBC) advocates the use of alternate materials in construction. It is essential to have a central process that internalises the resource efficient methods and approaches.

Finance

Strengthening the financing options for both the producers and consumers of resource efficient solutions is imperative. Some of the tools/ways identified are as follows:

- **Viable Business Models**
The housing ecosystem consists of various stages right from obtaining land and tenure to providing housing to the end-users. A decentralised mechanism that provides support along entire ecosystem through incentives, subsidies, benefits, etc. needs to be developed. The figure below highlights a potential viable business model.

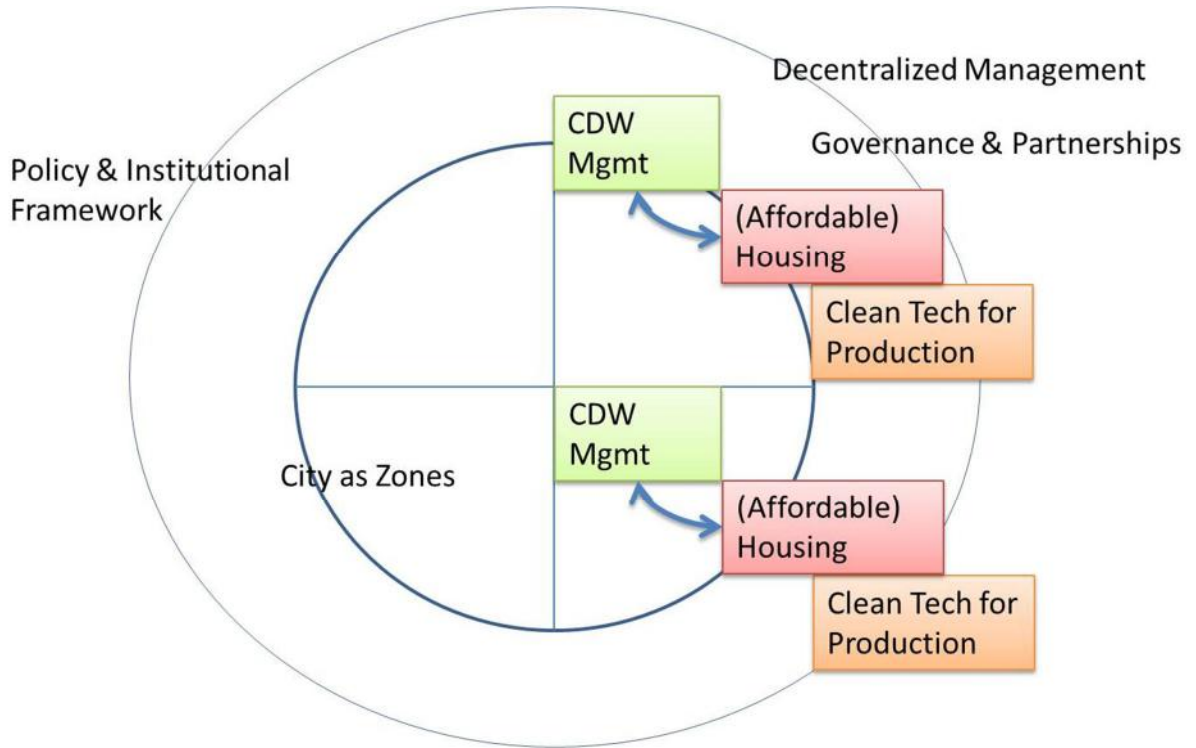


Figure 1: Decentralisation at scale

Institutional systems play a critical role in supporting and mainstreaming alternate or resource efficient approaches to all levels of a nation. Technical research, transfer, and human capabilities form the backbone of the construction sector. The very large disparities in the abilities of various stakeholders/institutions to generate appropriate innovative technology coupled with the fact that wherever there is access to appropriate technology, the absorptive capacities on the recipient side is rather weak. A mechanism that actively disseminates resource and energy efficient technologies to developers, entrepreneurs, etc. is required to adapt and promote the use of equipment and/or technological packages optimally. Developing tools and curricula that enhance both technical and managerial abilities of individuals, groups, organisations, etc. is critical. Further generating awareness through Information, Education and Communication (IEC) mechanisms needs to be tapped. To promote viable and long term partnerships for circular economies, public-private-people, can enhance the commercialisation of the technologies and create skilled workforce necessary to implement the policies and incorporate resource efficient methods in construction. Technology development and dissemination should be prioritised and accelerated by linking it with projects like the low income group housing. Resource Efficiency in construction needs to be integral to the development of smart cities, as huge money is being invested in India for the same. These initiatives need to be decentralized and region specific in order to be implementable and financially viable.

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Food Security

India is home to 190.7 million under nourished people (FAO, 2014), a quarter of all undernourished population in the world. While projections of India's population reaching 1.6 billion by 2050 (Department of Economics and Social Affairs, 2013) shall entail much higher food requirements than today, India's domestic production will only meet 59 percent of the country's food demand by 2030 at the current growth rate of Total Factor Productivity (Global Harvest Initiative, 2014). Decreasing yield of wheat, rice and pulses production (Birthal, Khan, Negi, & Agarwal, 2014), increasing impact of climate change on the crops, weather and natural resources (Razzuzi & Shrivastava, 2012) will further constraint the agriculture production. The intensifying competition over natural resources like land, water and energy will further shrink resources available for agriculture production. India will have to device ways and secure access to food for all, fighting against all the given constraints.

The contribution of agriculture to the country's GDP is around 17 per cent. At the same time, more than 50 percent of the population depends on agriculture for their livelihood. The huge population dependent on agriculture and the continuously decreasing contribution of agriculture to India's GDP is potentially the root of growing inequalities. Agriculture is one of the primary sources of livelihood and income generation for around 263 million or 22 per cent of the population (P, 2013). Farming as a livelihood is becoming unattractive especially for small and marginal farmers due to high vulnerability and risk, high input cost, no control on market and low profits. Further, over half of all agricultural households are indebted; the average loan on a farm household is INR 47,000 (Shrinivasan, 2015). India will have to build agriculture systems that can economically support the large rural population dependent on it for its livelihoods.

Agriculture is also one of the major sources of pollution to environment. Non-judicious and imbalanced use of inorganic fertilisers and unsustainable irrigation practices over the years has resulted in deterioration of soil fertility in large parts of productive agricultural land (Roy, Chattopadhyay, & Tirado, 2009). The run-off water from fertiliser and insecticide sprayed fields to the water bodies is polluting the water and making it unfit for human use. India will have to promote environmentally sustainable agriculture systems that ensure access to healthy natural systems for long term food production.

Public-Private Partnership (PPP) Models involving community

To ensure food security it is essential to have Public Private Partnership (PPP) Models that involve community for agriculture efficiency and higher income for farmers. PPPs provide a functional mechanism to collaborate and leverage resources, adapt to technology and commercialisation where the costs, risks and benefits can be shared. Studies corroborate that this not only creates an opportunity to reduce risk in production and price, but also creates partnerships between farmer's groups and market players for better links with input suppliers, finance and research institutions (Tiwari, 2012). Under the 12th five year plan (2012-2017) Ministry of Agriculture, GOI a PPP scheme in Integrated Agricultural Development (PPPIAD, 2012) has been launched. The aim is to facilitate large-scale projects and combine the effectiveness of the CPS and funding of the Public Sector to aggregate

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farmers, and integrate the agricultural supply chain. The National Agriculture Development Scheme or Rashtriya Krishi Vikas Yojana (ClimaAdapt , 2013) will provide financial assistance to the project.

Community based models

Community Agriculture Model is “an arrangement of resources (land, water, human, finance, etc) pooled by farmers at different parts of the value chain to increase agriculture productivity, farmer incomes and ensure sustainable use of resources”. Community models in agriculture offer an opportunity to increase the productivity, income and resource efficiency especially for small farmers. These farmer groups and farmer clubs usually assist each other to provide knowledge, evaluate different technologies, and choose suitable agriculture practices. Various organisations working with small farmers like Development Alternatives (DA), Watershed Organisation Trust practice and promote such models. DA has successfully also created market linkages for farmers in Bundelkhand, facilitating higher income for women farmers through developing and marketing organic manure (vermin compost) and spices in Jhansi district. With support of academic institutions like Central Agroforestry Research Institute (CAFRI), ICRISAT, DA has piloted projects and provided scientific guidance on agricultural techniques to farmers in Bundelkhand. The benefits of the linkages mentioned above indicate three essential inputs to food security:

- a) Linkages with academic and research institutes allows experiments to move from lab to field and vice-versa to achieve the desired impact of the intervention
- b) Linkages with government and NABARD schemes with respect to agriculture and farmers, allow the engagement of multiple resources for wider impact
- c) Market linkages are critical to derive higher prices for raw perishable items from agriculture

There are farmer cooperatives and farmer producer companies that aggregate outputs from agriculture production for value addition and to ensure higher incomes for farmers. The Sahaja Aharam Producer Company Limited, initiated by efforts of Centre for Sustainable Agriculture is one such initiative that aggregates agriculture production from various farmer collectives to reach wider market and has significantly raised incomes of the farmers. Some retailers and processors, such as Field Fresh, Pepsico, and Nijjer, have contractual buyback arrangements with the farmers that specify quantity, quality, and a pre-agreed price. Some retailers are also developing the concept of business hubs to reach out to farmers, including DSCL Hariyali Kisan Bazar, TATA Kisan Kendras, Godrej Aadhaar, and ITC e-Choupal and Choupal Sagar.

Technology

The technologies available to farmers for irrigation, farming or harvesting are usually investment intensive and ignore the requirements at farmer's system level. This point is substantiated by the fact that over the last three years, three-fourth of the total expenditure on irrigation by centre and state government combined is on major irrigation projects while minor irrigation projects only occupy one-fourth of the total expenditure (Indian Public Finance Statistics 2014-15). A majority of the small farmers, whose lands are located in arid and semi-arid regions that are heavily sub-divided and



fragmented, deprived of irrigation facilities struggle to earn their livelihood. Precision farming is one of the upcoming opportunities to increase efficiency in agriculture, also ensuring higher return for farmers (Advani, 2015). A successful agriculture project in the state of Odisha, India (Intel, 2012) demonstrates how technology can be used to address environmental and agriculture productivity issues and improve the livelihoods of small farmers. To summarise, effective need based technology can improve continuously the productivity, profitability, sustainability of our major farming systems.

Finance

Investments are required for wider dissemination of need based technologies innovated in labs and fields to reach the market and farmers. Investments are also required for infrastructure like roads for transportation of agricultural products, and storage systems.

Scaling Community based models

A standard appropriate framework (evidence based) to assess the socio-economic and environmental impact of various community based models is critical to scale community based models. It is also essential to build a knowledge system on community based models and their cost- benefits, capacities of decision makers to inculcate principles of community models during implementation. Apart from certain schemes for farmer cooperatives, and formation of farmer groups in government schemes such as National Horticulture Mission, community based models must be promoted at the state or national level. Effective use of ICT and social media will help to yield good results and scale up the models. There is also a need to institutionalize the flow of knowledge from farmers to the agriculture experts and vice versa. An easy to access - 'mobile demonstration van' showcasing various good agricultural practices can disseminate knowledge from the community based models to the farmers on a regular basis.

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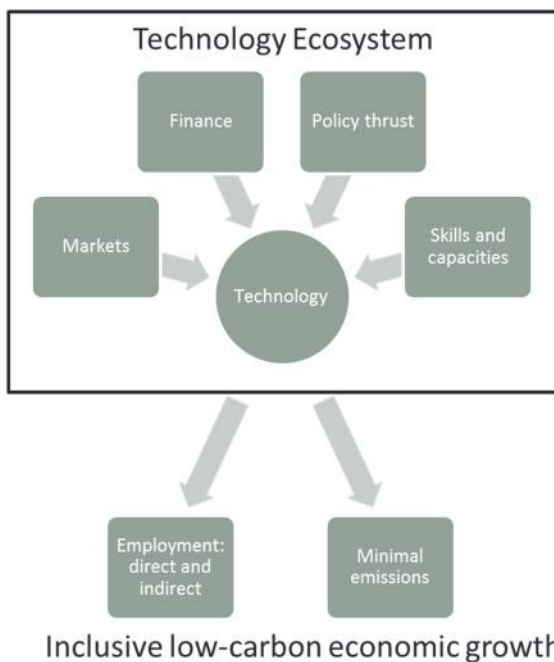


Low Carbon Energy

Energy Driving Low Carbon Local Economies

According to the 2011 Census of India, 81 million households or close to 400 million people do not have access to electricity as their main source of lighting. The electricity access gap remains an unfinished agenda in India for several reasons, which include weak implementing capacity and/or poor governance, shortages in electricity generation and huge population. The private sector is reluctant to get involved in the rural electrification agenda due to low cost-effectiveness and uncertain returns, as most rural communities are characterised by low population density, limited capacity to pay and low per capita consumption of electricity.

The decentralised low carbon production systems spread the benefit of development over a larger area, allowing a greater number of people to gain access to economic opportunities than would be possible in centralised production systems. While decentralisation can enable inclusive growth, low-carbon production systems usher in economic growth that does not transgress environmental limits.



The low-carbon transition has to be driven by a technological revolution, which would produce, disseminate and employ green technologies for low-carbon production. The development of these technologies has to be driven by appropriate thrusts in finance, markets, policy, skills and capacities etc. Additional policy thrust would be required to enable cost-competitiveness and inclusiveness of these technologies. Technology and its drivers together form the **technology ecosystem** that would usher in local low-carbon economic growth and benefits along the triple bottom line.

The current theme explores how these technology ecosystems can be built in various sectors of the economy to enable low-carbon local development, demonstrating the decentralised renewable energy-based electricity sector as an example. Currently, the

large-scale transition to a renewable energy-based economy is hampered by the under-developed, if not absent, nature of the ecosystem surrounding the technology. This is evident in the fact that financing options are plagued by high rates of interest, poor terms for debt, high fiscal deficit and insufficient budgetary allocations; the market for decentralised renewable energy companies is in its infancy; policy thrust is lacking as fossil fuel subsidies hamper the development of alternative green options. While renewable energy technologies already exist, it is necessary to build the ecosystem around these technologies in order to transition to decentralised low carbon energy systems.



Way Forward

India's growth model is integral to the way we live and the way we use our resources to increase per capita income and provide better quality of life with energy access to all. The cost of this growth has two dimensions i.e. inter generational and intra social. India's current capacity of 229 GW of electricity utilises 59% coal, 17% hydroelectricity, 12% renewable energy sources and 12% other energy sources. To ensure energy access to all through decentralised low-carbon production systems and promote inclusive, low-carbon economic growth the following four drivers need to be considered:

Market

Providing energy access to underserved rural areas requires market driven models and technology inputs. The Central Government grid extension programme cannot suffice for the entire rural area and hence social enterprises have to step in. Private players, like TARA Urja (TARA's newly incubated Micro-Utility Business), SunEdison, Husk Power, Desi Power etc. are doing well to demonstrate such market driven models that service the rural customer efficiently – through either household lighting or energy for productive usage. Other similar models need to evolve to include grid interactive systems and plug into the central grid plan. These sustainable, clean and promising private initiatives create social returns on investment as well as financial returns for the investor. Although the private rural electrification market is still in its infancy, there is tremendous scope for development.

Appropriate technology clubbed with local market solutions and behavioural change within the community can create a difference in the local economy. The local economy would benefit because of the local generation of power, capacity building to run the model and capacity building as a consequence of the access to power.

Policy

While an environmentalist may look at the reduction in emissions or air pollution, a business owner will see the rapidly reducing costs of technology and a policy maker will appreciate both and enable an environment friendly policy to facilitate this. Favourable policy environment would improve the ease of doing business for private investors and support research and development for deploying effective low-carbon energy access solutions.

Finance

With regard to decentralised renewable energy private investors need to have access to finance. Capital subsidies or easy terms of debt can provide a much-needed thrust. Through efficient revenue collection and theft control measures investors will have access to sustained cash flow. To avail essential services such as batteries for power storage households need microfinance which in turn will provides a storage solution and also help to reduce the price of electricity per power plant, trickling down to price per unit.



Skill Development

Since technology is at the heart of the proposed ecosystem, initial input from the public sector followed by investments by private sector would require skilled human resources who run the model and also benefit from the same. As an example, it was mentioned that the National Skill Development Mission can benefit greatly from the National Solar Mission if that channel of communication was strengthened. To demystify technology specific training inputs on communication must be provided to the customers. Digital skill development can be a solution to provide affordable training.

For decentralised generation the focus has always been energy access but the sustainability of both technology and its functional model has to be ensured. Thus, maximum innovation is required at the distribution and at the storage end (through batteries or other appropriate technology) to make the service to the customers more viable. There is also a need to build a strong assessment framework that includes parameters representing triple bottom line benefits, and the undeniable proof that such models can be replicated and scaled.



Annexures

Profile of Speakers

Dr. Ashok Khosla: *Founder - Chairperson, Development Alternatives Group and Co-Chair International Resource Panel, UNEP*

Experimental physicist from Cambridge and Harvard Universities, Dr. Ashok Khosla was the first Director in the Indian Government's first Environment Office in 1972 and then Director of Infoterra at UNEP in 1976. Since 1983 he has been Chairman of Development Alternatives Group, a social enterprise that promotes sustainable livelihoods and commercially viable and environmentally friendly technologies. Dr Khosla is also Co-Chair of the UN's International Resource Panel and member of the China Council for International Environment and Development. He has been President of IUCN (2008 to 2012) and Club of Rome (2005 to 2012) and is a recipient of the OBE, the UN Sasakawa Environment Prize, the Zayed Environment Prize, the WWF Duke of Edinburgh Medal, and the Schwab Foundation Outstanding Social Entrepreneur Award.



Swami Agnivesh: *Founder - Chairperson, Bandhua Mukti Morcha*

Winner of the Alternative Nobel Peace Prize (the Right Livelihood Award), 2004, Swami Agnivesh is known for his campaigns against bonded labor. In 1994, he was appointed the Chairperson of the UN Trust Fund on Contemporary Forms of Slavery. An environmental activist, he draws on Gandhian wisdom to advocate simplicity and sustainability and economic rights, deploring the economics of greed that characterizes much of today's globalisation. While his chief preoccupation is social justice and rights, he has also championed the search for peace in violent conflicts. Swami Agnivesh has spearheaded the interfaith and inter-religious movement nationally and globally, and established the The **Sarva Dharma Sansad** or All Faiths Parliament in 2007. His perspectives range from the ruinous debts of the Third World nations, to cultural imperialism, to appropriate developmental patterns, unsustainable over-consumption, and the need to make religion more people-friendly.



Dr. Suman Sahai: *Founder - Chairperson, Gene Campaign*

Recipient of the Padma Shri, the Borlaug Award, Outstanding Woman Achiever award, the Birbal Sahni Gold Medal and the Order of the Golden Ark., Dr. Sahai is founder Chairperson of the Gene Campaign which is a leading research and advocacy organisation, working on issues relating to food, nutrition and livelihoods. She has published extensively on science and policy issues and is a member of several national policy forums on scientific research and education, biodiversity and environment, biotechnology and bioethics as well as intellectual property rights. Dr Sahai chaired India's Planning Commission Task Force on 'Agro biodiversity and Genetically Engineered Organisms', for the XIth Plan. She was a member of the Steering Committee of the National Biodiversity Board, the Expert Committee on Biotechnology Policy and the Bioethics Committee of the Indian Council of Medical Research. She has also served on the Research Advisory Committees of national scientific institutions.





Inaugural Session

Mr. George C. Varughese

President, Development Alternatives (DA)

Mr. George C. Varughese President, Development Alternatives (DA) has over two decades of experience in environment and development. He has worked on national and international policy formulation, technical training programmes, building partnerships and managing large-scale field programmes, involving community participation. Mr. Varughese is a member of several international and national governing bodies, advisory panels, and working groups like Green Economy Coalition (GEC), World Bank Community Development Carbon Fund (CDCF), Global Water Partnership (GWP), UNEP - Global Environment Outlook (GEO), International Union of Conservation of Nature (IUCN), the Planning Commission and various ministries of the Government of India. He has also spearheaded several civil society initiatives like the Credibility Alliance, Independent Research Forum (IRF), a global civil society network for post-2015 development agenda. Mr. Varughese was the founding Co-Chair of Climate Action Network South Asia (CANSA). He is also Member Board of Studies – School of Planning and Architecture, Ambedkar University Delhi.



Dr Arunish Chawla

Joint Secretary, Ministry of Finance, Government of India

Dr Arunish Chawla is a 1992 batch IAS from Bihar Cadre. He is also an alumnus of the London School of Economics (LSE). Dr Chawla is currently Joint Secretary in the Ministry of Finance, Government of India. He has earlier worked as Private Secretary to Planning Commission Deputy Chairperson Montek Singh Ahluwalia. Dr. Chawla has been part of the plan panel's low carbon growth strategy road map and had worked closely with the expenditure monitoring unit in the panel. He has many research and publications to his credit.



Dr Murali Kallur

Senior Programme Officer, IDRC

Dr Murali Kallur is an ecologist specialising in sustainable use of natural resources and conservation of biodiversity. He is also an expert on climate change adaptation for communities dependent on forests, oceans, and agriculture. His work at IDRC includes managing the Collaborative Research Initiatives in Africa and Asia and a programme on climate change adaptation in Asia, a joint initiative with the UK's Department for International Development (DFID). Prior to IDRC, Dr Murali worked at the United Nations on biodiversity and other environmental issues that affect smallholder agriculture. He has extensive experience with community-based conservation initiatives. Dr Murali has worked at academic institutions, international and local NGOs, and French government institutions. He has many scientific journal articles to his credit as well as books in English and local Indian languages.





Mr. Ralf Fücks

President, Heinrich Böll Foundation (HBF)

Mr. Ralf Fücks served as Co-President for the national Green Party in 1989/90. During this period he strongly advocated transforming the Greens into a reform party. He has served as Deputy Mayor of Bremen and as Senator for Urban Development and Environmental Protection, Government of Germany. Mr. Fücks has been a member of the Executive Board of Heinrich Böll Foundation (HBF) since 1996. The primary focus of his work is on sustainable development, reshaping the welfare state, migration, the future of European integration, and on foreign policy. He was editor of the book "*Sind die Grünen noch zu retten?*" ('Is There a Future for the Green Party?'). He is a regular contributor to numerous newspapers and political periodicals and co-author to numerous books. He is the author of the book "*Intelligent Wachsen – Die grüne Revolution* (Intelligent Growth – The Green Revolution)".



Dr Rajesh Tandon

President - Society for Participatory Research in Asia (PRIA)

Dr Rajesh Tandon is one of pioneers of Participatory Research globally. Dr. Tandon, a firm believer in innate capacities of individuals and democratic institutions, founded and nurtured many institutions. He set up Society for Participatory Research in Asia (PRIA) as a vehicle to strengthen learning opportunities at the grassroots. He is also the founding member of CIVICUS (World Alliance for Citizen Participation). Dr Tandon has been honoured with the prestigious award in social justice for his distinguished work on gender issues. He has also been awarded the 'Doctor of Laws' (Honoris Causa) by the University of Victoria, for his pioneering work on civic engagement, governance and community based research. Dr Tandon is also co-Chair of the prestigious UNESCO Chair on Community Based Research and Social Responsibility in Higher Education.





Technical Session

Dr Arun Kumar

President of Development Alternatives (DA)

Dr Arun Kumar has extensive experience in the areas of technology design, system engineering, business development and research. He has worked in the areas of renewable energy technology design and development, systems engineering and business development and general management. Dr Kumar has been involved in the development and liberation of sustainable technology packages in the areas of low-cost construction, decentralised energy production, clean and green technologies, biomass utilisation, paper recycling and other livelihoods technologies. Dr Arun Kumar has been actively involved in planning for large-scale dissemination of cleaner technologies required under the International Protocols. The TARA Eco Kiln technology, promoted in India, is one of the first bundled Clean Development Mechanisms (CDM) registered projects making available Carbon Revenues to small scale businesses. He has authored numerous publications on technology promotion and benchmarking. He represents the DA Group on several national committees of Confederation of Indian Industry (CII), Department of Science and Technology (DST) and various Ministries of Government of India.



Dr Sunil Agarwal

Scientist, Science for Equity, Empowerment & Development (SEED), DST, Government of India

Dr Sunil K. Agarwal is Scientist in Science for Equity, Empowerment & Development (SEED) Division, Department of Science and Technology (DST), Government of India, New Delhi. At present he is handling two important schemes of DST having societal relevance i.e. Technology Advancement for Rural Areas (TARA) and Technology Interventions for Tribal Empowerment (TITE). Dr Agarwal is an M. Phil in environmental science and holds Ph.D. degree from Forest Research institute (FRI), Dehradun for which he worked on action research to evolve technology intervention models for sustainable rural livelihoods in mountain areas. He has also got trained as a fellow in Biodiversity Conservation from Development and Project Planning Centre, University of Bradford, Bradford, UK.



Mr. V. Mashar

Deputy General Manager, National Bank for Agriculture and Rural Development (NABARD)

Mr. V Mashar is a climate change adaptation/mitigation expert presently engaged in climate change vertical at NABARD, Mumbai. Mr. Mashar's expertise is mainly in formulation, appraisal, monitoring and evaluation of climate resilient rural development/infrastructure projects, watershed development projects and other agri-based projects. During his stint, NABARD has been accredited as National Implementing Entity (NIE) of Adaptation Fund Board (AFB), Green Climate Fund (GCF) and National Adaptation Fund for Climate Change (NAFCC). As a part of the accreditation under GCF, he has participated in the 10th Board meeting of GCF held at Songdo, Republic of Korea during July 2015. Prior to NABARD, he had an experience of working in a commercial bank and State Department of Agriculture.





Mr. Chandra Bhushan

Deputy Director General, Centre for Science and Environment (CSE)

Mr. Chandra Bhushan is an expert in the field of natural resource management, environmental geo-politics and industrial pollution. He has a diverse and distinguished track record in research, writing, and policy advocacy, having researched and written about issues ranging from industrial pollution regulations to energy security and climate change, and from water crisis to political economy of natural resource extraction. He has been working in the field of low carbon development and has authored various publications on low carbon development. He is also a member of various national and international working groups on Sustainability. He has been Co-Chair, Technical Advisory Committee, Global Resourcing Initiative (GRI), USA/Netherlands, He is member of the Food and Agriculture Division, Bureau of Indian Standards (BIS), Member, Copenhagen Working Group on Corporate Social Responsibility - CSR (business and development). Copenhagen Business School, Denmark, Member, Working Group on Effectively Integrating Industrial Growth and Environment Sustainability for the 12th Five Year Plan, Planning Commission, Government of India and member of various sub-groups of Ministry of New and Renewable Energy for the 12th Five Year Plan, Government of India to name a few.



Mr. Daniel Ziegerer

Director- Cooperation, Climate Change and Development Programme, Swiss Agency for Development and Cooperation (SDC)

Mr. Daniel Ziegerer is Director of Cooperation of the Climate Change and Development Programme of the Swiss Agency for Development and Cooperation (SDC) at the Swiss Embassy in New Delhi. Throughout his professional career, he was involved in the development of policy and law-making in the areas of environment and sustainable development. He led official Swiss delegations to and represented the Swiss government in international conferences and negotiations on these matters. Prior to this appointment, Mr. Daniel Ziegerer was Head of Global Affairs at the Swiss Federal Office for the Environment. In this function, he was the Swiss focal point for the United Nations Environment Programme (UNEP) and several Multilateral Environmental Agreements. He was also in charge of coordinating the Swiss preparations for the 2012 UN Conference on Sustainable Development (Rio+20). At the beginning of his professional career, Mr. Ziegerer worked for the Swiss State Secretariat for Economic Affairs in its Economic Development Cooperation Division. He also lived in Peru where he was working as Policy Adviser for the Peruvian Society for Environmental Law in its Biodiversity and International Affairs Programme.





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To Choose Our Future

The book 'To Choose Our Future' underlines a development paradigm in which the ecosystem, health, social equity and human empowerment are goals of equal importance with economic improvement. The book identifies the single most important priority for India today that of creating sustainable livelihoods at a large scale. It draws upon lessons from 30 years of work on sustainable national development.



Managing and Conserving the Natural Resource Base for Sustained Economic and Social Development

This report advocates and promotes the rational management of resources throughout the Post - 2015 SDG processes, given IRP's mandate and responsibility for raising the visibility and sense of urgency regarding natural resource issues among decision-makers and the public. In addition to integrating resource concerns in popular and widely acceptable goals on food, water, energy, urban development etc., this paper also advocates a separate goal on sustainable resource management.



Sustainable Social Housing Initiative: Stakeholder Assessment Report

This 2014 report presents the finding of an assessment on sustainability in urban social housing in India undertaken by Development Alternatives under the UNEP -Sustainable Social Housing Initiative (SUSHI). The assessment aims at creating a better understanding of the integration of environmental sustainability in the social housing space in India.



Biodiversity based livelihoods and Green Economy

This paper, by Keystone Foundation and Development Alternatives, explores the current state of biodiversity-based livelihoods in India, highlighting the key barriers and challenges in valuing ecosystem services and creating a culture of shared responsibility to protect biodiversity. It looks at the opportunities available to implement eco-development initiatives, recognising that transitioning to a Green Economy will require creation of a culture of valuing ecosystem services and sustainable harvest practices.

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