



WORLD **SUSTAINABLE** **DEVELOPMENT** SUMMIT

Beyond 2015: People, Planet & Progress

October 5-8, 2016

India Habitat Centre, Lodhi Road, New Delhi, India





WELCOME NOTE

It gave me immense pleasure to welcome the delegates to the first edition of the World Sustainable Development Summit (WSDS), the new personification of TERI's Delhi Sustainable Development Summit (DSDS).

The DSDS was initiated in 2001, one year after the global community embarked on the journey to achieve the United Nations Millennium Development Goals. The DSDS was based on the realisation that global exchange of knowledge, ideas, and technology is central to all aspects of sustainable development.

The year 2015 was pivotal as it witnessed two sets of major global agreements on the Sustainable Development Goals (SDGs), and the Paris Agreement to address climate change. TERI has been associated with both these global movements through outreach, research, and policy analysis. This involved

extensive dialogue with local and global stakeholders and during this process TERI strived to find solutions that would support individuals, corporates, communities, and countries to move to a path of sustainable development. As the world goes through a period of transition, the need for local action and global cooperation is even more important.

The year 2015 also witnessed the 15th edition of the DSDS. At this important juncture, the DSDS has evolved to the World Sustainable Development Summit. The WSDS, in its new manifestation promotes 'advocacy for implementation' with a primary focus on sharing regional experiences, i.e., enabling local solutions for global challenges.

The evolution of the WSDS, from the DSDS, aspires to raise the platform, attract greater talent and expertise, and devise

ways so that messages crafted at this platform are widely disseminated, thus leading to constructive action.

WSDS 2016 had a galaxy of distinguished speakers and an equally important group of participants from all over the world. It provided a platform for enhanced cooperation and strategic partnerships, which were essential to achieve the SDGs and limit global temperature rise to less than 2 degrees Celsius. The messages that arose from this major Summit were not only valuable

to governments around the world, but also identified viable actions by businesses, research and academic organisations, media, civil society, and the public at large.

The WSDS series commits itself to development that is sustainable and to an environment that is resilient.

Dr Ajay Mathur
Director General, TERI

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AGENDA



October 5, 2016	
8.30 am onwards	Registration opens
10.00–12.00 pm	Thematic Tracks @ India Habitat Centre
	❖ World Bank - Climate Resilient Agriculture
	❖ EU - India Collaboration for Implementation of NDCs
	❖ IFC – Valuation of Energy Costs in the India Context
	❖ UNDP - Mainstreaming SDG Goal No.7 – Affordable and Clean Energy
	❖ CARIAA - Linking Climate Risks to Policy and Practice – Sharing Experiences and Approaches for Research Uptake
	❖ Ingersoll Rand – Corporate Dialogue on Transitioning to Low GWP Refrigerants and Higher Efficiencies
	❖ Using Multi- Stakeholder Simulations to Examine the Impacts of Food Policy Choices in India and Asia
	❖ IUCN- Mainstreaming Biodiversity for Responsible Business
12.00 - 1.00 pm	Lunch hosted by EESL
1.00 – 1.30 pm	<i>Greenovation 2016 Exhibition Inauguration @ India Habitat Centre</i> ❖ Mr Jayant Sinha , Hon'ble Minister of State for Civil Aviation, India ❖ HE Mr Tomasz Kozlowski , Ambassador of the European Union to India <i>Followed by a walk-through of the Exhibition</i>

1.30 – 7.00 pm	Business Day <ul style="list-style-type: none"> ❖ Inaugural Session ❖ Plenary: Encouraging Businesses to Take the Lead in Poverty Reduction & Achieving SDGs ❖ Smart Plug-ins ❖ Plenary: Low Carbon Industries: Accelerative Employment in the Context of Sustainable Development ❖ Valedictory ❖ Networking Reception
October 6, 2016	
10.00 am – 12.00 pm	Thematic Tracks @ Vigyan Bhawan <ul style="list-style-type: none"> ❖ EU - Workshop on: Resource Efficiency and the Circular Economy ❖ AFD - Lifestyles, Production and Consumption: Key Challenges for Sustainable Development ❖ REEEP - Energising Agri-food Value Chain through Clean Energy – Investing in Entrepreneurship and Sustainable Solutions ❖ Norway Embassy/Statkraft - Clean Energy Nexus- The way forward in India ❖ Air Pollution in India: A Problem with Scalable Solutions - Roundtable
1.15 – 2.15 pm	<ul style="list-style-type: none"> ❖ Inaugural by the Hon'ble President of India @ Vigyan Bhawan ❖ Presentation of the 2016 Sustainable Development Leadership Award
2.30– 3.30 pm	Lunch @ India Habitat Centre

<p>3.45 pm – 5.00 pm</p>	<p>Ministerial Session - People's Aspirations and Sustainability : New Governance Paradigm @ India Habitat Centre Chair: Ambassador Ajai Malhotra, Distinguished Fellow & Senior Advisor (Climate Change), TERI</p> <ul style="list-style-type: none"> ❖ HE Mr Karmenu Vella, Commissioner for Environment, Maritime Affairs and Fisheries, European Commission ❖ Mr Anil Madhav Dave, Hon'ble Minister of State (I/C) of Environment, Forest and Climate Change, India ❖ HE Mr Lars Andreas Lunde, Deputy Minister of Climate and Environment, Ministry of Climate and Environment, Norway ❖ HE Mr Slawomir Mazurek, Deputy Minister of Environment, Poland ❖ HE Mr Ibrahim Baylan, Minister for Policy Coordination and Energy, Sweden ❖ HE Mr Erik Solheim Under Secretary General of the United Nations & Executive Director of UN Environment
<p>5.00 – 6.00 pm</p>	<p>Plenary - Air Pollution is a Solvable Problem Chair: Prof. V Ramanathan, Distinguished Professor and UNEP's Champions of Earth, Scripps Institution of Oceanography, University of California, San Diego</p> <p>Panellists:</p> <ul style="list-style-type: none"> ❖ Mr Kamal Bali, Managing Director, Volvo India Private Limited ❖ Dr Carlos Dora, Coordinator - Public Health, Environmental and Social Determinants of Health Department, WHO ❖ Dr Dirk Fransaer, Managing Director, VITO ❖ Dr Sunday Leonard, Science Programme Office, UNEP-CCAC ❖ Dr Ajay Mathur, Director-General, TERI
<p>6.00 – 6.15 pm</p>	<p>Tea</p>

6.15 pm– 7.30 pm	Plenary – Climate ~Water ~ Energy ~ Food Nexus Chair: Mr Ajay Shankar , Distinguished Fellow, TERI Panellists: <ul style="list-style-type: none"> ❖ Ambassador Jonathan Addleton, Mission Director, USAID-India ❖ Mr Anindya Chatterjee, Regional Director, Asia, International Development Research Centre (IDRC) ❖ Mr Klas Eklund, Senior Economist Sustainability, SEB ❖ Dr Keywan Riahi, Director- Energy Program, IIASA ❖ Mr Ravi Singh, Secretary General & CEO, WWF-India
7.30 – 7.50 pm	Special Addresses : <ul style="list-style-type: none"> ❖ Mr Suresh Prabhu, Hon’ble Union Minister of Railways, India ❖ Mr Pawan Chamling, Hon’ble Chief Minister of Sikkim Chair: Dr Ajay Mathur , Director-General, TERI
7.50 pm onwards	Cultural evening followed by Dinner
October 7, 2016 @ India Habitat Centre	
9.15-9.45 am	Tea
9.45 – 11.00 am	Plenary - Habitat III Agenda - Sustainable Development Goals and Implications for Cities Chair: Mr S Sundar , Distinguished Fellow, TERI Co-chair: Prof. Om Prakash Mathur, Senior Fellow and Head, Urban Studies, Institute of Social Sciences Keynote Address: Mr Durga Shanker Mishra , Additional Secretary (UD), Ministry of Urban Development, India Panellists: <ul style="list-style-type: none"> ❖ Mr Yuri Afanasiev, UN Resident Coordinator and UNDP Resident Representative

9.45 – 11.00 am	<ul style="list-style-type: none"> ❖ Ms Anita Arjundas, President & CEO, Mahindra Lifespaces ❖ Mr Cyrille Bellier, Deputy Executive Director, Strategy, Partnerships & Communication Directorate, AFD ❖ Mr Andreas Klugescheid, Vice President Governmental Affairs, BMW AG ❖ Dr Shipra Narang Suri, Vice-President, General Assembly of Partners towards Habitat III & Co-Chair, World Urban Campaign ❖ Ms Xueman Wang, Team Leader for the Global Platform for Sustainable Cities, World Bank
11.00 – 11.10 am	Showcasing the TERI - Mahindra Centre of Excellence
11.10 am – 12.20 pm	<p>Plenary – Sustainable Development Goals on Water: Challenges and Opportunities</p> <p>Chair: Dr SK Sarkar, Distinguished Fellow, TERI</p> <p>Panellists:</p> <ul style="list-style-type: none"> ❖ Dr Genevieve Connors, Program Leader, Water & Sustainability, India Country Office, The World Bank ❖ HE Mr Slawomir Mazurek, Deputy Minister of Environment, Poland ❖ Dr A Ravindra, Chairman, Centre for Sustainable Development & Chairman, Institute for Social & Economic Change & former Chief Secretary, Karnataka ❖ Ms Astrid Schomaker, Director Global Sustainable Development, DG Environment, European Commission ❖ Dr Alok Sikka, International Water Management Institute (IWMI) Country Representative, India
12.20 – 1.15 pm	Lunch

<p>1.15 – 2.30 pm</p>	<p>Plenary - NDCs: Plans, Policies & Priorities Chair: Dr Prodipto Ghosh, Distinguished Fellow, TERI Panellists:</p> <ul style="list-style-type: none"> ❖ Mr Erik Brandsma, Director-General, Swedish Energy Agency ❖ Prof. Hironori Hamanaka, Chair of the Board of Directors, Institute for Global Environmental Strategies ❖ Dr Ajay Mathur, Director-General, TERI, India ❖ Mr RR Rashmi, Special Secretary, Ministry of Environment, Forest and Climate Change, India
<p>2.30-2.35 pm</p>	<p>MoU Signing between TERI & the French Alternative Energies and Atomic Energies Commission (CEA) MoU</p>
<p>2.35 – 3.35 pm</p>	<p>Plenary-Beyond 2015: Sustainable Infrastructure for Africa's Transformation Chair: Mr Nitin Desai, Distinguished Fellow, TERI & Former UN Under-Secretary-General for Economic and Social Affairs Panellists:</p> <ul style="list-style-type: none"> ❖ Dr Araya Asfaw, Director, Horn of Africa Regional Environment Centre & Network, Addis Ababa ❖ Ms Meaza Ashenafi, Adviser, Gender and Women's Rights, Capacity Development Division, UNECA ❖ Mr Martin Hiller, Director-General, REEEP ❖ Ambassador Ajai Malhotra, Distinguished Fellow, TERI ❖ Ambassador Nalin Surie, Director-General, Indian Council of World Affairs
<p>3.35 – 4.00 pm</p>	<p>MOU Signing between the Government of India and European Union Special Address:</p> <ul style="list-style-type: none"> ❖ Sushri Uma Bharti, Hon'ble Minister of Water Resources, River Development and Ganga Rejuvenation, India ❖ HE Mr Karmenu Vella, Commissioner for Environment, Maritime Affairs and Fisheries, European Commission <p>Chair: Mr S Vijay Kumar, Distinguished Fellow, TERI</p>

4.00–4.15 pm	Tea
4.15 – 6.15 pm	Thematic Tracks
	❖ BMW- Realising the Electric Mobility Vision
	❖ 2nd EU- India Water Forum
	❖ EU- Achieving Sustainable Development Goals: Challenges and Opportunities for Urban India
	❖ Role of Forests in India's INDC
	❖ Pre-COP 22 Corporate Consultation: Role of Indian Industry in meeting India's INDC Goals
	❖ World Bank- Challenges & Strategies to Mobilise Climate Finance for Low-Carbon Development
6.15 – 6.45 pm	❖ Swedish Energy Agency - Role of Smart Grid Technologies in Power Sector Reforms for Promoting 24x7 Affordable & Environment Friendly 'Power for All' in India
	Special Address : Mr Amitabh Kant , CEO, NITI Aayog (National Institution for Transforming India), Government of India Chair: Mr Jayant Banthia , Former Chief Secretary of Maharashtra ❖ Launch of the Publication, 'People, Planet & Progress Beyond 2015'
6.45 pm onwards	Cultural Performance & Dinner
October 8, 2016 @ India Habitat Centre	
9.30 – 10.00 am	Keynote Address: Prof. Jeffrey Sachs , Director- The Earth Institute, Columbia University (via video) Chair: Dr Ajay Mathur , Director-General, TERI

10:00 am – 12.00 pm	Thematic Tracks
	❖ Genpact - Youth Ecopreneurs
	❖ International Solar Alliance
	❖ CDKN & LEAD- Collaborative Regional Learning and Brokering Knowledge to Enhance Resilience to Climate Change in South Asia
	❖ EESL - Scaling Up Energy Efficiency
	❖ TU - Ensuring Sustainable Consumption and Production Patterns (SDG 12) through Higher Education Learning
12.00 pm – 1.00 pm	Lunch
1.00 pm – 2. 15 pm	❖ Screening of the TRISHA (TERI's Research Initiative at Supi for Himalayan Advancement) film
	Plenary - Energy Transitions: Perspectives & Priorities <i>Chair: Dr Ajay Mathur, Director-General, TERI</i> Lead Presentations: ❖ Global Energy Transitions: Mr Paul Simons , Deputy Executive Director, International Energy Agency ❖ India Energy Transitions: Dr Ritu Mathur , Director, Green Growth and Resource Efficiency, TERI Panellists: ❖ Dr Anshu Bharadwaj , Executive Director, CSTEP ❖ Mr Jaco Cilliers , Country Director, UNDP India ❖ Mr Ashok Lavasa , Secretary - Finance & Expenditure, Ministry of Finance, India ❖ Mr Sumant Sinha , Chairman & CEO, ReNEW Power ❖ Mr Upendra Tripathy , Secretary, Ministry of New and Renewable Energy, India

<p>2.15– 3.15 pm</p>	<p>Plenary : Climate Finance and Implementation Towards Sustainability Chair: Mr Nitin Desai, Distinguished Fellow, TERI & Former UN Under-Secretary-General for Economic and Social Affairs Panellists:</p> <ul style="list-style-type: none"> ❖ Mr Suman Bery, Former Member - Prime Minister’s Economic Advisory Council ❖ Mr Ashok Chawla, Chairman, TERI ❖ Mr Sanjay Mitra, Secretary, Ministry of Road, Transport & Highways, India ❖ Mr Dinesh Sharma, Special Secretary, Department of Economic Affairs, Ministry of Finance, India ❖ Mr George N Sibley, Minister Counselor for Economic Affairs and Environment, Science and Technology, US Embassy - India
<p>3.15 pm – 4.00 pm</p>	<p>Valedictory Session: Opening Remarks : Mr Ashok Chawla, Chairman, TERI Summary of the WSDS 2016 Proceedings : Mr Amit Kumar, Senior Director – Social Transformation, TERI Presentation of Awards:</p> <ul style="list-style-type: none"> ❖ TERI University Awards ❖ TERI Press Photo Contest Award <p>Valedictory Address: Mr Prakash Javadekar, Hon’ble Minister of Human Resource Development, India (via video) Concluding Remarks: Dr Ajay Mathur, Director-General, TERI</p>
<p>6.00 – 9.00 pm</p>	<p>Green Day: An Evening dedicated to Environmental Innovation Dialogues, Open Mic and Literary Prize @ Residence of France IMPORTANT: Entry by registration only - register at sve@ifindia.in by 7th October noon.</p>





THEMATIC TRACKS





Climate Resilient Agriculture

In recent years, food security has become a global problem, more complex than ever before. The impact of global food shortage in any region is reflected as the price rise of the commodity at the global level. Food security is viewed together with nutritional security and issues related to it are considered as long term sustainability. Food production is interconnected with a wide range of issue areas such as population growth, changes in dietary choices, alternative uses including options for energy production and potential impact of issues such as climate change, farm sizes and farmer's demography etc.

Agricultural productivity is highly vulnerable to climate change. Insufficient/excessive rain fall; hot or cold spells; little too early or late; days with extreme climate; etc. can have catastrophic effects on crop yields and livestock production. Rising concentration in the CO₂ due to climate change could perhaps help in increasing production in some regions, but the indirect impact of changing climate disturbance over the length of the growing period of the crop usually results in devastating impact of crop yields and even quality of the produce.

In 2007, the IPCC's Fourth Assessment



Report (AR4) predicted that parts of the sub-tropics could experience deteriorating conditions for food production where global average temperatures would rise by more than 1 – 3 ° C. Crop yields across almost all regions would decline by 5 – 47% as a result of extreme weather events combined with the depletion of natural resources. It is predicted that production of important cereal crops (wheat, rice & maize) will decline globally. Also, most regions with high population density where food security is an issue today will perhaps suffer the most.

Modern farming technologies have reduced this vulnerability and increased production over the recent decades, but there is quantitative evidence showing that climate change is already affecting the quality and quantity of food produced globally. The extensive and late winter rains in the year 2015 in India has impacted negatively the wheat yields and quality of the wheat grain. The biggest losers from the warming trends are expected wheat in Russia, India and France; and maize in China and Brazil. A Stanford University study reported that global production of maize would be approximately 6% higher and wheat 4% higher were it not for changing weather patterns since 1980.

The current agricultural practice also leads to GHG emissions. These can be substantially reduced by adopting alternative environment



friendly technologies. Use of germplasm which tolerates fluctuating temperatures; resistant to drought & water logging; applications of fertilizers at root zone rather than direct broadcasting; conservation agriculture, precision agriculture; organic agriculture etc. are some of the suggested technologies for climate smart agriculture.



With the above background, a thematic track on “Climate Resilient Agriculture” targeting issues related to climate change and strategies to mitigate the impact of climate change on agriculture was organized on 5 October 2016 by TERI in collaboration with the World Bank. The session focussed on issues related to climate change and strategies to mitigate the impact of climate change on agriculture.

In the Introductory Remarks & Theme setting, Dr Madhur Gautam, Lead Economist, The World Bank, stated that food systems are highly vulnerable to climate change.

In the sub-session on “Why ? Scale, Trends & Outlook” chaired by Dr Madhur Gautam, with panelists, Dr Pramod Aggarwal, Regional Program Leader, Climate Change, Agriculture



and Food Security of CGIAR – CCAFP Programme and Prof N H Ravidranath, Professor, Indian Institute of Science (IISc), it was unanimously felt that Climate change is a reality and agriculture presently contributes around 23% of the total greenhouse gas emissions. Agriculture is a victim as well as a contributor to climate change. Various Climate Smart Agriculture (CSA) strategies have been initiated worldwide but there is no prioritisation. A large financial gap remains in supporting CSA. The next sub-session on Policy / Strategic Level chaired by Dr Vibha Dhawan, Distinguished Fellow and Senior Director, TERI had Mr David Butler, Director, Sustainable Food Systems Ireland (SFS), Dr Tushaar Shah, Senior Fellow, International Water Management Institute (IWMI) and Dr M R Garg, General Manager – Animal Nutrition Group, National Dairy Development Board (NDDB) as panelists. It was discussed that there is an urgent need to consider synergies and trade-offs between food security and adaptation. A comprehensive



approach consisting of partnerships, knowledge generation, incentive mechanism, CSA enablers is required as there is no single bullet solution. Traditional knowledge and cultural practices can also be used as mitigation strategies and tools. Hence, legacy should be used where appropriate to build on existing systems and knowledge. Germplasm screening for climate resilience is the key to develop adaptive genetic resources. New technological tools such as genomic selection in livestock and crops can help accelerate the speed of adaptation. Green Livestock development strategies for reducing emissions and increasing per capita productivity should be prioritized. High efficiency and sub-soil irrigation along

with watershed management is another strategy for adaptation. Climate smart solar pumps can be a viable drought coping tool as it reduces water wastage if linked to the grid. Extra power generated can be an income generation source for the farmers. The last sub-session on “What Works” was chaired by Ms Priti Kumar, Senior Environmental Specialist, The World Bank with Mr Shyam Khadka, FAO Representative in India, Food and Agriculture Organization of the United Nations (FAO) and Dr P K Joshi, Director, International Food Policy Research Institute (IFPRI) as panelists. They emphasized that using reduced agricultural inputs can also lead to increase in productivity as in the case of

System of Rice Intensification (SRI). However, adoption of such practices by farmers requires a study of their investment behaviour. Climate Smart villages are also being developed by the Consultative Group of International Agricultural Research (CGIAR) in many countries. The challenge lies in scaling up of CSA initiatives, Farmers' attitudes and transitioning is a key issue and one needs to take care of de-risking farmers' interests. Climate change solutions need to be income-centric; but sustainability is important as we need to balance today's incomes with tomorrow's incomes. There is no silver bullet or a blanket recommendation that suits all situations. For India, convergence of various CSA initiatives can lead to their better adoption and hence, success.

In the wrap-up session, Mr Madhur Gautam and Dr Vibha Dhawan reiterated the use of new technologies for irrigation and conservation agriculture. Also, the importance of farm mechanization for small and marginal farmers and custom hiring model, would lead to its availability to the smallest farmers. Also new models of enterpreneurship would develop. These shall make agriculture more sustainable and carbon neutral. To conclude, agriculture is a victim of as well as a contributor to climate change. High efficiency irrigation, watershed management, greening livestock and unlocking value chains are the four key buckets in which adaptation and mitigation strategies can be classified.



EU-India Collaboration for Implementation of the Nationally Determined Contributions

The introductory session was made by Ashish Chaturvedi who heads the EU India dialogue. There was a mention about the Kigali and Marrakesh negotiations which were very close by. The Paris Agreement has already been ratified by India and a date of ratification has been declared by EU. India and EU have been found to be not very different. These nations have given an INDC which has been deemed ambitious by various organizations, who dare to study these things. A lot of similarities are found to be shared between India and EU. The diversity has been in terms of its member states – both these nations have been found to be celebrating, at different stages, a BREXIT. It was further added by him that today's discussion was to outline the contours of this cooperation.

Henrietta Faergmann congratulated India on taking global leadership at the climate agenda. There was a mention of India having already ratified the Paris Agreement and EU being on the verge to ratify. Hence things seemed to be glorious for the Marrakesh session. The difficulty in implementing the plan of action was put forth. There was a mention of challenges in terms of water, food etc. It was emphasized



that India has low per capita emissions; and had already committed to a strong mitigation measure and wide ranging adaptation measures. The significance of India, being an emerging economy was reemphasized. Offshore wind, grid integration of solar parks and energy legislations was talked about. The International solar alliance – a joint initiative by the Prime Minister of India and the President of France was also mentioned in the session. Modi's EC on March, 2016, was discussed – how the dialogue should be more than just government to government. Decision on jointly developing business partnerships and research was the need of the hour. The presence of enormous opportunities for policy dialogue was reiterated. There were few words on experience with implementations with a mention of EU having the most ambitious mitigation action.



The target set for Paris was also found to be very ambitious - 40% economy wide reduction by 2030. There was also a mention of need for investment in low carbon technologies in order to decarbonize. 40% of wind turbines were found to be made in EU. Jobs would be created in the Renewable Energy sector. For this an investment of 500-600 Billion Euros would be needed which was to be financed through the use of public finance as seed money to incentivize private players. There was a suggestion to implement new policy for Decarbonization of transport along with revising the energy efficiency and labeling programme. .

Ambuj Sagar from IIT Delhi questioned about the opportunities existing for India in the current context. It was mentioned that the task was daunting quite similar to fixing a car while driving



it. The focus ought to be on making technologies actually available a) R&D models b) Product development challenges c) adaptation of existing technologies. Demonstration of implementable business models was important. There were questions raised on how to implement scale up in terms of emission trading, tax, subsidies. Learning on how to move up the diffusion curve was essential. Knowledge about opportunities and tensions in terms of access to energy and how India manages these challenges and how EU can help in that is required. Building capacity in terms of technology, implementation and analytical capacity is essential for improved decision making. Emphasis ought to be on facilitating partnerships around specific challenges and facilitating programmatic aspect of capacity building.

Kirtiman Awasthi focused on adaptation and Indo-German cooperation. There was a mention of technology, finance, capacity building, collaborative research between India and EU. There was an emphasis on promoting multi-stakeholder dialogue and implementing locally scalable models in order to be able to achieve a multiplier effect. Some other critical points discussed were the use of innovative technologies to promote livelihood diversification, mainstreaming of adaptation into development policies and leveraging finances through national and international sources. The significance of capacity building along with technological innovation for climate change was reemphasized. Innovation was the key to sustainability - innovative adaptation is needed in the water sector, change value, business models, and crop varieties. There is a need for mobilizing public and private finance, generating evidence based capacity, gender mainstreaming and developing monitoring and evaluating frameworks.

Ritu Mathur cited that development goals – energy requirements were going to increase five times. She also emphasized the need to decouple energy and emissions from the growth story. The need of the hour was to lay emphasis on learning and deeper collaboration. Links with land and water need to be identified. Closed synergies need to be developed. Implications for finance need to be revisited. Reviewing the global model is essential for a climate change assessment.

Keywan Riahi mentioned that INDC comes from different countries. There is a dire need to assess where the INDCs are taking us and where they leave us in terms of long term targets. The inherent barriers need to be identified. It is extremely crucial to review the interactions between climate policy and Sustainable Development Goals (SDGs). The overall aim is to develop national roadmaps, and to check whether national efforts add up to the global objectives that have synergies between climate change and SDGs in order to be able to develop international and national roadmaps.



Valuation of Energy Costs in the Indian Context

The thematic track on Valuation of Energy Costs in the Indian Context was the third phase of a three phase study undertaken by TERI along with the World Bank Group. An outline paper was tabled at the event showcasing India Inc.'s preparedness in putting a value to the energy costs.

Dr Annapurna Vancheswaran, Senior Director, TERI welcomed the lead discussants and participants following which the theme was set by **Dr Prodipto Ghosh**, Former Secretary, Ministry of Environment and Forest and Distinguished Fellow, TERI. He spoke about the proxy carbon markets existing in India, including the Perform Achieve and Trade scheme and the Renewable Purchase Obligation. Such instruments, he said, focus on putting a price on primary energy, which is closely related to carbon pricing. He shared that the Government of India, while formulation of the National Action Plan on Climate Change in 2008, did not create explicit carbon market instruments because of the following two reasons; first, India abhors any legally binding cap on carbon emissions; second, there was a global carbon market in operation, and India being a very important player in CDM, a lot of corporate investments turned

sour because of International developments over which government has no particular control over.

Under the Paris agreement, a new international carbon market is being negotiated with likely interlinked global, national and sub-national carbon markets across the world. India may also be a part of this global carbon market with a functioning internal carbon market, and schemes including the PAT mechanism and RPO would still function.

Mr Rajesh Miglani, Senior Climate Business Specialist, South Asia, IFC representing the World Bank Group, in his introductory remarks spoke about the Carbon Pricing Leadership Coalition (CPLC), a voluntary initiative which aims to bring together leaders from public and private sector with an objective to implement



effective carbon pricing policies worldwide. This coalition is growing very fast with more than a hundred countries stating their intent of using carbon pricing instruments to meet their carbon pledges in the NDCs. Currently, in India, there are seven companies who are a part of CPLC. Mr Miglani shared that in-spite of having a coal cess in India (which amounts to about \$7 per ton of Co2 emissions), companies should still have a carbon price to proactively calculate the right price of carbon and internalize it. This would help in shaping the future investment decisions of the company. CPLC has created a global platform to learn from peers and a repository of knowledge in the public domain. Companies can join CPLC by demonstrating leadership in the carbon space.

Mr Venkatesh Valluri, Chairman, Valluri Technology Accelerators & Valluri Change Foundation and Executive Council member,

TERI Council for Business Sustainability, gave special remarks for the session. He spoke about increasing prevalence rate of diseases like cancer which presently affects 1 in 10 people in India and may soon affect as many as 1 in 3 people, spreading like viral fever. The major cause for this, he said, is environmental degradation and pollution. Good living conditions and environmental sustainability has become more important now when humanity is getting affected. Carbon Pricing is one of the possible solutions. The price presently varies from \$1 in Japan to \$130 in Sweden, but there exists a dichotomy about how to actually charge this price. India contributes to 4% of the global pollution presently and further economic growth cannot be based on industries and technologies that mess up the environment. For this there are three pillars that India needs to take into consideration, namely technology, standards and pricing.





Following the introductory remarks, the round table discussion with a group of Lead Discussants represented by senior officials from 17 leading companies was moderated by **Ambassador Ajai Malhotra**, Distinguished Fellow & Sr. Advisor (Climate Change), TERI. The discussions were held on the themes titled ‘Start Spreading the News: Sharing Corporate Experiences in GHG Mitigation’ and ‘Making the mare go: Financing Challenges and opportunities’.

The first lead discussant, **Mr Vinod Paliwal**, Sr. Manager, Shree Cement Ltd, shared his company’s initiatives and experiences in reducing GHG emissions. He shared various energy efficiency measures, like installation of waste heat recovery systems resulting in reduction of 4 lakh tons of CO₂, usage of alternate fuels and raw materials like fly ash, waste and water use reduction initiatives etc. Shree Cement Ltd. focused on material substitution with a rate of 22% that helped in reduction of CO₂ emissions. The next lead discussant from Vedanta Ltd,

Mr Anil Pinto, Head Strategy, Power Vertical, Vedanta Ltd. spoke about the Vedanta Sustainability Framework that mandates emission reduction targets to be met by each facility, and measures are taken by them to reduce their emissions every year. Post INDCs’ submission, Vedanta Ltd. made a public announcement to make changes in their sustainability framework to include reconstitution of carbon strategy, carbon intensity reduction and introduction of internal carbon pricing.

Mr Lingaraj Dinni, Wipro Ltd. shared that the company has set up long term targets to reduce emissions. The Company looks at a two-step approach; first, initiatives within the fence, like retrofitting, and second procurement of green energy. Wipro Ltd. has undertaken a comprehensive natural capital accounting study over the last three years, where a social cost of carbon has been taken as \$120 per ton of CO₂, calculating the amount which can be possibly charged by environment for the company’s

emissions, water usage, and waste generated and biodiversity affected. The company calculated that 40% of the total emissions are within their fence and 60% outside. Wipro Ltd. looks forward to reduce both types of emissions in the coming years. **Mr Gaurav Sarup**, Sr Manager- Sustainability (HSEQ & Security), Cairn India, shared that the company powers 70% of its operations using low carbon fuels. The company consistently benchmarks their energy efficiency to stay under the industry benchmark set by the global oil and gas producers. Rising emissions in the company in the past 3-4 years led to introduction of energy efficiency measures, resulting in reduced emissions in turn reducing their GHG footprint.

The next set of questions was addressed by the CPLC member companies. Amb. Malhotra posed questions on how implementation of internal carbon pricing has affected their business operations and strategies employed to arrive at an internal carbon price.

Mr Anirban Ghosh, Chief Sustainability Officer- Mahindra Group, Mahindra & Mahindra Ltd shared that CPLC as a tool has helped the Mahindra group in reducing its carbon footprint. Initiatives were taken to reduce the carbon emissions by manufactured vehicles by 25-30% and to double energy productivity by 2030. **Ms Alka Talwar**, Head- Corporate

Sustainability, Tata Chemicals Ltd., shared that the Tata group has been working towards GHG emission reduction since 2007 by looking at initiatives like sustainable packaging, transport, waste recovery etc. Ms Talwar shared that implementing an internal carbon price has been a difficult journey for the company. The issue has been addressed by putting together a team including the CFO, financial team and the sustainability team. The expected outcome of putting an internal carbon price was understood by the team before actually setting up a shadow price. **Mr U P Singh**, Sr Manager- Corporate Sustainability, Tata Steel Ltd shared that the company has reduced its carbon emissions over the last decade by 27% and is currently looking at how to put internal carbon price. The company plans to roll out a carbon price within a couple of months.

Mr Damandeep Singh, Director, CDP India shared that 500 high emitting companies globally are not pricing their carbon, out of which 400 are headquartered in countries where some form of carbon pricing mechanisms exist. In India, there has been an increase in companies pricing their carbon from 27 in 2015 to 44 in 2016 that are either pricing carbon internally or are planning to do so in the next two years. The momentum is increasing in the emerging economies.

Discussion on the theme two, 'Making the Mare Go: Financing Challenges', followed immediately. Amb Malhotra set the theme by saying that there is no dichotomy between social value maximization and stakeholder value maximization, and in many cases it goes hand in hand. There is a growing global momentum for pricing carbon and one of the ways to raise funds is through carbon markets since investors too are welcoming carbon pricing. It is now seen as risk mitigation and a useful tool for promoting market innovation and clean technology adoption driving a low carbon economic growth.

Mr Surinder Makhija, Senior Vice President, Jain Irrigation Systems shared some of the financing challenges in GHG mitigation in India, talking about various initiatives taken by the company including calculating carbon footprint and installation of renewable energy.

Mr Himanshu Bhatnagar, Manager Project Appraisal, PTC India, shared that as a part of the financial arm of the PTC group, the company has come out with two types of reforms, internal and external. Internal mechanisms include promotion of energy efficiency amongst employees and externally through inclusion of green technologies in operations of the company.

Mr M K Biswas, Dy. General Manager (Corporate Planning), GAIL (India) Ltd, a natural gas transmission and distribution

company shared the financial challenges of setting up a green technology system. He said that natural gas is a bridging fuel in moving towards renewable energy. GAIL has also undertaken initiatives related to renewable energy in various parts of India for moving towards green energy and increased efficiency.

Mr Rajesh Miglani, Senior Climate Business Specialist, South Asia, IFC shared the best practices on climate finance from around the world. He shared that IFC is coming up with a Green Cornerstone Fund of \$2 billion to lead the climate finance momentum around the world. He said that one of the major challenges in mobilizing green funds lie in mobilizing finances from the private sector, who are key in meeting with the financial requirement to combat climate change. **Mr Vivek Adhia**, Head-Business Engagements, WRI India shared that there is an immense cusp of possibilities with the growing emerging economies. Cumulatively approximately \$89 trillion of infrastructural investment will happen in the next few years. Moving towards a low carbon growth also makes economic sense for the world today. He said that well-designed carbon schemes can also lead to increased green revenue as seen in the case of British Columbia. **Mr Sunil Kumar**, General Manager, NABARD (National Bank for Agriculture and Rural Development), an apex development bank fully

owned by Government of India and Reserve Bank of India, is the national implementing entity for adaptation fund board and a direct access entity for Green Climate fund. He shared that the fund requirement for INDCs is huge and NABARD is actively promoting projects that are climate friendly. Their organization supports programs to promote efficient energy equipment using success-fee payment model to promote energy efficiency.

Mr Arunavo Maukherjee, from Tata Cleantech Ltd. shared that they promote sustainable businesses and clean fuels as a part of their company strategy to promote sustainable development with a growing portfolio of projects

in solar and wind energy. **Mr Chandan Bhavnani** from YES Bank Ltd shared that for YES Bank, carbon pricing is more of a risk mitigation strategy. A convergence can be seen between carbon pricing, environmental social and governance, investor shifts and hidden costs associated with carbon emissions like health costs etc. So when a price is put on carbon emissions, it leads to promotion of green technologies. Climate finance is a very important piece of portfolio for YES Bank Ltd. He said that investments in the green energy sector will keep growing in the future as the risks are lesser and investors do not like to take risks. YES bank has a first mover advantage since it started working in the



renewable energy sector in 2008 itself when the momentum was still in its nascent stages.

Ambassador Malhotra concluded the track by saying that big money is needed to address the problem of climate change and it cannot be met by CSR initiatives alone. In the face of expected

long term climate disruptions, companies must be pro-active to secure resilience of their businesses and by effectively pricing carbon; companies can internalize the future costs of environmental damage.

The highlights of the session are:

1. The industry has to take a proactive role in undertaking initiatives for mitigation of climate change. One of the tools includes internalizing a carbon price. This will make their investment future proof and channelize their business towards a greener pathway.
2. While the industry takes a proactive role, there will be challenges like lack of technical understanding on methods of internalizing carbon costs and financing challenges that can be dealt with through collaborative efforts and hand-holding.
3. There is a need for a standardized carbon pricing amongst the industry peers through Natural Resource Accounting and identifying suitable technologies that can result in achieving sustainability goals without hampering the profit potential.



Mainstreaming SDG Goal No.7– Affordable and Clean Energy

Background

The Sustainable Development Goals (SDGs), also known as the Global Goals, are a universal call to end poverty, protect the planet, and ensure that all people enjoy peace and prosperity. SDGs are a set of 17 goals, backed by 169 targets, to be achieved by 2030. These goals were negotiated for over two years at the United Nations and agreed to by nearly all the world's nations on September 25, 2015. For the successful implementation of the SDGs, their inclusion and mainstreaming into national policies, plans, and strategies is crucial. The first step towards mainstreaming of SDGs is to take them into account while drafting the required policies, plans, and programmes.



This two-hour track focusses on mainstreaming of SDG 7, which is to ensure access to affordable, reliable, sustainable, and modern energy for all. Like other SDGs, SDG 7 also holds the three unique points of universality, integration, and transformation. This goal was framed based on four facts—(1) one in five people still lack access to modern electricity; (2) three billion people rely on biomass for cooking and heating; (3) energy is the dominant contributor to global greenhouse gas emissions; and (4) reducing the carbon intensity of energy is a key objective in long-term climate goals. The five targets of SDG 7 are:

- ❖ By 2030, ensure universal access to affordable, reliable, and modern energy services
- ❖ By 2030, substantially increase the share of renewable energy in the global energy mix
- ❖ By 2030, double the global rate of improvement in energy efficiency
- ❖ By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency, and advanced and



cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology

- ❖ By 2030, expand infrastructure and upgrade technology in order to supply modern and sustainable energy services for all in developing countries, in particular, the least developed countries, small island developing states, and landlocked developing countries, in accordance with their respective programmes of support.

Mainstreaming of SDG 7 would vary across countries and administrative divisions within a country, depending upon realities and circumstances. Also, the inclusion of SDG 7 needs to align with the existing policies, national and sectoral plans, and commitments in international agreements. The mainstreaming of SDG 7 is a complex endeavour as it needs a balance towards economic growth, human development,

technical interventions, and environmental impacts. This track aimed to discuss possible processes for integration of SDG 7 in national policies and plans through exchange of views between the policymakers at different levels. The aim was to draw an outline of implementation strategy for mainstreaming SDG 7 through the listed discussion questions:

1. How to prioritize inclusion of SDG 7 in national policies and plans?
2. Is there any learning on successful integration of SDG 7 that exists at such an early stage of SDGs?
3. What should be the major indicators and processes to track SDG 7? Does SDG 7 restrict to mere delivery of the products and services as per the targets?
4. How to integrate other SDGs with SDG 7 and how does SDG 7 compliment other SDGs?

5. What are the key issues and possible barriers a country needs to account while integrating SDG 7?
6. What should be the process of integrating SDG 7 and does one universal process of integration works?

Keynote address

Ms Rachel Kyte's presentation gave an overview of energy access scenario all over the world. She highlighted the importance of setting benchmarks, role of private and public partnerships and need for generating right evidences of developments being done in the area. A need for specific regulatory and investment environment and creating strong organizational capacity was suggested. India and China were mentioned as the fastest growing economies which have made considerable progress in the area of energy access. Ms Kyte also emphasized on the need of creating enabling environment through enabling regulations, specially for energy efficiency. The 2.7 billion population without access to clean cooking and 1.2 billion population without access to electricity are mainly confined to twenty countries. The international community needs to concentrate in these countries and must look at the financial and business models suitable for sustainability of the energy access initiatives in these countries.

Ms Kyte also mentioned to deal energy access challenges through energy productivity lens.

Session summary

India presents immense opportunities to scale up initiatives and efforts towards clean energy access. India's ratification of the Paris Agreement underscores its climate leadership and is a remarkable step in international diplomacy. India has also been successful in setting a mid-century target for itself, which several other nations have still not been able to do. With existing data, existing data, it is possible to be able to inform ourselves of what the critical path would be to reach this goal. It is not however possible to build solutions sitting in isolation of the ground realities and therefore there is a need to bring those without "access" into the conversation, and a certain amount of institutional flexibility must be built to be able to adapt and be more responsive.

Regional cooperation can significantly contribute to sustainable energy transitions as well as harness scale economies. India is well placed in terms of its energy resources and there are immense opportunities to leapfrog to sustainable energy access in India as well as in neighbouring countries.

"If you can't measure it, you can't improve it." The lack of proper monitoring of progress,



challenges, failures is however leading to a loss in the desired evolution of initiatives and calls for a need to build consciousness into the development process.

We must recognise that SDG7 is important for the achievement of many other goals. But it is also important to understand that SDG7 is not a mini grid route to rural energy access, or energy access purely through public sector finance. Private sector finance must be routed in as an equal key investment and for that clean and reliable energy needs to be a good business model in and of it-self. Innovation, investment, incentives, institution are key drivers and we need to track their progress on a peer to peer basis. However, SDG7 will fail if it can only deliver poor power to poor people.

Though the difference between the percentage growth in number of households and the percentage growth in number of electrified

households is not much, in absolute numbers this is quite significant and there is a need to accelerate efforts to reach everyone. Affordability is one key challenge and to increase the uptake of available electricity, financing connection costs of BPL and borderline APL households may be required.

Solar energy will also become more and more cost effective as focus is brought to more energy efficient devices by the government. On the other hand, clean cooking efforts can be augmented by utilising existing and new power infrastructures to consider induction stoves as a viable option.

While we need to monitor the outputs of energy access efforts, it is equally important to monitor the outcomes of these efforts. It is not just about how many kilo watt hours a household can utilise, but also about how many lumens that connection is powering. Similarly, it is not only





about how many LPG connections have been provided, but also how many actual transitions from traditional solid biomass fuels have taken place.

Concluding remarks

Dr Jaco Cilliers presented the concluding remarks and emphasized that SDG 7 is to be looked along

with the other goals as each goal compliment or support the other. Various departments from government, private sector, financial institutions and Civil Society Organizations need to come together to address the various challenges associated with energy access and energy efficiency goals.



Linking Climate Risks to Policy and Practice— Sharing Experiences and Approaches for Research Uptake

EVENT:

Linking Climate Risks to Policy and Practice – Sharing Experiences and Approaches for Research Uptake
(CARIAA – India Country Engagement) October 5th, 1000 to 1200 hours

SPEAKERS:

Co-Chairs: Dr Ajay Mathur, Director General, TERI; Dr Anindya Chatterjee, Regional Director, Asia, International Development Research Centre (IDRC)

PANELISTS:

Shri P.D. Rai, Member of Parliament, Sikkim

Prof S.P. Singh, Former Advisor, State Planning Commission, Government of Uttarakhand

Dr Anindya Chatterjee, Regional Director, Asia, International Development Research Centre (IDRC)

Dr Nisha Mendiratta, Director, Climate Change Programme, Department of Science and Technology, Government of India

Dr Savita Anand, Former Joint Secretary, Ministry of Rural Development

Dr Ajay Mathur, Director General, TERI

The background:

Climate change is perverse. The impacts arising out of climate change have spatial variations. The geographical vastness India exhibits also gives rise to multiplicity in impacts due to climate change. From the coasts to the semi-arids to the mountain ecosystems, impacts due to climate change across these regions vary. For instance, climate change (heavy precipitation

and subsequent landslides, decreased rainfall and sea level rise) repetition of affects in the same sentence incomes. In certain cases people unable to cope with the situation have migrated and shifted their livelihoods for sustenance. This in-turn can lead to socio-cultural complexities within societies and might alter their vulnerabilities. In this very case, though the impacts arising out of climate change are different, they all lead to a similar outcome. This reiterates the earlier



premise: biophysical impacts from climate change might be different, but they can lead to similar socio-economic aberrations.

To address these similar patterns of distress, regional studies, informing policies across scales, are needed. The effectiveness of influencing policies would be enhanced when multiple regional studies try to sieve for commonalities in distress patterns across scales and try to address them collectively. Such an approach would

eventually lead to an effective and collective way of enabling research into use across domains and scales. Given the quasi-federal system of governance in India, such an approach is more appropriate since certain policy decisions rest at the national level, hence the need for a collective force to influence policy is further justified. It is in this context that this thematic track would like to explore the need for and the way to achieve a common goal setting in informing policies from



climate change research across various ecosystems in India. It aims to focus on the need for cross-scalar policy integration to enable effective action against socio-economic stressors arising out of multi-scalar impacts of climate change.

To enable this, The Energy and Resources Institute, Indian Institute for Human Settlements and Jadavpur University are together engaged in a collaborative national study which is part of a larger programme (Collaborative Adaptation Research Initiative in Africa and Asia) on adaptation to climate change. As part of this collaborative study, the team at these institutes are working on issues relating to climate change vulnerability and adaptation in three distinct hotspots, namely, semi-arid regions, the deltas and the Himalayan river basins. They are trying to (Sentence is too long) to develop and implement a research plan to assist in improving the impact of their individual research into shaping (collective) policy making. This thematic track would include an overarching presentation sharing how the research under CARIAA aims to ensure an uptake in policy and practice. Thereafter, invited panelists holding key positions in public policy making will be requested to share their thoughts on research integration into policy and planning through a sharing of their experiences and ideas on approaches that can be considered or undertaken.

The event:

The event, as an initiator towards the Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA) India country engagement group, aimed at enhancing the science-policy interface in the light of climate risks that are being faced. An overarching theme of the event was set through a presentation that spoke about the objectives and goals of the various CARIAA consortiums working in varied hotspots across India.

The panelist's talks and the discussion that followed highlighted the means to and bottlenecks in achieving an effective science-policy interface. It was acknowledged by the panel that climate risks being faced in the hotspots in these regions are varied and a robust scientific understanding is required. Issues ranging from political will to individual capacities were widely spoken and discussed about. The panel discussion also highlighted the need to realize, and the challenge in understanding, the potential of an adaptation option (like pilot interventions) to be up-scaled with an ultimate goal of building climate resilience.

The panel spoke about how existing government policies can lead to building adaptive capacity through inter-departmental linkages at a government level. The example of watershed



development, which has adaptive co-benefits, was highlighted during one of the talks. The role of nodal agencies under the central government in trying to build capacities by providing technical support to state agencies to enable effective action against the perils of climate change was also stressed upon. The example pointed out here was that of the Department of Science and Technology (DST), Government of India's, initiative of creating local capacities by supporting states in establishing their own climate change cells to aid in tackling climate change.

This was followed by a vivid open house, where a discussion on enabling such an interface ensued. The audiences were left to ponder upon the ways to achieve an effective interface of science and policy. Questions ranged from the role of payment for ecosystem services leading to climate risk reduction, to methods to enable top-down and bottom-up linkages. Towards the end, it was however equivocally acknowledged by all participants that a roadmap towards enabling a Science-Policy Interface has to be formulated.

Highlights:

1. There is a need for an overarching climate legislation that subsumes various laws and policies pertaining to the environment within it.
2. Prioritizing and up-scaling potential innovations around climate resilience is a major challenge.

Quotes:

- ❖ Shri P.D. Rai – There is an immediate need to understand climate risks and their linkages between with political risks.
- ❖ Prof S.P. Singh – Forest missions don't talk about timberline, whereas the Himalayas have one of the most diverse timberline in the world.
- ❖ Dr Anindya Chatterjee – What drives communities and political agenda is risk perception and not always knowledge.
- ❖ Dr Nisha Mendiratta – Effective communication is key – information communicated to policy-makers has to be simpler.
- ❖ Dr Savita Anand – There is a need for convergence between state and central programmes.
- ❖ Dr Ajay Mathur – One of the challenges we are facing today is that water is exclusively managed by government agencies. Community managed systems have almost died out.



Corporate Dialogue on Transitioning to Low GWP Refrigerants and Higher Energy Efficiency

Dr Mathur inaugurated the session with his introductory remarks on the growth trajectory of ACs in India. He marked that this has contributed to the global warming because of its high electricity demand and refrigerants used in it. Refrigerant gases also have a high Global Warming Potential (GWP) which makes it a key issue of concern to the international community. He informed that as a non-governmental initiative, TERI has constituted a committee to support government in bringing high efficiency air conditioners with low GWP refrigerants. He informed that he along with Steve Anderson will be co-chairing the committee which will also be including members from Collaborative Labelling

and Appliance Standards Program (CLASP), NRDC, Super-Efficient Appliance deployment programme of Clean Energy Ministerial; and TERRE policy centre. The committee will work towards identifying opportunities in bringing high efficient low GWP refrigerants.

Mr. Rashmi while delivering keynote address noted that India should consider the technical, policy and funding issues while making the road-map of HFC phase-out. He admitted that industries are transforming themselves. He added that there are challenges and opportunities in this process and energy efficiency is one of the opportunities that can be utilized to help incentivize this process. He suggested that



this transition must be achieved with the least cost burden on all concerned stakeholders. He emphasised the need for incentivizing energy efficiency gains rather than de incentivizing them through the Multi-Lateral Fund.

Mr. Shende moderated the session by saying that the ratification of Parties to the Paris agreement as well as the proposed amendment to the Montreal Protocol at Kigali to include HFC phase-down represents an important inflexion point in the climate discourse.

Mr. Gonzales unfolded the journey of refrigerant from ODP to GWP and the challenges involved. He noted that we are now transitioning to fourth generation refrigerants. He recalled that CFCs were replaced with HCFCs which were then replaced with HFCs. This fourth generation refrigerants has posed many challenges than



past. The challenge is to find alternatives in the form of synthetic HFO blends or feasible natural refrigerants which are environmentally benign in nature. He expected that in further meetings over the Montreal protocol, policy frameworks needs to be focused upon.

Mr. Diddi was asked to highlight the ways in which the successful initiatives by BEE & EESL can be replicated for the room air conditioners. Answering which, he mentioned about the models of demand aggregation to bring down cost in effective way to market determine affordable cost. He also stated the key success factors of the star labelling program of the BEE, which includes continuous updation of labelling scheme that derived energy efficiency innovation in the manufacturing sector.

Dr. Carvalho highlighted the key challenges



and the critical key factors for implementing projects in developing countries. She emphasized the need for capacity building. She noted that traditionally the multilateral funding from MoP did not incentivize energy efficiency and felt that this needs to be re-looked at. While focusing upon service sector, she said synchronization between building design and efficient AC technology needs to be achieved in order to maximize gains and minimize operational costs.

Mr. Randy highlighted the efforts taken by his organization in transitioning to low GWP refrigerants, which among other initiatives, committed to reduce GHG emissions by 35% by 2020 with an investment of USD 500 million over 5 years. He informed that they have made commitment to UN to replace the existing refrigerant with the new refrigerant by 2030 in all



their appliances and to invest 500 million dollars in Research and Development for new refrigerants and technologies in next 5 years. He proudly announced that they are pioneers in launching products with new refrigerants in the market.

Mr Deol threw light on the issue of application patents for HFCs and added that cost of patents represents only 1-5% of the overall equipment cost. He suggested that industry needs to on how we should retrofit our factory to prepare for the next transitions in the future.

Mr Anderson praised the leadership of India for creating financial mechanism, lead to MLF which resulted in phasing out of 99% of all ozone depleting substances. He also noted Indian industry's proactive approach in experimenting with propane based solutions. He suggested the potential of using a matrix called Life Cycle Climate Performance in



evaluating Global warming potential and Energy consumption of a product.

Dr. Agarwal noted the collective efforts of all countries, because of which the ozone layer has been replenished successfully. He further added that the role of R&D in this endeavour is going to be crucial. He mentioned that while talking about the refrigeration and air-conditioning industry and appliances, Energy efficiency should be focussed up first as the 95% contribution towards greenhouse gas emission coming from energy rather than refrigerants.

Ms Jaiswal also praised the leadership of the Indian industry as well as the top government for their proactive role in the transition to low GWP refrigerants. She mentioned that the time has arrived when the talk should focus on energy efficiency and low GWP refrigerants through innovations.

Open Discussion

This marked the end of the panel discussion and the chair thanked all the speakers for bringing forward a diversity of approaches discursing on challenges and opportunities available while phasing out HFCs as refrigerants. Interventions were also made by representatives from SIAM and ISHRAE regarding their respective concerns in the automotive sector and standards for flammability & toxicity of refrigerant gases respectively. Mr. Ashwini from ISHRAE requested the support from Ingersoll Rand in conducting R&D along with the premier educational institution like IITs. He said that the ISHRAE can facilitate these activities. He then opened the floor for discussions. The discussion revolved around the following points:

Can CO2 alone be used once through a chilling system as a replacement of HFCs?

Dr. Bhaskar agreed upon the usage of CO2 in certain application like Cascade systems. Mentioning about the complex appliances in future, he said wherever it makes sense, it can be used.

In what ways can the Air-conditioning Industry move towards energy efficiency with the 4th generation refrigerants?

Dr. Agarwal agreed that the energy efficiency has not been recognized so far in the Montreal Protocol or the MLF system. He said energy efficiency can be increased by increasing insulations. Ms. Carvalho informed the participants that UNDP had started accounting for the projects which include energy efficiency since the initiation of HFCs



Mr. Rashmi, Special Secretary, MoEF & CC concluded the track by mentioning various initiatives taken by Government towards energy efficiency. He talked about the energy efficiency mission which by all means incentivize and regulates the energy efficiency sector, PAT (Perform, Achieve and Trade) as regulatory scheme, Labelling and star rating etc. He also spoke about Partial Guarantee Fund for helping those industries which fail in Energy Efficiency objectives. He suggested the need for

a global policy regime to make a transformative change in this sector with energy efficiency on board. He ended his speech by saying Energy Efficiency gains can be optimized by the choice of refrigerants.

Mr. Karan Mangotra, TERI summarized the track by reiterating three key points of discussion: 1) Need to incentivize energy efficiency 2) Technology flexibility through local and global Research & Development 3) Need for innovative business models to make state of art technologies available at market determined affordable cost.



Using Multi-Stakeholder Simulations to Examine the Impacts of Food Policy Choices in India and Asia

The session started with an introductory remark by Ambassador Ajai Malhotra Distinguished Fellow & Senior Advisor, TERI on the emerging issues like climate change, rapid urbanisation, poverty and inequality affecting agriculture systems in developing regions of the world.

The primary objective of such an exercise involving multi stakeholders is to help high level discussion makers better understand the interconnectedness of the local and global food systems. One of the key outcomes from the game was that countries need to address the three



A presentation was made on the food chain reaction game conducted in November 2015 in the US where 65 leaders and policymakers from around the world confronted simulated crisis, flash points, and trade-offs that disrupted global food security between 2020 and 2030. The presentation on the food chain reaction game included goal, approach, different scenarios, primary findings and policy recommendations.

critical gaps i.e. knowledge, productivity and co-operation, impinging upon agriculture.

Dr. Prodipto Ghosh, Distinguished Fellow, TERI mentioned that the typical simulations are done by computer generated models based on the assumption of perfectly competitive markets. But, these models can't point to disruptive changes. Now moving away from these models and into game theory where outcomes uncover



certain types of reactions. These aren't forecasts, these are projects based on certain assumptions that can lead to multiple solutions. Such solutions and playing games repeatedly give insights into what might happen in the real world and decision making as well as national and global policy making implications.

There are certain aspects not covered in the original FCR scenarios that would lead to different outcomes such as energy-disruptive technologies, Ag tech, GE, enhanced yields, among others. There could also be disruptive policies-like Indian plan for interlinking rivers. It is possible to develop different kinds of scenarios and see what solutions and outcomes come out. Real value is that it points to disruptive changes and discontinuities applicable nationally and internationally.



Prof. Y K Alagh, Chancellor CUG and Professor Emeritus Sardar Patel Institute of Economic and Social Research in Ahmedabad mentioned that the reliance on models is changing; towards game theory. But even with that they didn't get into disruptive behavior where normal isn't equilibrium. Chaos is part of understanding behavior and decision making.

The reactions of different stakeholders to what other people are doing is very interesting. When you don't know what is happening, you are in a field of uncertainty. And if you put together people who are involved, out of darkness you start creating some light because the actors are forced to take a decision based on their experience and the information they have. This is not statistics, and the world is a chaotic place. Simulations are a methodological advance to allow some insight into the real world chaos. The world is also changing. Somewhere in the 90s, you crossed \$3k per capita and grains became less important. And non grains became more



important. The 1970s focus on food security was largely grain and grain stocks. Now a different world with broader range of commodities, actors are mobile and move from rural to urban areas, climate etc. Electronics for ag marketing are missing from all these new “smart cities.” Farmers and ag product providers are not considered. We need more strategic planning! We are moving away from pure competition and comparative advantage being the basis of all decision making & strategy.

In thinking about an India and Asia specific game, there exists a lot of inequalities within countries and major agro climatic diversity. We don't have good stocks. Every major agro climatic region of the world is relevant in the world economy. There are a lot of challenges between people in valleys and hills. Large Asian countries are worlds within a world.

Dr. Prodyot Ghosh, Distinguished Fellow,

TERI mentioned that typical simulations are done by computer generated models based on the assumption of perfectly competitive markets. But, these models can't point to disruptive changes.

Now moving away from these models and into game theory where outcomes uncover certain types of reactions. These aren't forecasts, these are projects based on certain assumptions that can lead to multiple solutions. Such solutions and playing games repeatedly give insights into what might happen in the real world and decision making as well as national and global policy making implications.

There are certain aspects not covered in the original FCR scenarios that would lead to different outcomes such as energy-disruptive technologies, ag tech, GE, enhanced yields, among others. There could also be disruptive policies-like Indian plan for interlinking rivers. It

is possible to develop different kinds of scenarios and see what solutions and outcomes come out. Real value is that it points to disruptive changes and discontinuities applicable nationally and internationally.

Mr. Shyam Khadka, FAO Representative in India, New Delhi stated that the world is increasingly interconnected with globalization and trade. This creates a high level of interdependency. And in this kind of world the actors that come into the picture are new ones. No country in the world could stand beyond a week on their own given our interdependencies, as seen for example in the 1973 oil price spike.

Impressed by FCR's multidisciplinary team and participants. Comparative advantage is one way things may go, but pure economic merit is not always the only reason decisions are made. Games allow for this kind of thinking and analysis. Incentives for decision makers are different at different levels of government. Information on private stocks of food grains is

missing in the FCR simulation. Behavior of the farmer and private stockholder is changing. Knowledge gap (of small farmer stocks and flows) – is a significant gap and we need to address this foremost to make headway.

Prof. R.B. Singh, Chancellor CAU and Past President NAAS highlighted that India is a game changer. What happens in India will be what will happen at the global level. One fourth of the world's hungry are in India. Stunted children and economic loss is striking. The Caste system pervades and worsens malnutrition and under nutrition. We are number one in milk production, and number three in wheat and rice production in the whole world, yet there is so much inequality. India influences the whole world. We need to connect the local and global together. Connecting the global to the very remote and local is extremely important in simulations and policy. There is a need to address the questions of how we will support our human resources to get rid of hunger and poverty in India? Nearly



650 million people are small farmers and farmer families. We live in an unequal India, and we live in an age of disruptions. These disruptions are reality. “New normals” exist everywhere. Food, nutrition, income, health, education, livelihoods, and security are all interlinked and cannot be seen in isolation. Any game changing policy should consider all of this.

One of the new normal is climate change instability and volatility, and another is market volatility. Climate change is a reality – you cannot deny it, and market forces and disruptions are interlinked. We saw what happened in 2007 and 2008. Any new development strategy and policy must consider all these things together.

Dr. Partha Mukhopadhyay, Senior Fellow, CPR, New Delhi shared that one of the key takeaways from experience in FCR was the diversity of perspectives. But there were also a few issues with the game design:

- ❖ The assumption was built in that if a decision makes it to country government X that it makes it to the people of country X. Going forward, to avoid this, we would need to pay careful attention to the participants.
- ❖ In the DC simulation, there was always a nice, neat fall back option. You could go towards global governance. In a regional situation, to be able to create such focal point organization, there is not really that fall back. What would a regional solution

look like? Where would it be located? An additional degree of complication would be added to a game because of this.

- ❖ The actual nitty gritty of logistics and transport were missing: making a decision to move stocks is different from actually delivering successfully: getting bulks of commodities from area X to area Y requires infrastructure, and that is missing from most of the places you want to get it to. We need more regional logistics players in the room for another game.

Mr. Bal Krishan Anand, General Manager, GOSCA South Asia, Cargill Highlighted that the utility of simulations is that we cannot predict disruptions – but we do have to be ready to deal with them as they come. A 9 billion billion population is another “new normal”. The nature of food has changed to some extent. Calories vs nutrition is important but either way we will stress our natural resources to produce enough food. There is stress now, but not crisis: cereal crops have record low stock prices. But at the same time we have 1 billion hungry people around the world. However, better food availability for safe and sustainable food will be hard with population growth and climate change combined with limited natural resources and land area. A regional game would capitalize on opportunity and allow partners to reconvene.



Mainstreaming Biodiversity for Responsible Business

Realising the fact that business is an important mechanism through which Biodiversity conservation and enhancement of ecosystem services could be achieved, a thematic track was organised on Mainstreaming Biodiversity for Responsible Business. The Aichi Target by Convention on Biological Diversity (CBD) and the SDG's (Sustainable Development Goals) have largely focused on this theme through its various goals such as Target 6 and 15 of UN's Sustainable Development Goals and Target 3, 4, 6, 7, 13, 16 and 18 of CBD's Aichi Biodiversity Targets. Similarly, India has also developed its National Targets (5, 7, 9, 10 ,11) focusing

on biodiversity conservation. Thus to bring out the challenges and opportunities for responsible business the following points were discussed:

- ❖ The issues of sustainability vary with respect to the type of business and hence defining the sustainability and developing solutions to mitigate the impact is needed.
- ❖ Investing in biodiversity and ecosystem services is futuristic and ensures multiple benefit flow in favour of business and local livelihoods.
- ❖ Documentation, safeguarding and strengthening traditional knowledge needs standardization, partnerships and innovative models of equitable





sharing benefits from commercialisation of biological resources.

The session started with a welcome and introduction by Mr. Siddharth Edake, Associate Fellow, The Energy and Resources Institute (TERI) who also chaired the session. Dr. S.K Sarkar, Director, TERI welcomed the speakers, panellists, delegates and set the tone for the discussions.

Mr. R Mukundan, Managing Director, Tata Chemicals provided his remarks on biodiversity conservation. As many companies depend on biodiversity as a resource, the impacts currently faced by various companies due to the rapid depletion in biodiversity were discussed by him. He suggested that the legal frameworks need to be followed and companies have to pay for the respective ecosystem. Dr. J R Bhatt, Advisor, Ministry of Environment, Forest and Climate Change further highlighted about the threats

to the biodiversity and some of the initiatives undertaken towards its conservation.

Dr. Yogesh Gokhale, Fellow, TERI briefly introduced the thematic track and the issues which need to be address in the panel discussion. Panel discussion included panellists from various industrial sectors (Image No. 2). The discussion was chaired by Dr. S.K Sarkar, Director, TERI and the Vote of Thanks was presented by Ms. Archana, International Union for Conservation of Nature (IUCN).

Dr. V.P. Singh, World Agroforestry Centre, South Asia Programme, initially, talked about the link between agroforestry and how it could help in biodiversity conservation. He explained that agro biodiversity not only means different species of plants but also its conservation and utilization aspect. He emphasized on the biodiversity in the agriculture sector and also gave an example about the application of wild rice species. Citing

another example, he said that in Tamil Nadu, a plant's genes TMK6 is used as an insect resistant in rice and with the help of this gene it is possible to generate inbuilt resistance to insects in rice plants. He further discussed other issues such as the patents by foreign companies at a very high price and so on.

Dr. Hishmi Jamil Husain, Environment Superintendent, Rio Tinto represented the mining sector. He agreed with the fact that mining is one of the key culprits impacting biodiversity and emphasised on conserving biodiversity with a net positive impact. A study by IUCN shows that conserving flora and fauna generates revenues of around INR 30,000 crores. He further gave the example of vulture conservation and explained that conservation of vultures not only helps in vulture conservation but also helps in achieving the Aichi targets.



Mr. Nitin Sukh, YES BANK Institute; representing the finance sector, discussed about the Natural capital and how its decline is creating stress. He emphasized that agriculture today is exerting more pressure on biodiversity, resulting in its decline. He talked about conserving biodiversity by making consumer driven companies coming up with eco-labeled products, or cultivating organic food like the State of Sikkim. In Sikkim, people are ready to give extra amount for eco labels and this extra amount goes to Natural capital. But the problem is due to a lack of awareness; organic products are accessible to few groups of people only. He further explained how banks are less appreciative of non-profit assets and to provide funds to farmers during losses which is how Natural capital plays a key role.

Mr. Ashok Yadav, Agriculture Sector, Insurance Company of India introduced the concept of agriculture insurance. He briefed about how technology and insurance conserve ecosystem services, for which he cited the example of their efforts in conservation of water in Punjab. He suggested that irrigation systems and tension meters should be adopted more frequently to check the soil moisture to avoid over irrigation. In Punjab, water pumps used to run around the clock for paddy, but now the Punjab government have installed pumps which

measure moisture levels in soil and accordingly switch off and on automatically. This technology has shown positive results. He concluded by explaining that the tribal people live nearest to biodiversity so they should be highly sensitized.

Dr. N B Brindavanam, Dabur India Ltd, accepted the fact that pharmaceutical sector is directly involved with the harvesting of biodiversity. He briefed about destructive collection practices going at the village level and the initiatives taken by Dabur India to reduce unsustainable harvesting of wild plants. Pharmaceutical companies depend on very few species of plants but require a very large number of plants in terms of their quantity and volume. Herbal sectors require very large and diverse species of plants on a day to day. Dabur started captive farming in order to fulfil the demand. This serves dual purpose as this technique of demand side management helps save ecosystems and at the same time fulfils the resource requirements. Further, he explained that since all the species are not cultivated, proper resource utilization is necessary and this is possible only by creating awareness amongst the stakeholders.

The session was followed by an open discussion (Image No. 4) which concluded with the remarks

that the Business industry needs to be properly streamlined and monitored which would help them reduce the impacts on biodiversity. The funds from businesses need to be properly channelized to ensure desired impact. Thus mainstreaming biodiversity using the tool of responsible business shall achieve the desired national as well as international targets by 2020.

Way forward

The discussion and the presentations prioritised three main approaches to undertake with respect to Business and Biodiversity such as:

- ❖ Species level conservation by developing the ex-situ methods of multiplication for commercial use
- ❖ Livelihood options for local communities to reduce their impact on the natural ecosystems and;
- ❖ Restoration of degraded landscapes by developing suitable habitats

These three approaches would be important for industries to contribute substantially in attaining the National Biodiversity Targets and hence also contribute to the global efforts of biodiversity conservation and sustainable use of the biological resources.



GREENOVATION
2016





Greenovation 2016 Exhibition Inaugurated at WSDS 2016, India Habitat Centre

Shri Jayant Sinha, Hon'ble Minister of State for Civil Aviation, Government of India, accompanied by Dr Ajay Mathur, Director General, TERI, and Mr Tomasz Kozolowski, Ambassador of the European Union, inaugurated the Greenovation 2016 exhibition followed by the walkthrough of the exhibition at the World Sustainable Development Summit 2016 at India Habitat Centre. The exhibitors include Asian Development Bank, Energy Efficiency Services Limited, Indian Renewable Energy Development Agency, European Union, Solar Energy Corporation of India, Dalum Papir and Embassy of Poland. The highlights of the Greenovation 2016 exhibition were the BMW showcase on its state-of-the-art, the all electric i8 car and the 'EESL ILEDTHEWAY' selfie station.





INAUGURAL
SESSION





Inaugural Session

Emcee: **Mr Martin Wright**

Welcome Address: **Mr Ashok Chawla**, *Chairman, TERI*

Theme Setting: **Mr R Mukundan**, *Managing Director, Tata Chemicals; and*

Dr Ajay Mathur, *Director General, TERI*

Keynote Address: **Mr Eric Solheim**, *UNEP Executive Director and Under Secretary General of the UN*

Inaugural Address: **Shri Jayant Sinha**, *the Hon'ble Minister of State for Civil Aviation, Government of India*

Vote of Thanks: **Dr Annapurna Vancheswaran**, *Senior Director, TERI,*

Incharge of Sustainable Outreach and Youth Education

Firstly, the Chairman or the emcee of the inaugural session, Mr Martin Wright, welcomed everybody to the inaugural session of the business day of the World Sustainable Development Summit (WSDS 2016). He highlighted that the Delhi Sustainable Development Summit (DSDS) had been tackling many of the crucial global challenges that the world faced, and it was also reflected in the theme of WSDS 2016. The ratification of the Paris agreement by many countries, including India, was not only a reason to celebrate, but was also a challenge. He felt that the Paris accord set a hugely ambitious and courageous target of keeping global temperature up to 1.5–2°C above preindustrial levels as the

impacts of global warming at just 1°C rise were clearly evident. He felt that to tame the climate tiger we needed to draw on every ounce of human ingenuity and resolve it. He dwelled on the fact that human beings needed to unleash a wave of innovation not seen since the industrial revolution, that is where businesses could take the centre stage. Therefore, businesses, governments, enterprises, and their power to deliver solutions was very crucial. We needed solutions which can lift millions out of poverty while at the same time curbing emissions.

Thereafter, **Mr Ashok Chawla** introduced the session and welcomed everybody to the first formal event of the WSDS 2016. While setting



the theme, he said that though the agenda for development is set by the government and political leadership, the battle in the trench will have to be fought by business and industry. He added that technical knowledge of sustainable development along with collaboration of private organizations/institutes is necessary. He also felt that it might be the first in a series of the world summits but it actually builds on a long history of what TERI had been doing over the last 15–16 years. He said that while the agenda was set by governments and political leaders, the business and industry stakeholders were bound to play a very vital role in it. In recognition, TERI had set up a Council for Business Sustainability and this

council had actually put together the business day's events. He also said that the business community had been increasingly engaged in the implementation of the future agenda—engaged in terms of technical know-how and collaborations. He expressed hope that the association between TERI and industry would be more comprehensive and broad based. He also said that he was sure that as we move ahead we will get more engagement, more favourable response to implement the ambitious agenda the global community had accepted for itself.

Mr R Mukundan said that since India had ratified the Paris convention, henceforth, the business industry was no longer a bystander



but an active participant in this engagement on sustainability. He felt that we all had committed to certain goals and these goals, especially the sustainable development goals (SDGs) and the commitments, were for the first time truly co-created. He suggested that both civil societies and industries should work together to achieve sustainable development goals. He assured that his organization stood fully alongside the civil society and the government in their responsibility to fulfil their commitment on climate change. He felt that TERI had set up the Council for Business Sustainability which had been actively working towards bringing like-minded industries together and also making sure industries worked together in terms of having the right framework and implement sustainability agenda. Presently, the network had over 100 corporate members representing a huge swath of Indian industries including PSUs, MNCs, and private companies from across India. He said that the challenges we faced and the risks which were there upon us because of climate change were all very clear and hence there was a sharp focus on sustainable development. He also felt that the nexus of planet, people and progress assumed significant importance and the theme of WSDS 2016 (Beyond 2015: People, Planet & Progress) was a very apt one to reflect, to recommit, and

to move forward in making sure that we build a sustainable future for all of us.

Dr Ajay Mathur expressed hope that the WSDS 2016 should prove to be the time when we were able to move action from ‘the few’ to ‘the most’. He said that the TERI Council for Business Sustainability brought together like-minded companies who were today part of ‘the few’ but the messages, the lessons, and the best practices should be brought to ‘the most’. Dr Mathur highlighted the need of action in the direction of sustainable development. He hoped to work in collaboration with businesses in India and abroad and felt that the goal was to hold hands of both businesses and governments so



that it could help them bring the change that was needed for the actions to move to ‘the most’. He also said that for the Paris agreement to be effective for everybody, we needed to ensure that there are technologies, financing, best practices, and there are options available to all. He looked forward to discuss about achieving these objectives during the WSDS 2016.

In his speech, **Mr Eric Solheim** spoke about the cleaning of River Ganga and suggested conversion of this activity into a business opportunity. He also informed about his visit to Varanasi city and talked about the water pollution problem plaguing the River Ganga. He felt that the Prime Minister of India had



put in place a project to clean River Ganga and he hoped for the success of the project. But he felt it could only be successful if it is seen as a business engagement or a business opportunity and governments must regulate markets and engage businesses for that. He also said that India ratifying the Paris agreement on the birth anniversary of Mahatma Gandhi was a good step and we must all follow the footsteps of the great leader. He highlighted that embracing the climate agenda was an enormous opportunity for Indian businesses because there were opportunities for a large number of better jobs in new and renewable energy sector, climate smart agriculture, mass transit systems, greening of the cities, and basically in all the spheres of climate resilience. He assured that businesses will be top priority of the United Nations while seeking solutions on technologies, outreach, and finances. He also said that as the head of the United Nations Environment Programme (UNEP) he would make sure that business will be the topmost priority in their agenda for seeking the desired solution. UNEP would be ready to make agreements with individual businesses, with federations of businesses, and work cordially with them. The technologies, the outreach, the financial resources, and businesses were central to all the activities. Mr Solheim also

said that businesses could bring in the correct technical solutions, and the politicians could frame the markets in the right way. He felt that huge money was resting with the Seven Wealth Funds, the banks, the insurance companies, and the big investors and we needed to drive that investment in a greener direction. He said that ultimately it was all about getting the core business right to get inclusive green responsible capitalism to exchange brown inequality and not inclusive and irresponsible capitalism. The stock exchanges and the central banks must regulate the markets, and the Ministers of finance were key for this agenda. He also felt that we should use the financial resources of the State to leverage risks and we must also get value for money. We should avoid grants as grants could not resolve the problems because there was not enough money with development aid, nor with the government to really solve the problems through grants. He gave the example of the Coca Cola company who have collaborated with a Mumbai-based solar company. This collaboration had provided a solar-based culler system for small vendors all over India and this had transformed the lives of some of the small vendors in India. He gave another example of a company in China to prove that there was no way small NGOs or even governments could

reach out to people in the way the private sector can and they have the resources, the technology which we need—so we simply needed to step up in a completely new league when it comes to private sector engagement if we wanted to solve the big environmental and climate problems of the day.

Shri Jayant Sinha congratulated and thanked TERI for organizing the WSDS 2016 that had brought together collaborators, stakeholders, business people, policymakers, people from all across the spectrum to discuss about the difficult challenges that the world faced. He also suggested that perhaps it would be wonderful if we could actually organize events





such as WSDS in real India, at places, such as Chhattisgarh, Madhya Pradesh, Jharkhand, or Assam, where people were dealing with the most acute problems affecting the Earth on a real and day-to-day basis. He also felt that we should not diminish the scale and the magnitude of the issues that the world was facing as he highlighted that the world had just crossed the 400 parts per million carbon dioxide concentration in the atmosphere. Year after year, the planet was recording the hottest years that we had ever recorded before. He felt that the planet and all of our lives were at risk. Therefore, we needed to really engage on these issues of sustainability and sooner than later we needed to find solutions and also change the way in which we lived and the way in which we went about our business

and all the other things that we did in our daily lives. He also highlighted that businesses and the markets that they represent are going to be the fundamental way in which we would have to solve these problems because if there was anything that had taken us to prosperity, if there was anything that had enabled us to solve the problems that our societies faced, it had been markets and innovative business. And as we confront these existentialist issues that we do with sustainability, we have to get markets to work, we needed to have businesses that innovate and we have got to ensure through those businesses, solutions, and services that the necessary behavioural change, the necessary revolutionary changes that we need are required. He also felt that we needed to transform India so

that we could move towards a sustainable future and that is why India ratified the Paris Agreement on Mahatma Gandhi's birthday, because it is fundamental to the values and traditions of India and it was absolutely vital and necessary for our future. He also felt that there were three very important aspects that we needed to think about for this transformational change to happen. The first very important aspect we had to think about was how do we innovate so that when we get people to change their behaviours, when we change our way of life—then those changes actually are also sustainable. He gave the example of *Swachh Bharat Abhiyan*. He felt that if we wanted a sustainable future we had to make India open defecation free and for that the country needed a behavioural change and a change in the mindset of the people in India. He said that transformational changes needed to happen and only then India would be able to move towards a much more sustainable future. He also felt that it was the government's responsibility to put in place the appropriate regulations, the appropriate tariffs and the ensure that there is ease of doing business and that the cost of doing business is as low as possible. So, governments needed to learn to think completely differently in some phase, rather than thinking only in terms of control and licensing and permitting, but he felt

that it was a challenge for governments around the world to really act as facilitators. These are very difficult challenges we confront as we take on these sustainability challenges and that is the responsibility of government. He also stressed on the fact that if we wanted sustainability and a sustainable future we had to have sustainable business models. He also said that we needed to make sure the returns were commensurate with the risk that innovators and business people take to forge and create new markets. He also reiterated that to ensure adequate returns we had to enable businesses to invest and we had to enable businesses to be able to satisfy the markets. But, for that they have to be able to generate adequate returns so that huge finances come in and these kinds of solutions get financed. That is a big challenge and unless we get our regulations and our tariffs appropriately set up that kind of financing is not going to happen and we are not going to be able to attract the debt capital or the equity capital to finance these massive buildouts that were required. We need billions of dollars, in India alone, for some of these sustainability solutions to be brought to market at scale. He pondered that how do we mobilize more financing to come up with these large-scale solutions that are necessary to really unlock this transformational change and

to build a sustainable future. He summarized by saying that we faced three kinds of profound challenges; firstly, the behavioural change and the innovation that is required for this kind of radical transformation; secondly the appropriate policy and regulations to enable these markets to work; and thirdly sufficient capital to really build out and bring the solutions at a sufficiently large enough scale so that we are able to achieve such radical transformation.

Dr Annapurna Vancheswaran while delivering the vote of thanks said that India had shown global leadership and vision and elaborated that this translated to introducing waste management and disposal solutions, generating carbon sink, reducing carbon intensity, etc. She shared two major challenges in the form of identifying action on how business sectors engage and expand and how TERI creates benchmarks for the private sector. She expressed happiness that India had shown global leadership and vision by ratifying the Paris Agreement and now it was time for India's business sector to show that they were part of



the solution. She also felt that the theme of the business day of the WSDS 'Mobilising Business Strategies and Solutions' was timely and the interventions and discussions that were going to happen at the WSDS would align business across India to the future development agenda. She thanked everybody present on the occasion and the dignitaries on the dais. She ended by thanks by assertively reposing her faith in Indian businesses.



PLENARY SESSION-1





Plenary session 1: Encouraging Businesses to Take the Lead in Poverty Reduction and Achieving SDGs

Moderator: **Mr Nitin Desai**, *Former Under-Secretary-General for Economic and Social Affairs, UN & Distinguished Fellow, TERI*

Panelists: **Mr Krishan Dhawan**, *CEO, Shakti Sustainable Energy Foundation;*

Mr Amit Shah, *Senior President and Country Head, Corporate Strategy and Communications, YES BANK; and Executive Director—YES Institute;*

Mr Pau Abello, *Managing Director, Roca Bathroom Products Pvt Ltd; Mr Anirban Ghosh*, *Chief Sustainability Officer—Mahindra Group, Mahindra and Mahindra Ltd;*

Mr Jaco Cilliers, *Country Director, UNDP in India*

The discussion started with the importance of reputational issue for the corporates to contribute to the SDGs by taking them to the board-room discussions. It is time for companies

to think beyond CSR and consider how to make investments more systemic to contribute to SDGs. Companies that take the lead will benefit from being early movers. For example,





the automobile industry is now being forced to change to better fuels and efficient engines at a pace faster than they are comfortable with.

Banks too need to look at their role as a catalyst. For example, YES Bank decided to do responsible banking in thought and action. India's socio-economic environment is entirely different and needs to adopt some of the global issues for domestic implementation.



Business opportunity is available in all SDGs. Dealing with issues related to water would mean dealing with a large number of issues in SDGs.

India has a fabulous programme called the Integrated Watershed Management Programme. The programme has the potential to increase income by 2%–2.5% in a period of five years. Active support of business is essential for sustainable growth and development of all and it



can't come through policies alone; it has to come from business seeing its value. Business cannot profit on a dead planet making it essential for businesses to contribute to SDGs.

Mindset was identified as an integral issue. The example of dual flush system is a case in point.



SMART PLUG-INS





Smart Plug-ins

The theme of this plenary is smart plugs-ins. While a lot has been said about what needs to be done, this plenary shows what is actually being done, turning theory into practice. Some of the smartest practitioners, who are actually making a sustainable future happen, are going to share some perspective.

area. First, identify leading local start-ups that require support to grow. For example, for the past couple of years in India, ADB has been working closely with the Centre for Innovation Incubation and Entrepreneurship (CIIE) at IIM Ahmedabad, including supporting their power start programme. This programme has



Mr Yang Pingjai, Advisor, Asian Development Bank; formerly Director, South Asia, ADB. He spoke about his involvement with many things, including helping innovators and start-up companies. It is ADB's belief that entrepreneurs and start-ups play a key role in driving innovation and growth in the clean energy sector. These businesses develop new technologies, business models, products, and services that require finance for developing clean energy solutions cost effectively. ADB contributes through three specific things in this

successfully supported more than 50 promising new and early-stage Indian clean tech start-ups. Secondly, as a financing institution, ADB extends support to clean tech and VCP investors. This involves both supporting external investors as well as helping ADB grow its clean-tech portfolio. In India, ADB in partnership with the UNDP is providing financial and other support to Infuse Ventures. Hosted by CIIE at IIM Ahmedabad, Infuse Ventures has invested in more than a dozen early stage companies, several of which are now beginning to make significant inroads



in new clean-tech markets. Third, the ADB supports collaboration and knowledge sharing among start-ups, industry investors, and other key stakeholders.

ADB organized the first-ever global gathering of 28 clean tech accelerators from around the world, including two from India, and that collectively has supported over 1000 clean-tech start-ups and have raised more than two billion dollars in financing that is a summary of ADB's activities in support of this event.

Mr Tivo, European Union (EU) delegation. As a negotiator for the EU at the United Nations, he contributed to setting up of the SDGs and agenda for 2030. The EU had various stalls at the WSDS exhibition. There were stalls on water, sustainable urban development, urban

development, efficiencies of resources, and climate change and energy.

Along with EU as a whole, there are also the member states of the EU which also have their own institutional cooperation, the EU and EU members states and European businesses together hope to provide some very institutional to very practical cooperation innovative ideas that are adopted to the Indian context. Some of these are adaptations of what is done in Europe that are relevant for India while others are innovations that have been geared up especially for India.

For example, integrated water management is a big thing and there are businesses that showcase the practical side about contamination of waters and technologies for waste water treatment.



Regarding efficient use of resources, the EU has common projects with India, particularly in solar cells. Lastly, about climate threats and opportunities, the ratification of the Paris agreement by both the EU and India is on the verge of entering force as treaty. It is important that EU and member states collaborate with India on a climate change. So, there are a few project mostly aiming at transfer of technological knowledge.

Seven innovators, involved in bringing about change on ground, gave short presentations.

Ecolibrium Energy is a five-year-old company based out of Ahmedabad and funded by CII and Infuse Ventures. In India, around 44% of power is consumed by industrial and commercial customers while 20% is still wasted. The platform that they have built is a combination of a hardware and a cloud-hosted platform that enables industry to figure out where they

are using energy, where are the leakages, why are the leakages there, and help them optimize by giving them recommendations in terms of what should be done. This helps industries not only source cheapest power but also helps them optimize their consumption. The process helps the companies analyse the problems and what has to be done to maintain better. Thus, we are moving from preventive maintenance to predictive maintenance helping reduce their energy consumption.

Ecosen Solutions introduced themselves through a video. The video showed fascinating solutions to post-harvest food wastes in India as well as many other countries.

FlyBird Farm Innovations have developed a low-cost and innovative smart irrigation and fertigation system. Agriculture faces a lot of challenges, mainly due to water scarcity and erratic power as well as increasing labour costs



and irrigation at odd times. To address a couple of these key problems, they came up with the smart irrigation and fertigation system called Siri. Basically, it senses soil moisture and soil temperature and temperature humidity based on the sensors, the system decides when to irrigate, how much to irrigate, and irrigation can be done exactly based on the crop age and crop type. All the sensor data is connected back to the controllers, which takes the decision of how much irrigation needs to be done.

TPS Renewables generally manufactures prefabricated biogas plants and has worked with prestigious clients such as WWF, MIT, DuPont. The product is designed for urban establishment, which can be squeezed into smaller spaces. Then, its performances is two times more than

the standard or its predecessors, and we have managed to coexist with people in the urban society with scum management systems and so on. Biomonitoring is a proprietary patented remote monitoring system of TPS Renewables that has sensors that directly send all signals to a server; the data is collected and uploaded on the dashboard of clients so that the clients have continuous track on the performance of the system. For standard one TPD, which is one tonne per day plant, it produces 70 kg of equivalent LPG and water footprint is negligible (1:0.2) when you compared with conventional systems, which is 1:1.

Gram Power is an energy management company. The need for energy management arises with the belief that every unit of energy





saved is every unit of energy generated. The company is active in urban as well as rural areas. Through real-time reporting, Gram Power brings a level of transparency between the consumers and the DISCOMs and thus saves energy. Gram Power has been received several accolades and has been recognized by NASA as top ten green tech company as well as by the USAID, which are funding us for rural electrification for the last two three years.

Tessalt is into cold chain space providing innovative technology in the form of thermal energy storage. Tessalt provides backup thermal energy to cater to your cold chain needs right from the farm to the fork, which is not only economical but also environment friendly. The

key benefit is that anyone using this technology is able to lower down the operational cost by 60% to 70%. Also, it provides 100% product safety due to backup energy and is not dependent on vehicles' engine to run refrigeration systems. Customized solutions to cater to different needs, size, and applications are available for different applications. Traceability of the product is now also available so you can trace the temperature of the product every time. Lastly, it has reduced diesel consumption per annum by 100 L.

Nature-tech Infra provides holistic developmental input in the villages. The company supplies electricity to rural folks thus creating an environment that is prudent for development and is sustainable. Nature-



tech provides affordable, reliable, and cheap electricity in a sustainable way and the plants are owned by the community. To make these plants sustainable, simple technology is used as the cost of maintenance for advanced technology is also

high. This is achieved through building solar micro grids. These provide electricity to light up the villages, houses, and electricity to schools electricity to schools, health centres, etc.



PLENARY SESSION-II





Accelerating the Transition to Low Carbon Industries

The subject of this plenary is how to accelerate progress towards low-carbon industries needed in the future. The target is to not only make businesses sustainable in terms of their environmental impact but also in terms of their human impact. As Mr Desai said, development has to be sustainable as well as responsible. To discuss this, the panel comprised of Amb. Ajai Malhotra, TERI; Amb. Shyam Saran, Chairman, Research and Information System for Developing Countries; Mr Randal Newton, Vice President-Enterprise Engineering, Ingersoll Rand; Mr Rajib K Mishra, Director, Marketing and Business Development, PTC India Ltd; Mr Yongping Zai, Director, Energy Division, South Asia Regional Department, Asian Development Bank.



The second plenary also witnessed the first audience voting which was on the topic ‘How do businesses see climate change mitigation and emission reduction?’ ‘Reducing greenhouse gas emissions (Option D)’ got the highest vote, followed by ‘Option B: Opportunity for new product development’; at third position was ‘Option C: Opportunity to enhance brand value’, and lastly ‘Option A: Cost savings’.

Amb. Shyam Saran started his keynote address by throwing light on some of the key elements on the issue of business opportunities that are being thrown up by our global effort to deal with the challenge of sustainability and climate change. Drawing attention to what Hank Paulson, former Secretary of Treasury of the United States and who navigated through



the Lehman financial crisis of 2007/08, says that the world is now faced with a climate bubble similar to a financial bubble of 2007/08. According to Mr Paulson, years of unrestricted credit built-up in the financial sector of the country led to credit bubble burst in 2008. The world is making the same mistake today with climate change. It is starring down a climate bubble that poses enormous risks to both our environment and economy. The warning signs are clear and growing more urgent as the risks go unchecked. There is virtually no debate amongst climate scientists and economists that the planet is warming and that the burning of fossil fuels is largely responsible. He says that business itself

is actually not fully conversant of these risks that the economies around the world face. So the first order of the business is to get businesses acquainted with the kind of risks being posed by climate change and environmental crisis. Secondly, what is the change or transition required to make an accelerated shift from an economic system based on the burning of fossil fuels to one based essentially on renewable, clean sources of energy. The easiest way from businesses' point of view is by putting a price on carbon. Unless there is high enough price on fossil fuel, the shift to renewable energy will not be possible or will be slow.

The third aspect he drew attention to is the

issue of externality, which is defined as the cost of benefit that affects the party who did not choose to incur that cost of benefit in economics. And this is true for most cross-cutting global issues, including climate change. So there is a cost to society, but with respect to individual costing, the social aspect of the burden is not taken into account. This is why global agreements are needed, which the Paris Agreement gave. The next big challenge is to align private calculations with the social calculations and that can only be achieved through global approach. The next aspect is making these calculations take account of risks. Businesses do not operate on the long term; they essentially look at short-term interest. This is where calculations in terms costing alignments between private interests and long-term interest are a very major issue. Unless there is a shift from putting a greater value on extraction and less value on conservation, it would be difficult to deal with the issue of climate change and that is as much a risk for business as it is for governments.

Dr Mishra stressed on the importance of innovation and public acceptance for sustainability of businesses. He said that the Government of India has taken a very bold and innovative step by announcing a target of 175 GW of renewable energy to be integrated to the



grid, which is almost one-third of the present total installed capacity in the country. To make this happen, a robust market design for absorbing this spark and an environment where the change is accepted with an open heart by people rather than enforcing it are very important. Third, there has to be price parity.

Mr Newton indicated the diverse industrial presence across the globe. He said that in their customer service, energy efficiency comes at the top. Also, 60% of Ingersoll Rand products contain refrigerants. Sustainable development for to the company include both. As per the company's climate commitment to the United Nations and to the Clinton Global initiative, they pledged to reduce the direct emissions of the products being sold in the market place by 50% by 2020 and use new refrigerants in every product globally by 2030. The firm also pledged to reduce the greenhouse gas emissions in our factories, offices,

and fleet by 35% by 2020. The importance of these commitments lie in the fact that it gives the government confidence to make laws where it is realistic for industry to move.

In addition, a part of the company looks closely at energy efficiency in buildings and making buildings sustainable. These days buildings have too much air conditioning; however, ensuring the right model for the building, appropriate equipment, and correct size can improve energy efficiency for the building. Taking care of these elements can save 20–40% energy consumed by the air-conditioning in buildings. In addition, the company is investing \$500 million in product related R&D.

Dr Zai shared his views from the perspective of a member of financial institutions using numbers. In recent years, ADB's has lent about \$17–18 billion per year in direct lending. Of which about \$5 billion has been lent to the energy sector and further lower (approx. half, i.e., \$2.5 billion) to clean energy; ADB is also required to make a contribution to climate financing. So, any loan to renewable energy is counted as the climate financing.

Every year ADB lends about \$500 million dollars to \$1.5 billion to the Indian energy sectors, with an average of about \$1 billion. Some of the loans extended by ADB in recent years include

\$1.5 billion to POWERGRID of India for green corridor projects with KFW and some others, \$200 million to EESLF for efficient lighting, street lighting, and also efficient agriculture pumps, up to \$500 million to Punjab National Bank for its solar rooftop financing programme.

However, this contribution in the overall context is a small fraction of the requirements. So the best use of those resources is in adoption of new technologies, low-carbon technologies, energy efficient systems. Although ADB's role is small, it is important that financing clean-tech investment is perceived as risky for commercial banks. ADB supports R&D, strategic low-carbon energy technologies such as carbon capture and storage in China, Indonesia. It has established the pilot Asia Pacific Climate Technology Financing Centre to promote rapid diffusion and deployment of low-carbon technologies. So, these are a few examples of ADB's commitment towards low-carbon development.

There is a huge suction demand for funding, which has led to loans being extended to Punjab National Bank, Power Grid, and others in India and also in China for carbon capture and storage, but the quantum required is much more. The evidence available about other funds that are around, including the green climate funds, leads to doubts regarding how far these will be viable.



VALEDICTORY SESSION





Valedictory Session

Chair: **Dr Ajay Mathur**, *Director-General, TERI*

Special Address: **Ms Rachel Kyte**, *CEP, Sustainable Energy for All (SE4All) & Special Representative of the UN Secretary-General for Sustainable Energy for All;*

Ms Preeti Sinha, *Senior President & Global Convenor, YES Institute at YES BANK Ltd*

Valedictory Address: **Shri Piyush Goyal**, *Minister of State (IC) for Power, Coal and New & Renewable Energy, Government of India*

Vote of Thanks: **Dr (Ms) Annapurna Vancheswaran**, *Senior Director, TERI*

Dr Mathur welcomed the dignitaries on the panel. Ms Rachel Kyte said that energy is a problem common to all living beings on the planet; hence, solutions for the same should be regime-based. The renewable energy mix is a big part of the solution. In 2016, 2.9 million

people, mainly women, will damage their lungs to provide food to a household. It is a health and economic hazard as the opportunity cost for these women to earn a living is lost because of the time they spend in collecting firewood. We need green energy to be competitive in a world





that is shaped by climate change. Ms Preeti Sinha shared about the promotion of ‘green capitalism’ by the YES BANK Group. She spoke about how financial inclusion is the key to YES Bank and about how the platforms accessible through smart phones are getting the urban poor closer to financial inclusion. The agenda



that YES bank is working towards is focussed on the market reforms to embrace sustainable development. Shri Piyush Goyal shared that there is no contradiction between sustainable development and economic development. He added that sustainability cannot work in silos; it needs to be integrated into the organisation.



NETWORKING RECEPTION









THEMATIC TRACKS





Workshop proceedings: Resource Efficiency and the Circular Economy

Major natural resources that sustain economic growth and development are finite and exhaustible, and there is an urgent need to use them prudently. There is a surmounting need for resource use management (or achieving resource efficiency), thereby helping in decoupling economic growth and resource use. Sustaining long term economic growth calls for using resources efficiently where secondary use of resources will a critical play part in reducing demand for virgin materials. Resource efficiency is a key idea which is gaining political

acceptance and has been a key issue under the G-20 Agenda. The International Resource Panel (IRP), which was launched by the United Nations Environment Programme (UNEP) in 2007 to build and share the knowledge needed to improve our use of resources worldwide, has acknowledged that efficient use of natural resources will play an important role in achieving sustainable development goals (SDGs). It was argued that the traditional linear economy approach results in massive waste generation at all stages of a product life cycle right from





resource extraction, processing, value addition, consumption to end of life stage. At the same time, the conventional linear value chain needs to be closed. That would promote secondary resource management and hence putting resources back into the economy. There is a need to develop products which are easier to repair and not difficult to recycle and simultaneously create awareness among consumers at the point of purchase. By rethinking, we will be able to create economic opportunities particularly in developing countries, thereby addressing key socioeconomic challenges like unemployment, as well as addressing environmental degradation.

It should raise awareness about resource efficiency in cooperation with the key government departments, NGOs and the media. In order to close the loop, we need to contextualize the circular economy package for India via structuring the informal sector where much of the end of life products gets treated. The share of reusing discarded materials/waste is extremely low. Moreover, the prevalence of the western development model, and the rise of consumerism has become an outcome of the modern economic development model. Increased income leads to prosperity thereby leading to changes in consumption behavior. Although the waste generation per capita in India is 500 grams per day, given the sheer size of the economy the total quantum of waste generation is significant.





It is in the interest of our sustainability and culture to rationalize the use of resources. We need to promote technological interventions and behavioral practices in the economy so that value added output and scrapped materials of one economic actor become an input of the other, thus transforming the linear economy to a circular one. There is a need to follow the strategy of convergence, where for example energy released during production can be used to generate electricity. Growing urbanization, increased resource consumption and waste generation calls for developing and implementing strategies leading to circular economy which will help in achieving resource security and environmental protection for India.

India has already witnessed quite a number of initiatives in this regard right from designing policy interventions, development of business practices and improved consumption behavior that would lead to development of similar opportunities in other sectors. Conducive policy environment in other sectors will help in developing similar viable business models which will spur efforts towards resource efficiency. For instance, the take back model of used or discarded mobile phones is already in place in many developed countries and India, where selected companies have engaged e-commerce industry for procuring and recycling. Institutional consumers of various office electronic items are often adopting leasing models for procuring

similar items at offices and institutions. The example cited includes leasing of photocopy machines by the institutional consumers which are taken back by the manufacturers once they reach a certain years of useful life. Companies are exploring replacement of products from virgin materials with products manufactured from waste/discarded materials.

The Ministry of Environment, forest and Climate Change over the years has announced a number of policies for handling wastes and many of them have been revised recently, although the response of their implementation has been mixed. While the bigger industries have the capacity and necessary finances to address the problem, the medium and the small sized companies often struggle with knowledge, capacity and resources for implementation. The relevant associations can play an important role in improving their capacities as well help them in mobilizing finances. Most of the outputs from SMEs are intermediate inputs used in medium and large industries. Hence effective vendor engagement often plays an important role in improving material use along the value chain of the product. Challenge also lie due to variation in proportion, type and quality of non-segregated wastes generated during primary, intermediate, processing as well as disposal state which are

difficult to recycle. They need segregation and pre-processing for better utilization. Undertaking material flow studies periodically often helps us in understanding potential leakages and wastages and targeted interventions that can help checking such resource losses. It stresses on flow of material throughout the manufacturing of any sector and converts it into cost of material, energy and labour thereby helping companies to estimate potential loss in production incurred.

The EU can play an important part in enabling India to realize its development ambition through a circular economy approach. India could benefit from their expertise in policy making and technology, smoothening the transition to a circular economy. In fact, the EU has been promoting and implementing resource efficient approaches in its policies, notably by adopting a dedicated thematic strategy, a flagship initiative, a roadmap and most recently a package dedicated to the circular economy. The latter has the objective to help businesses and consumers to use resources in a more sustainable way, by “closing the loop” of product lifecycles through greater recycling and re-use, and bring benefits for both the environment and the economy. Furthermore, the EU is promoting greater efficiency in resource use at the global level, for instance through its Switch-Asia Programmes

and its support to the International Resource Panel. It is also supporting endeavours by its strategic partners, including India. In particular, the EU is about to launch a Resource Efficiency Initiative (REI) in India, a project to foster an

efficient and sustainable use of natural resources in the country by supporting the Indian Resource Panel and promoting standards and business best-practices.



Lifestyles, Production and Consumption

Key Challenges for Sustainable Development

The thematic track on ‘lifestyles, production and consumption: Key Challenges for Sustainable Development’ was hosted in collaboration with the Agence Française de Développement (AFD) and the Institut du Développement Durable et des Relations Internationales (IDDR).

Across the world, as millions are lifted out of poverty and there is an increase in the number of middle class, there has been shifts in lifestyles, consumption behavior and aspirations. Global material use has grown more than three times between 1970 and 2010, with annual global extraction of materials growing from 22 billion tonnes (1970) to 70 billion tonnes (2010).

A key reason for the growth in material use is the growth in per capita income and consumption. In the current global context it is important to identify strategies to limit our collective ecological footprint while also allowing those who are not able meet their basic needs to prosper.

A ‘sustainable lifestyle’ is a way of life that can meet the basic needs for well-being of everyone, without jeopardizing the needs of future generations. Transitioning towards sustainable

lifestyles requires both sustainable production and consumption.

Mr Cyrille Bellier, Deputy Director, Strategy and Communications, AFD gave the introductory speech. He outlined various international initiatives relating to the climate finance and development agenda. He pointed out that while international climate financing is increasing, this will not be enough to achieve the sustainable development goals, and that domestic finance will also be required. In addition, governments cannot take all actions, civil society must also be involved in this effort.

One major shift in the development agenda in the last few decades has been a shift in focus from targets to processes targets are not the sole focus of the development agenda, but there is a focus on establishing processes to achieve these targets. For example, when we talk of sustainable lifestyles, we should now focus on transitions, that is, how to get to where we need to get, rather than solely focusing on the results we want to achieve. To achieve sustainable lifestyles, ideas, finance, political will, data, and research is required.



Dr Ajay Mathur, Director General of TERI pointed out that just as international financial institutions are recognizing the value of investing in projects which are sustainable; individuals are gradually recognizing the value of sustainable lifestyles. In this context, a sustainable lifestyle is one which allows for a quality of life which meets the needs of all, without borrowing from the future.

Dr Mathur stated that the lack of affordable, easily available lifestyle options is a key challenge in operationalizing sustainable lifestyles. He also points out that if people collectively demand more sustainable lifestyle options, political representatives will respond accordingly. Political representatives can no longer ignore the fact that climate change is a real issue.

At an individual level, a change in attitudes and behaviours is required, along with demanding

more sustainable options as consumers. While a growing number of people are moving towards adopting sustainable lifestyles, to strengthen this movement, regulations, financial decision making, and availability of technology at affordable prices are required. In addition, it is important to develop metrics to measure the sustainability of lifestyles at various levels – individual, household, communities, and cities. These metrics should help us quantify ecological footprints better but also help us understand why they are different across communities and regions.

Recently, India was ranked first on the Greendex, a consumption index developed by the National Geographic and GlobeScan. However, as incomes rise, and there is a growth in the middle class, it is important that collectively our expenditure decisions move towards making consumption patterns more sustainable.



Dr Bertrand Charrier, Researcher, AFD, pointed out that consumption patterns should meet the basic needs of people, and the aspirations of people across regions should be taken into account. However, it is important to make people more aware of the fact that overconsumption does not necessarily lead to happiness or well-being. New metrics are required to measure this well-being which does not equate overconsumption with growth.

Today 1.8 Billion people belong to the middle class, while close to 5 Billion people will be classified as middle class (according to various definitions). The gap between the consumption patterns of the middle class in developed and developing nations is gradually closing and consumption patterns are becoming similar across the globe.

In this context, traditional values which privilege sustainable consumption should



also be encouraged. In addition to changing consumption patterns, the way we produce must also change.

Dr Eva Alfredsson, Senior Analyst, Swedish Agency for Growth Policy Analysis, pointed out that while many actions have been initiated globally, there has been no net progress on sustainability. Given the severity of the problem, we may not have enough time to develop alternate metrics to measure sustainability. Action must be taken simultaneously. In 1999 the Swedish government established 15 environmental goals to be reached by 2020. While Sweden may not succeed in achieving all these goals, there are several lessons which can be shared with the world based on its experience of attempting to achieve these goals.

Recently, in 2014, the government commissioned an all-party committee to prepare a long term climate policy framework to make

Sweden carbon neutral by 2045, beyond the government's term in office. All parties stand behind the framework which was eventually developed. While there is a long term plan for 2045, shorter plans for 2020 and 2030 have also been outlined. In addition to goals, methods have also been outlined to reach these goals. Finally, climate laws passed by Parliament are likely to have a longer shelf life than government policies.

Dr Shilpi Kapur discussed the role of the rising middle class in changing consumption patterns. She pointed out that consumption patterns represent needs and desires of individuals, and are also a means by which individuals express their identities.

The middle class has been defined in various ways across countries and regions. Most definitions use income as a category to define

the middle class someone who falls in the middle class in a low or middle income country may not be categorized within the middle class in a high income country. The middle class typically has the purchasing power to buy consumer goods, and thus plays an important role in shaping consumption patterns in any country. Globally the number of people in the middle class is rising, and it is expected that 5.5 million people will be in the middle class in India by 2025.

Dr Kapur pointed out some constraints in operationalizing sustainable lifestyles. These include the lack of affordable options as well as the lack of information about sustainable alternatives. While governments find it difficult to force any changes in attitudes and behavior, businesses may not see any immediate incentives to offer sustainable alternatives.



However, there is a possibility to encourage a change in consumption patterns. Technical change and innovation is one possibility, in addition to traditional norms and practices which privilege sustainable living should be encouraged and changes can be brought about in education systems to encourage responsible living.

Dr Laura Brimont, Research Fellow, IDDRI, discussed the issue of mobility within the framework of sustainable lifestyles. She argued that there are several reasons to discuss mobility as a component of sustainable lifestyles. Firstly, cars are a symbol and it is often aspirational to own a car, secondly, mobility shapes our access to several other goods and services, thirdly, car based mobility in particular has several negative externalities related to the environment, such as increased space requirement, noise and air pollution. Finally, there is a major shift in mobility patterns, especially in Europe.

Some signs of this shift include, firstly, increased acceptability of sharing cars, without necessarily owning them. Secondly, impact of the digital revolution on how cars can be shared. New applications make it much easier for individuals to share cars. Finally, more sustainable options such as electric cars are more

easily available now. These trends can make mobility more sustainable.

However, some key challenges which remain pertaining to sustainable mobility include firstly, alternative sustainable modes of transport are often more expensive, and secondly, the culture of sharing is not strong in several parts of the world, such as Europe. The key challenge for public authorities is that they must develop a governance system to account for multiple actors, and also develop systems to resolve conflicts between new and existing stakeholders in the system.

The panel discussion was moderated by Ms Urmi Goswami, Assistant Editor at the Economic Times. At the end of the panel discussion she opened the discussion to the audience, and some issues which were raised include the relevance of Gross National Happiness as an alternative to measure the progress of societal progress, the role of education in transitioning towards sustainable lifestyles, the need to engage with business to in the transition towards sustainable lifestyles, and the need to meet the basic needs of the poor within the context of sustainable consumption, and the role of public policy in promoting traditionally sustainable lifestyles.



Energising Agri-food Value Chain through Clean Energy–Investing in Entrepreneurship and Sustainable Solutions

Thematic track on: Energizing agri-food value chain through clean energy- investing in entrepreneurship and sustainable solutions

SESSION 1:

Speaker Chair: Mr. Nagaraja Rao, CTI-PFAN

Speaker 1: Mr. Himanshu Mishra, Co-founder, Sustain Earth

Speaker 2: Mr. Kartik Wahi, Co-founder & Director, Claro Energy Private Limited

Speaker 3: Dr. Tushaar Shah, Senior Fellow, International Water Management Institute (IWMI)-India

SESSION 2:

Speaker Chair: Mr. Martin Hiller, Director General, REEEP

Speaker 1: Mr. K P Philip, IREDA

Speaker 2: Mr. Hari Natrajan, CLEAN Network

Speaker 3: Dr. Klas Eklund, Senior Economist, Sustainability of SEB

Speaker 4: Dr. Keywan Riahi, Director- Energy Program, IIASA

The theme was set by Mr. Amit Kumar, Regional Programme Advisor, REEEP South Asia Secretariat where he discussed issues pertaining to agri-food value chain and the lack of inter-linkages throughout the value chain. He presented the findings of the need assessment study which was carried out by TERI and supported by REEEP. The common challenge observed across the region is to integrate the regulatory, technological, financial, and entrepreneurship aspects of sustainable crop management, processing distribution and retailing; to create

favourable environment for the Food-Water-Energy Nexus in the region. He mentioned some key constraints and gaps in powering agri-food value chain through clean energy interventions. Issues such as limited access of farmers to market is a constraint as the actual output is required to combat food and economic security concerns of the world..

The track was divided into two sessions. The first session was on “Stories from the Ground”. This session comprised of entrepreneurs who work in providing clean energy solutions to



the rural community in India through various green business models. These models include decentralized biogas production from cattle dung to cater the thermal and electrical needs of the farmers and rural community throughout the milk value chain wherein the farmers are able to create market for their products with efficient utilization of energy from biogas. This model was presented by Mr. Himanshu Mishra, Co-founder, Sustain Earth. Through their experience, he could clearly mention the pain points that they had come across during the installation of these projects; from quality dependency, to lack of masonry experience to absence of after sales and availability of services. Some key points that were worked upon over the years include-improved biogas production, prompt after sales support and innovations to de-skill installation process.

The second business model was presented by Mr. Kartik Wahi, Co-founder & Director, Claro Energy Private Limited, on use of solar water pumps for irrigation with innovation on producing water for drinking, fisheries and aeration. This model helped the farmers to shift from conventional to high value crops that brought in additional income to them. He stated the importance of integrating a good technology with an effective business model. He spoke about various new innovations that the company is planning to integrate in the solar pump sets for improved monitoring and efficiency, these includes- GIS mapping, remote monitoring, changeover for battery charging, dual application for both running the pump or running other motor driven machines, pre-paid metering, etc.

The third business model was presented by Dr. Tushaar Shah, Senior Fellow, IWMI-



India on “Solar Power as Remunerative Crop (SPaRC)” a cooperative model created by solar pump owners wherein the farmers could use the energy for irrigation and also sell the surplus power to grid to gain additional income. SPaRC was established by the International Water Management Institute (IWMI) and is being scaled up with support from the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). SPaRC offers farmers a guaranteed buy-back of the surplus solar power they produce, provided they are connected to the electricity grid. This guarantee allows farmers to invest in solar powered pumps, which reduces the use of carbon intensive diesel pumps on farms. One key motivation for the project is its ability to reduce transaction costs from many dispersed individual sellers.

The second session focused on the investment challenges and opportunities in agri-food value



chain. The session was chaired by Mr. Martin Hiller, Director General, REEEP. He initiated the discussion towards intertwining investment into agri-food value chain. He stated the importance of identifying entry points and opportunities for the sector and developing enterprises at all levels within the agri-food sector (food- producing through processing to retailing) requires coordination in the research and development, technological know-how, financial support as



well as development of conducive policy structure to advance ahead. This new revolution should be clean, efficient, self-sustainable and progressive for the society. Efforts and steps have been taken to move forward in this direction across the globe – some became trend setting examples, others face challenges - high upfront and investment costs, misunderstood or mistrusted technologies, lack of standards and quality assurance track records, outmoded financing availability, etc. Mr. Martin Hiller invited speakers to seek insights in financial, technical, economical and entrepreneurial aspect, for a holistic understanding of the entire subject. He mentioned REEEP's role in advancing markets for clean energy in developing companies.

Mr. K P Philip, IREDA discussed various schemes initiated in collaboration with KfW and UNIDO, for entrepreneurs working to provide energy access to rural community at an interest

rate from 9%-11%. He stated that the Central Government has plans to roll out new schemes and incentives to promote entrepreneurial innovations in the field of clean energy. Mr. Klas Eklund, SEB suggested that investment through capital and green bonds can be used for scaling up green innovations as financing renewable energy projects is a critical task for the financial institutions and banks around the world. He said in order to scale-up these projects, a robust techno-financial model is essential. Mr. Keywan Riahi, Director, Energy Program IIASA emphasized that the availability of right tools and data are the challenges faced during scaling up of green solutions in this sector. He presented the challenges being faced by project implementers in terms of lack of information and manuals available for equipment design and application. He suggested the importance of database and manual creation for effective implementation of



clean energy projects. Mr. Hari Natrajan, CLEAN Network mentioned the lack of development fund as capital for budding entrepreneurs and suggested government financing bodies to lend investment fund on non-collateral basis. He said that it He emphasized on the importance of developing robust information channel between the investors and practitioners to facilitate better fund flow in the sector. He also stated the importance of a long-term policy plan at all levels of the Government. Another important aspect presented by him includes development of technical standards and certification for services as well as products in the sector. Also, developing guidelines for training and capacity building

from the entrepreneurial to technical levels is required. He mentioned the important role for FMCG companies in the agri-food supply chain, which could be explored in order to provide value to the farmer's products.

The session was concluded with recommendations such as-

- ❖ To build a successful commercial models from farmers to end consumers
- ❖ Government to intervene aggressively for devising appropriate pricing mechanism to provide better value for farmers
- ❖ It is essential to focus on data availability and monitoring



Clean Energy Nexus: The Way Forward in India

There is a shift in global energy mix from conventional sources to clean energy sources. Hydropower can play a crucial role as a balancing power in the growing capacity of variable renewable energy (RE) (wind and solar) in India. Hydropower plants should give priority to drinking water, irrigation, and power. Energy efficient devices and digitalisation would help meet growing electricity demand and reduce emissions. TERI with support from the Norwegian Embassy and Statkraft organized a thematic track on the topic- Clean Energy Nexus: The Way Forward in India.

The Energy and Resources Institute (TERI)

has been working extensively in the field of renewable energy primarily with the Ministry of New and Renewable Energy. TERI works on the regulatory as well as the technical aspects of clean energy—renewables, energy security, climate change, etc. TERI and the Norwegian Ministry of Foreign Affairs (MFA) are working together to address the knowledge gaps in the three strategic areas of clean energy, climate change, and energy security, with a goal of contributing towards the achievement of India's NAPCC targets.

Statkraft's expansion in the Indian solar segment is also a testimony of Norway's faith





in the Indian renewable sector. Energy Nest, a leading Norwegian company in energy storage is under process to set up a first-of-its-kind thermal energy storage project in India. Statkraft Markets Pvt. Ltd has been a trailblazer in the power trading arena with a host of innovative initiatives and has been serving India by helping bridge the demand and supply gap of the various utilities.

With more than 95% of electricity generation from hydro coupled with decades of experience in the hydro sector, Norway is an appropriate partner for India in its Small Hydro Power Development. Norway also had footprints in the Indian Power sector dating back to 2004 with the commissioning of 86 MW Malana power project, where Statkraft has 49% equity share. The main focus of this thematic track was to exchange viewpoints on various aspects of the electricity sector, with primary emphasis on renewables. Other issues pertaining to market mechanisms



existent for developing a demand driven market will also be discussed. The broad area of this thematic track would cover the following topics:

- ❖ Renewable energy scenario for India and Norway—Regulatory and policy status
- ❖ Power markets
- ❖ Small hydro initiatives
- ❖ Market instruments for driving the electricity demand

Welcoming the Guest of Honor and the Esteemed Panelist

The session was inaugurated by TERI's Director General, Dr Ajay Mathur. The guest of honour was Mr. Lars Andreas Lunde, Minister for Climate and Environment.

Inaugural Speech by the Guest of Honour Mr. Lars Andreas Lunde, Minister for Climate and Environment; wherein he emphasised that it is possible to meet the growing electricity demand and reduce emissions simultaneously by

using energy efficient devices and digitalization. Approximately 150 GW of renewable energy (RE) had been installed in the year 2015 globally, which shows an increase of 8% from the year 2014. Norway has 95.7% of hydro power out of which 50% is regulated. Deregulation is important for more efficient use of invested money and more equal price level all over the country. Deregulation is required in regional market (India and neighboring countries) to create a market similar to Nord pool).

Technical session: Promoting Renewable through mandatory and voluntary trading mechanism

The session began with a presentation given by Mr. Shirish Garud on Renewable Energy Scenario in India and TERI's initiatives with Norway; wherein he described the present status of renewable energy in India and how TERI has



successfully completed Phase I of Framework Agreement with the Norwegian Ministry of Foreign Affairs (MFA) which addressed the knowledge gaps in three strategic areas: clean energy options, climate change, and energy security and climate change interfaces. Mr. Sushanta K Chatterjee, Joint Chief (Regulatory Affairs), Central Electricity Regulatory Commission delivered a detailed presentation on- "Impact of regulatory and policy mechanisms initiated by the Govt. of India for RE promotion"; wherein he said that the main drivers for development of renewable energy are energy security and climate change. India does not enjoy the luxury of flexible generation which is a challenging part of RE into grid. He also emphasized that everyone is committed to build robust policy & regulation for RE growth exponentially in India. Ms Anjali Chaturvedi, Executive, Indian Energy Exchange, delivered a comprehensive presentation on "Current state-of-affairs in



green power market in India”; her presentation detailed about the current scenario of renewable energy in India, wherein she highlighted about the different market mechanisms available for promoting renewable energy. She also explained in detail the Renewable Energy Certificate mechanism in India; the various sources from where the Renewable Purchase Obligation (imposed by the State Electricity Regulatory Commission) can be complied.

Ms. Pooja Malhotra, Vice President, Statkraft; gave a detailed presentation on “Incentivizing

Renewables through certification mechanism” wherein she insisted that large hydro should be considered as renewable energy as it is recognized as renewable energy in the rest of the world. She with her colleague described about the market mechanisms prevalent in Norway and pointed out that these mechanisms can be implemented in India. They talked about the power markets in Norway and also described Statkraft’s presence in Norway’s power market.

The next technical session was on- Small Hydro: A pivotal area to be explored to strengthen Indo-Norway consensus.

The session began with Mr. Dominic Martin, Vice President-Political and Public Affairs, Statoil; giving a brief presentation on “Statoil new energy solutions-shaping the future of energy”

He discussed in detail Statoil’s interventions in the energy sector and possible interventions



for Statoil in India. Mr. Rahul Varshney, Director (Business Development), Statkraft gave a detailed presentation on “Hydro initiatives and opportunities between India and Norway”, during the presentation he chalked down an exhaustive plan on the possible interventions for hydro in India. There has been slow movement in this aspect of the power sector. He described the history of development of hydro power in India and how it had taken a boost in the country back then. He detailed that concerted efforts made by various stakeholders for the promotion of hydro power. He also emphasised that hydro has been a sector where Statkraft has been extensively working on. He requested the regulators to ease the regulatory process for the further promotion of hydro power in India.

The final session was an interesting panel discussion on “Issues and Challenges for promoting clean energy through an Indo-Norwegian Nexus”. The chair for the session was

Mr. K.Ramanathan, Distinguished Fellow, TERI. The panel had eminent speakers including Dr. Amarpal Singh, Chief Executive, Punjab Energy Development Agency ; Mr. Rahul Varshney, Director (Business Development), Statkraft; Mr. Sanjeev Mehra, Managing Director, TATA Power Trading and Mr. Sanjeev Mehra, Managing Director, TATA Power Trading. The session had very informative discussions on the promotion of hydro power and its further promotion in the country. Mr. Anil Razdan said that we should balance the need of a hydro power plant in the following priority – Drinking, Agriculture and Power. Mr. K.Ramanathan concluded that Indian power sector is going through a transformation, it is really important to understand how to manage and achieve renewable energy grid integration. Three important components in renewable energy (RE) grid integration is to provide flexibility in thermal generation, exploiting storage and flexibility in demand.



Air pollution in India: A Problem with Scalable Solutions-Roundtable



Air pollution is a key concern in a developing economy like India. Despite several efforts by the Government of India, more than 80% of Indian cities violate the prescribed standards of air quality. Research studies have indicated significant impacts over human health and agriculture due to high pollutant concentrations in India. Delhi being the capital has remained in limelight due to its alarmingly polluted air in the last few years, while there are several other regions which are equally or polluted in the country. Economic estimates point to a degradation cost of Rs. 1.1 trillion by the outdoor and of Rs 0.9 trillion by the indoor air pollution in India, which is about 3% of the total GDP of the

country. Many of these air pollutants like black carbon (which is a constituent of combustion based particulate matter emissions), and ozone (formed at ground level by reactions of precursor pollutants gases like NO_x and VOCs) also have warming potential, and hence, are known as short lived climate pollutants (SLCPs) . World-wide, SLCPs have emerged as a powerful strategy for reducing the projected warming trends from now to mid-century by as much as 50%. While doing so, 4 million annual deaths and billions of dollars of crop damages can be saved globally, while climate benefits remain additional to these.

There is multiplicity of sources which contribute to pool of emissions which eventually

deteriorate the quality of air in India. While on one hand, the poverty driven issues of energy access lead to the use of biomass based fuels for cooking purpose, on the other hand, growing aspirations enhanced by limitations in public transport have led to unprecedented growth in number of vehicles in the cities. Growing power demands and dependence on coal also contribute significantly to emissions along with industrial pollution. Improper management of waste-municipal and agricultural is also a

of high intensity emission sources and adverse meteorological conditions, specifically in winters. It is in this scenario, it becomes very important to understand the chemistry and transport of pollutants to identify measures for effective and optimal control of pollution.

While there are many global efforts in assessing the issue, in India, there are limited initiatives for studying the effect of possible measures on air quality improvement in densely polluted regions in India. This project developed a white



key issue which eventually leads to emissions of pollutants, as significant quantities of these wastes are combusted for volume reduction and heating purposes. Other than the emission sources, meteorology plays its role in defining the air pollutant concentrations. In India, the Indo-Gangetic Plain show the highest pollutant concentrations due to the presence

paper based on simulation studies to assess different options which can reduce air pollution in a city like Delhi and also in the whole Indo-Gangetic Plain (especially Uttar Pradesh). The simulations were carried out using state-of-the-art regional scale air quality models (CMAQ) using emission inventories at a resolution of 4x4 km for Delhi and 36x36 for the Indo-Gangetic



Plain. Simulations also tested the effectiveness of different interventions in bringing air quality benefits to the region. Accordingly a list of possible options was prepared which was to be recommended for reduction of air pollutants will be prepared.

The findings of the draft white-paper were deliberated in a workshop held as a thematic event in the World Sustainable Development Summit being organized by TERI during 6th October 2016. The workshop brought together policy makers; air pollution and climate science experts; civil society; business and financial institutions; and the media to highlight the importance of air pollutant reduction and their associated benefits related to human health, agriculture and climate. The workshop aimed to target interventions in different sectors such as residential cooking and transport to reduce their contributions to the pollutant concentrations.

It proposed to evolve a framework for the integrated role of science, policy, business and civil society for addressing air pollution concerns and indicate a pathway for emission reduction from different sectors. The broad objectives of the workshop were :

Objective 1: How can we catalyze scientific research to mitigate PM and ozone precursor emissions from different contributing sectors? Which are the key strategies that can work in reducing pollution in Indian cities and other highly polluted regions?

Objective 2: What will encourage the policy makers to set time bound targets for air pollution mitigation?

Objective 3: What factors impede the focus on mitigation strategies for emissions from different sectors and how do we jointly address them?

Objective 4: What should be the immediate role of science, policy, business, financial



institutions and advocacy groups and what will drive their collaborated action?

On 6th Oct Nov 2016, , TERI and UCSD with contributions from 25 authors from 17 International and National institutes released a report ‘Breathing Cleaner Air- Ten Scalable Solutions for Indian Cities’, which not only highlights the issue but also presents a prioritized list of solutions for reduction of air pollutants in India. The report was released in a plenary session in WSDS and was also discussed in a separate thematic event on the same day. In the events, TERI brought together key experts from Government of India, the scientific fraternity in India (IITs, IITM, and other premier academic institutes), World Health Organization, VITO, Climate & CleanAir Coalition and other important agencies. TERI also invited people from scientific fraternity in India working on the issue of air pollution control and will seek presentations on



their work on air quality assessment and control in India. Discussions focussed on recommending a clear set of proposed interventions, which can have maximum impact on improving air quality in Indian cities and other polluted regions like Uttar Pradesh.

In the thematic event on ‘Air pollution in India: A Problem with Scalable Solutions’, presentations were made by distinguished scientists from India and abroad. They included Prof. V. Ramanathan, UCSD, Dr. P. Gargava, CPCB, Dr. Sunday Leonard, CCAC, UNEP, Dr. Henk Bekedam, WHO, Ms B. Abubakar, Federal Ministry of Environment, Nigeria, Mr. Sumit Sharma, TERI, Dr. Carlos Dora, WHO, Dr. S. Ghude, IITM, Dr. R. Krishnan, IITM, Dr. G. Beig, IITM, Dr. I.H. Rehman, TERI, Ms. T. Ramanathan, Nexleaf, Prof. C. Venkataraman, IIT-B, and Mr. S. Jannesen, VITO, Belgium.

Dr. V. Ramanathan from UCSD chaired and

inaugurated the roundtable and emphasised on substantial return achieved by the governments on investments made for air pollution control in US. He broadly described the formation and contribution of the core group which worked together to release this report. Dr. Sunday Bonard from UNEP, CCAC stressed upon all government department to work together to combat climate change. He also added that policies developed through the integrated approach of climate change and air pollution will help India as well as the world to grow in a sustainable way. Dr. Henk Bekedam of WHO highlighted the health linkage of air pollution and stated air pollution as the fourth leading cause of death in the world. He emphasised on the need to have a political will to solve the menace of air pollution. He added that clean air program should also be added as a part of the Swachh Bharat Abhiyan

of Govt. of India. Ms. B. Abubakar of Federal Ministry of Environment, Nigeria emphasised on leaving a better world for the coming generations than what we received from our predecessors. She added that a new sector of economy can be built through the opportunity of solving climate change. Sumit Sharma from TERI mentioned about the proposed Clean Air Mission as part of the ten scalable solutions for Indian cities. The solutions touched upon sectors like transport and up gradation of traditional fuel burning technologies. He also mentioned about enhancement of LPG penetration and improved induction and biomass based cook stoves in India.

Dr. Carlos Dora, WHO, mentioned that the air pollution is also related to cardio-vascular diseases apart from respiratory diseases and pitched for multi-sectoral emission reduction. Dr. S. Ghude, IITM presented the impacts of



tropospheric concentration of ozone on crop productivities, especially of wheat crop in India. Dr. R. Krishnan presented the impacts of aerosols on climatic patterns. He showed how the aerosols are responsible for weakening of monsoon in India. While briefing about the new modelling and outreach initiatives taken through SAFAR, Dr. Beig mentioned that the levels of PM_{2.5} in Delhi have remained almost constant during 2011-2015. was only 11.5%. He stressed on the need for high quality air quality monitoring systems and data. Mr. Jannesen, VITO presented the air quality management plans and tools that should be in place to answer critical questions

like when, where and what type of measure to be deployed for control of air pollution.

Dr. P. Gargava, CPCB rightly stated that the air pollution is not a local problem, it has multiple dimensions. Dr. I.H. Rehman, TERI mentioned that the platform of institutions and experts should interact with government bodies to take forward the study with integrated monitoring and simulation to combat the air pollution problem. In conclusion, Dr. Ramanathan said that this roundtable should be a beginning of the process to combat air pollution in India and the report will be submitted to government of India for implementation of recommended actions.





ADDRESS BY THE PRESIDENT OF INDIA, SHRI PRANAB MUKHERJEE ON THE OCCASION OF INAUGURATION OF THE WORLD SUSTAINABLE DEVELOPMENT SUMMIT ORGANIZED BY THE ENERGY AND RESOURCES INSTITUTE

At the very outset, I would like to congratulate Shri Pawan Kumar Chamling, Chief Minister of Sikkim on receiving the Sustainable Development Leadership Award. I am indeed happy to have the opportunity to take part in the deliberations at the first edition of the World Sustainable Development Summit. To begin with, let me congratulate TERI - The Energy and Resources Institute - for initiating this conclave of great relevance. This global forum has evolved from the Delhi Sustainable Development Summit (DSDS) that was launched by TERI in 2001. The DSDS had been at the forefront of creating environmental consciousness and promoting leadership to tackle the challenges of climate change and sustainable development. I fondly recall having the opportunity of inaugurating another edition of the Delhi Sustainable Development Summit couple of years back, when I was External Affairs Minister. I am pleased to see it grow into a larger and more inclusive platform now. I take this opportunity to welcome the delegates who have come from abroad.



SHRI PRANAB MUKHERJEE
President of India

TERI has been consistent in its endeavour to find solutions and create new knowledge on issues relating to environment, climate, resources and sustainable development. Through this World Sustainable Development Summit, TERI is seeking to provide a unique platform to experts, administrators, policy-makers and others from round the globe, determined to protect our planet, to promote international exchange of knowledge and ideas. I urge TERI to continue its efforts for many more years.

The threat of climate change is real and immediate. It concerns the whole world as its ill-effects are all-pervasive. Developing



economies are more vulnerable to climate change as these economies are closely tied to climate-sensitive sectors like agriculture and forestry. As a developing country with shared concerns on climate vulnerability, India has a vital stake in an equitable and multi-lateral approach towards climate change.

India is home to almost 18 percent of the world's population. However, we possess only four percent of the world's renewable water resources. Our energy consumption constitutes six percent of the global energy consumption. Resource constraints notwithstanding, we have worked hard to become the fastest growing economy amongst the major economies of the world. We

have the capacity to clock sustained high growth. But growth is dependent on resource availability, especially energy. Factors such as demography, development and urbanization exert tremendous pressure on availability of resources. Large-scale utilization of resources leads to their depletion and also impacts adversely on the environment. This results in reduced availability of resources for future growth putting a question mark on the sustainable development of an economy.

We need to follow a twin-tracked approach of limiting the rise of climate change while ensuring the existence of sufficient resources to meet our future developmental requirements. This objective mandates the efficient use of earth's



natural resource. We should aim at creating a society that is prosperous but not wasteful. We should make use of our abundant renewable sources to create a society that is self-sustaining and mindful of its responsibilities towards the present and future generations. Our society must learn to exercise restraint in consumption while continuing to use resources in moderation. In this regard, I am reminded of these words of Mahatma Gandhi who once observed and I quote: “The earth provides enough for everyone’s needs but not for everyman’s greed” (unquote).

Promising initiatives have been taken both at the national and international levels aimed at addressing the challenge of climate change.

The adoption of the Paris Agreement and the Sustainable Development Goals in 2015 are but two crucial steps in this effort. They speak of the global acceptance of the view that all the people and countries of the world need to work together for our common future.

India ratified the landmark Paris Agreement that was reached at the twenty-first Conference of Parties four days ago on the occasion of Mahatma Gandhi’s birth anniversary. I am glad that our ratification has occurred prior to the next Conference of Parties and I hope that it will encourage other countries to follow suit. If the legally required ratification by countries who together account for 55 percent of the global



emissions is achieved, it will enable the coming into-force of the Paris Agreement before the next Conference. This will be a major boost to our fight against climate change. I take this opportunity to compliment France for its effective leadership at the Paris Conference.

Prior to the UN Climate Change Conference in Paris in December 2015, all countries under the UN Framework Convention on Climate Change (UNFCCC) were asked to publish their Intended Nationally Determined Contributions (INDCs) for reductions in greenhouse gas emissions. Our NDCs are ambitious but if we can accelerate steps on several fronts, it will be possible to achieve our targets. The NDCs are complemented by the National Action Plan on Climate Change (NAPCC), which India had adopted in 2008. The NAPCC sets out a comprehensive response to the challenges of climate change through eight missions. It includes both adaptation and mitigation goals in addition to scientific research. The tasks have been set while recognizing the need to increase the standard of living of a vast majority of people and reducing their vulnerability to adverse impacts of climate change.

Merely setting up of policies and missions, to my mind, is not adequate. It is the effective implementation and enforcement of these policies that is most critical. I would like to make a special mention of India's achievements in both renewable

energy and energy efficiency. While our progress in this direction is globally significant, we have to continue pursuing more ambitious goals.

The world is facing challenges in all the three dimensions of sustainable development: economic, social and environmental. On the one hand, over a billion-and-a-quarter people are still living in poverty. On the other, patterns of unsustainable production and consumption are endangering our planet's eco-systems. This threat presents us with an opportunity to work together. Global action built on partnerships is required to achieve sustainable economic and social progress, inclusive growth and protection of the earth's eco-systems. Both the Nationally Determined Contributions and the Sustainable Development Goals impel us to look beyond national boundaries and act in solidarity rather than in silos. Collective action, indeed, is necessary to address the shared concerns of our world.

I am happy that through the World Sustainable Development Summit, TERI is taking a lead in providing a platform for sharing of experiences and for collaborating on strategies for result-oriented action. This collaboration between governments, private sector, academia and civil society will be a vital source of knowledge, innovation, expertise and solutions in tackling the twin and inter-linked challenges of development and environment. The theme of this Summit



'Beyond 2015: People, Planet and Progress' will motivate us to transform the way we think about progress. The barometer of prosperity is not merely economic growth but the well-being and availability of opportunities for all. Prosperity can be secured only when our planet remains healthy. We must work towards effective governance of our planet's natural resources to ensure clean air and water. We must also work towards adequate food and nutrition for all people. Reducing socio-economic inequalities is a universal agenda that requires urgent action by all nations.

I hope this World Sustainable Development Summit will deliberate on policy discourse and conceptualize new solutions to find innovative pathways of development. I am confident this conclave will witness the formation of multi-stakeholder partnerships that will benefit all while safeguarding mother earth's eco-systems. I conclude by wishing you all success in your deliberations.



MINISTERIAL SESSION





People's Aspirations and Sustainability: New Governance Paradigm



First of all the emcee announced the subject of the Ministerial session, that is, 'People's Aspirations and Sustainability, the New Governance Paradigm',— a very timely subject because it is not only important for climate finance but in other areas too. Ambassador Ajay Malhotra, distinguished fellow and senior advisor on climate change, TERI, was the moderator of the session.

Ambassador Ajay Malhotra extolled the experience and important work done by Shri Anil Madhav Dave, the Hon'ble Minister of

State (Independent Charge) for Environment, Forest and Climate Change, Government of India. Ambassador Malhotra informed the audience that Shri Dave has been a member of the Parliamentary forum on global warming and climate change and has made a major contribution as regards the conservation of the Narmada River. He has actually taken a lot of effort to see that the concerns of the communities who live around the river are taken care of. He has also successfully led India's approach to the COP22, at Marrakesh in Morocco.

Shri Anil Madhav Dave, Hon'ble Minister of State (Independent Charge) for Environment, Forest and Climate Change, Government of India, strongly felt that the success of any government policy, or international framework, or the success of individual efforts, always depends on the cooperation of the common people who are the actual stakeholders of the concerned project. He also said that climate change is no more a subject for the elite class and the academia only, rather now climate change is a subject of the society, therefore, it should be addressed properly. Probably for each and every government this is the vital part, while implementing the Paris agreement in their country. He also felt that there are a lot of discussions on climate finance and technology transfer going on at the world stage, but CSR or corporate social responsibility is an equally

important term in the Indian sphere. There is a need to strengthen the United Nations (UN) as an organization. Also, the latest technology in each and every area should be transferred to not only the developing countries but to smaller countries as well. It had to be transferred at the lower cost and higher technology. He spoke on the importance of responsible and sustained growth, not merely sustainable growth and importance of strengthening the hands of the UN and financial terms and to see that the best-in-class technologies are transferred to small island states and other countries. Shri Dave also highlighted that India ratified the Paris Agreement on October 2, the birth anniversary of Mahatma Gandhi, whose life was an example to the world that how one can live without generating much carbon footprints. He said that we must try to follow the way of life that Mahatma Gandhi had





shown to us. If we do not adopt that lifestyle then it would be very difficult to sustain. In this way, Shri Dave highlighted Gandhian precepts and sustainable lifestyles. He also said that while it is true that finance technology negotiations and bilateral-multilateral seminars should be there but at the end per capita carbon footprint should reduce and if it will not reduce we would not find the solution to our problem. Discussions and seminars will be organized in all the corners of the world but at the end we need an answer, we need a solution and the next twenty years in the life of the planet earth are extremely vital, either we will reach at the point of no return or we will solve the problem in such a way that we will make the world more beautiful than what it was 50 years ago.

His Excellency Mr Karmenu Vella, the European Commissioner for Environment, Fisheries, and Maritime Affairs, agreed that



the 2030 agenda had indeed introduced a new governance paradigm but we need to remember that this after a long and careful process was different because this process was not a simple top-down process; it took into consideration the people's aspirations and to be a success, it needs to continue doing that. The outcome contains all the ingredients for success but there are still obstacles to be overcome and the first obstacle is complacency, we cannot possibly afford to act though simply having the goals was an achievement in itself. But, the goals need to become reality as they need to be integrated into all our policies, they need to become part of our political DNA and as soon as we see them as standalone goals separate from our existing policies and separate from our priorities, they are doomed to failure. He also opined that we need to make certain that our policies are all pulling in the same direction as implementing the SDGs

is not about trade-offs, it is about maximizing benefits. He said that if you create jobs at the expense of human safety and human dignity, or if we prioritize growth at the expense of pollution or environmental degradation, then we are doing the opposite of sustainable development. Growth cannot be sustainable unless it protects the natural capital we all depend on. He also highlighted that it will not be the mega projects that will attain the SDGs but it will be the action of each and every single citizen—depending on the lifestyle choices that they make. He highlighted that the European Union (EU) is working hard to integrate the sustainable development into domestic policies. He felt that being the world's largest provider of official development assistance gives EU a powerful lever and one which should be used carefully. That way the EU can have a major impact on implementation of the SDGs around the globe. At the moment, the EU is rethinking its approach and is seeing how best to support countries in this common universal endeavour. More than anything, this means better integration of the three dimensions of sustainable development. Recognizing the need to address poverty, social issues, and environmental degradation, together with all the mutual benefits that will ensue, HE Vella felt that the EU would like to see India as an important strategic partner. Already there are

partnerships for water, energy, climate change, and sustainable urbanization and he hoped that these partnerships will support some win flagship initiatives, such as Clean Ganga, Clean India, and smart cities. He then turned towards an important aspect of the 2030 agenda, SDG number 14—on oceans, as oceans cover three-quarters of our planet and we need to act now to reduce the impacts of human activity and climate change on them. He also felt that oceans are a shared responsibility and we all need to protect them to help in development of the blue economy in the most sustainable way. It is an area where the EU is working quite intensely and will be launching an international initiative on ocean governance in a few months' time. HE Vella also highlighted that the annual ocean conference would be organized exactly after an year and they would invite leaders, policymakers, entrepreneurs, scientists, and civil society members so that together they could identify solutions and could commit to dipphase to the next phase of actions to protect coasts, oceans, and its resources. He also emphasized on the essential role of oceans in regulating the climate and also felt that after the 2030 agenda was adopted in New York, Paris also delivered a landmark agreement. He felt that there is an urgency to work and act now to achieve the objective. The Paris agreement gives us the

long-term direction, it sets the context for more immediate decisions and a framework to develop the policies. The task now is to turn the nationally determined contributions into actional strategies. He also highlighted that another good outcome from Paris was the enhanced cooperation with India and the recent launch of the India EU Clean Energy and Climate Partnership in Brazil. He hoped that it will deepen the exchange on clean energy solutions and help EU and India to identify areas where they could work together on building resilience to climate change.

His Excellency Mr Erik Solheim, Executive Director, UNEP, in his address exhorted people to learn from Mahatma Gandhi the importance of simple living and mobilizing the masses effectively to tackle poverty and the growing environmental issues. He stressed that unless we saw citizens' movements all over the planet we will never be able to manage the growing environmental concerns. He felt that we need to engage the masses by speaking in the common language and by trying to focus on those environmental issues that are close to people. He stressed on the importance of grassroots efforts and citizens involvement in climate change action. He also said that the most decisive factor in Paris was new attitude to business and that new attitude is embracing the change with open heart. He highlighted that there is not a choice

between development and environment and these two agendas should be merged together. He also felt satisfied that now developing nations are leading the way on many of such important issues. China and India were absolutely critical to set the climate agenda. Also, India has brought Mahatma Gandhi's thoughts and principles into climate action in a very effective manner and this political mobilization by the Indian government is very important.

His Excellency Mr Ibrahim Baylon, Minister for Policy Coordination, Energy, Sweden, highlighted that looking ahead, the World Sustainable Development Summit (WSDS) is a historic moment, and in the next 40–60 years, this movement will be looked upon as a movement of change. He described the world being at a historic turning point at the moment after the EU submitted its instrument of ratification and a new process starts. He felt that in light of the ratification of Paris Agreement, the world has a number of challenges before it. It is important to show to people that it is both viable as well as possible to solve problems without conflicts, wars, and other such maladies. He stressed that while the ratification of the Paris agreement was significant and historic, but it will not solve anything without the implementation phase. From Swedish point of view, he felt that there was a strong linkage between a sustainable

environmental development and a sustainable social development. It is equally important to address the social inequalities present in the world. He felt that to combat climate change we need socially as well as environmentally sustainable societies. He also expressed his satisfaction on the rapid technological development as the costs of renewable technologies have reduced significantly since the last 6–7 years or so. He also felt that the energy sector and access to energy are keys to make an impact on combating the climate change. At the same time, doing all this in a sensible and step-by-step manner will also provide new jobs and new growth. He also gave an example of the Swedish heating sector explaining the way in which they became more or less free from fossil fuels in the sector by efficiently using the available renewable resources.

Ambassador Ajay Malhotra highlighted that as part of the SDGs and India's efforts to bring electricity to every Indian citizen, the Government of India, under the leadership of the Prime Minister, is doing significant work for promoting renewable energy and energy efficiency.

Mr Lars Andreas Lunde, Deputy Minister of Climate and Environment of the Government of the Kingdom of Norway, said that the SDGs and the Paris agreement offer a long-term vision, and clear and credible signals to governments as

well as to the private sector. Those signals guide plans on capacity development investment and strategy. He also noted that a growing range of companies in Norway have started to relate to their SDGs and climate risks in their operations and business models. They were using these goals to improve their own performance and to control risks. They see both SDGs and the climate agreement not as obstacles to growth but as new opportunities. Action along the whole chain of SDGs will strongly increase our resilience as well as our safety, especially of the vulnerable people and countries. He also felt that we needed to build the regulatory framework and economic incentives that will make the polluter pay. This will make sure that the sustainable solutions and products become the most favourable and economical, and it will also make it profitable for companies to invest in sustainable business models and products. Carbon pricing is obviously a major part of the framework needed. He further highlighted that Norway supported appropriate carbon pricing strongly internationally as well as at home. There has had been a carbon tax in Norway for about twenty five years. In 2020 they will have reduced their greenhouse gas emissions by 17 to 20 million tonnes equivalent of CO₂ that is more than one-third of Norway's annual emissions of about 50 million tonnes CO₂. Mr Lunde also informed that Norway is



a staunch supporter of phasing out fossil fuel subsidies, which corresponds to five times the global support for renewables. He also stressed on the fact that the new technologies will not automatically be available for the world. We need financing and business models that ensure this. Investors need instruments to mitigate risks and providers and consumers need long guarantees. He also highlighted that the Paris agreement and the SDGs provide a new governance paradigm for the people, planet, and progress. The next step now is to ensure that this paradigm delivers

the results that the world needs. He also spoke about his country's support for the Indian Prime Minister's efforts for phasing out a few subsidies on fuel and that is absolutely the right path to follow as these subsidies distort both price and demand.

His Excellency Mr Slawomir Mazurek, Under Secretary of State, Ministry of the Environment, Poland, stressed that Poland was determined to fully contribute to implementation of the 2030 agenda with the 17th sustainable development goal. He stated that Poland had just started the

ratification process of the Paris agreement and its implementation would foster the most official reduction of the greenhouse gas concentration in the atmosphere in the scope of the SDCs. In particular, he stressed on renewal of biodiversity, soil regeneration, forests, and the improvement in water quality and reduction of hunger and poverty in the world. He also informed the audience that over twenty years Poland through implementation of sustainable development strategy tripled the GDP and at the same time

reduced the emission of greenhouse gas more than thirty per cent. He stated that it would not have been possible without new financial mechanism, Polish national fund of environment protection, and water management. Billions of dollars were raised by Polish centres for this and this money was invested in environmental protection—for water management, waste management, etc.



PLENARY SESSION-I





Air Pollution is a Solvable Problem

Air pollution is a problem that needs urgent attention. London fogs in the 1960s, despite the nostalgic ring, for example, were considered as one of the most lethal manifestations of air pollution. Caused by coal fire that was burnt at the time, London, in response to the pressing concern, switched its fuel to reduce the toxic fog. In a similar vein, Delhi attempted to curb the issue of rising air toxicity by shifting from diesel to CNG; however, given today's statistics the problem is far from getting solved. In this regard, the title of this session is not only aptly worded but also carries a sense of optimism as we—along with our esteemed panellists—broach the issue. The panellists for this session were: Mr Kamal Bali, managing director of Volvo India Private limited, Dr Carlos Dora coordinator Public Health, Environmental and Social Determinants of Health Department at the World Health Organisation, Dr Dirk Fransaer managing director of the Spanish Institute of Technological Research, Dr Sunday Leonard, the science programme officer the UN Environment, Dr Ajay Mathur, director general of TERI, and Professor Ramanathan, distinguished professor the Scripps Institute of Oceanography at the University of California.

The second chairman addressed the gathering by reiterating the relevance of the topic. In his speech he mentioned a special track record for predicting not just global warming (which was indeed detected by 2001), but also the fact that in another 30 years we will shoot past these two degrees threshold. To enumerate the poignancy of the situation, three points were highlighted which are as follows: a) air pollution is a solvable problem, b) cleaning the air does not hinder development or economic growth, and c) for each rupee that is spent on cleaning the air, one gets a benefit of at least 30 times that amount. The second chairman talked about how Santiago competing with London for the second most-polluted city in the planet cleaned up remarkably well and while it is not 100 per cent clean, it has considerably improved. With regard to the Swachh Bharat Abhiyan, the time was said to be appropriate for India to take this crucial step. With this premise, 26 experts were called to deliberate on it and a report on the matter was slated to get released later. Due to some technical issue, while the image wasn't reflecting on the screen, the second chair explained the core issue at hand. As per this, the outer circles that are interconnected represented the sectors that contribute to



pollution. For example, ammonium sulphate constitutes approximately one-third of what we breathe; furthermore, while the ammonia comes from agriculture, sulphur comes from coal plants in Uttar Pradesh. Hence, if we want to clean the sulphate, we must first attack the agricultural

and power sectors. Dr Sumit Sharma a young scientist from TERI had demonstrated that most of the particulate matter in the air comes from the national capital region. This it seems is 10 times the area of Delhi so it was deduced that 40 per cent of the pollution comes from outside Delhi, such as the regions of Punjab, Uttar Pradesh, Madhya Pradesh, and the south. Hence to attack the air pollution problem, the cooperation and collaboration between cities is needed. It was emphasized that the proposed solutions have been reviewed by a group and only those have been selected with which people have previously worked. It was recommended that what Los Angeles did in the 1960s—stopped open waste burning—is something that Delhi should also do. This reduced pollution levels by no less than



25 per cent. While India has certainly made some significant move in the necessary direction, by 2022 the decision to leapfrog to Bharat VI from Bharat IV has indeed been a remarkable initiative. Apart from this, the necessity to unite the different sectors under the common cause of reducing air pollution was stressed. TERI was

discussion by highlighting the fact that due to poor air quality in the last 15 years most of us suffer from one kind of ailment or another. The fact that the toxic air quality has enfeebled us in many ways, which improves as soon as we exit the city and returns with our entry back, paved the way for initiating a discussion of the



mentioned as the lead institution in the creation of the report.

Dr Ajay Mathur addressed the gathering by thanking the participants in the preparation of this report. Professor Ramanathan was thanked for not just mentioning that TERI led the report, he was also thanked for providing mentorship. With further emphasis on the relevance of the 10 solutions, Dr Ajay Mathur returned to the

real concern—how do we ensure that the 10 solutions get off the ground? First and foremost, the need to have in place an effective air quality index was deemed necessary. Secondly, we should assess the cost to our health. While it is a personal cost, it also impacts our employers. In this regard, the real work remains to be done by the owners of the fields around Delhi. Dr Mathur in no uncertain terms spoke about

the importance of creating public pressure to urge the owners of power fields to implement procedures that would help reduce particle emissions. For this reason, permanent support from the centre is needed throughout the year. It was recommended that the permanent group should include representatives from various ministries and interest groups that represent these sectors. The real challenge would be to assemble these groups in one place and create awareness regarding the need for change to happen. Dr Mathur concluded this section of the discussion on a positive note saying that Delhi certainly stands a chance at having cleaner air over the next decade.

The following was the exchange between Dr Mathur and Mr Bali:

Dr Mathur: Okay, I am hoping you will invite me 2026. We all know that this problem is not going to be solved with the cooperation from the industry. So I am going to put our distinguished panellists from the industry on a spot and ask him to respond. Mr Bali from Balmer as was mentioned is head of Volvo India.

Mr. Bali: Thank you Professor Ram, and thank you Dr Mathur for some very interesting opening comments, and thank you TERI for inviting me to this very important discussion this evening. Let me take a step back and talk about what we are actually doing on ground to solve

these problems. Is air pollution really solvable, what are the steps various stakeholders are taking in this? In a fair bit during the conversation here I will talk on behalf of the Volvo Group. Let me remind you that there are 17 sustainable development goals that have been finalized by the UN and Volvo as a group has chosen to adopt four of them very sincerely and seriously. But before I come to those, I just want to share one very important myth which a lot of business leaders have. We believe that the business model for sustainable solutions is not sustainable. I think this is a complete myth. So there are huge opportunities, business opportunities, in creating a business model which addresses these concerns if we can live up to those ambitions. Of course there are technological issues; there is collaboration of stakeholders which is very critical. So Volvo firstly believes that and we have chosen four sustainable development goals; number one is being healthy and safe. Safety has been a core concern in Volvo for a very long time. I don't want to go into the details. The second is innovation and infrastructure where we are saying it is very important to have innovation in our business model so we can solve some of these challenges which are being posed to the environment. For instance, going forward, electro mobility is clearly one of Volvo's solutions for all public transport. In Europe we

are going to stop manufacturing busses which run on fossil fuels. In India we are bringing in hybrids. And then the next step would be plug-in hybrids and, going forward, electric buses. So these are some of the clear solutions which we have in mind when we speak of sustainable cities and sustainable communities as one of the key aspect of sustainable development. Sustainable transport means transport which is accessible to all, so whatever we bring in must pass three tests. It must be socially inclusive; it can't be only for the rich. Second, is that it has to be economically viable which means it must give more for less, it must be efficient. Third, is that it must be environmentally friendly, which is what is going to be the solution. So the third sustainable development goal is that sustainable cities and communities are places where we are going to work very seriously and for the long haul. We are looking at seven different fuels in which we have worked in the last few years. With these we wish to prove to the world that we have finalized seven different fuels which can work in the long run. These are zero or low-emission fuels and DME is about chosen suggestions. The last and the important thing which we have chosen as the fourth sustainable development goal is protecting the planet and this I think is very important. Climate change, what Professor Ram talked about, is a very crucial issue. I think we owe it to

our future generations. So electro mobility is very clearly the next phase of urban transportation, and long-haul DMA solutions solar energy for one of our plants. We are confident of solving the transport problem effectively as a lot of our competitors in this field are doing good work. When it comes to industries, we have decided that out of the three plants which we have in India, one plant will run completely on renewable energy starting next year. This is the other investment which we are making. The next initiative, which I am very proud to inform you, is that we are the first company in India which is already manufacturing Euro six engines which we export to Europe. So the day the fuels are ready in India, Volvo will be the first company to start Euro six from the following year. And last but not least, our consideration and support is with WWF. We are close to 16,000 employees between our joint ventures and core operations. We believe that we can effectively engage with society to bring about awareness (as this is very crucial). These are some of the basic things that we intend to do. We firmly believe that for sustainability to work, sustainable solutions have to be a part of the business model.

After the conclusion of this section, the session chairman introduced a different angle: if one can provide clean energy access to women in villages in Punjab, Harayana, and Uttar Pradesh, it will

have a perceptible impact on Delhi. In this regard, Dr Abubakkar, who has done tremendous work in Nigeria, will be the first speaker.

Dr Abubakkar opened her speech by thanking Professor Ramanathan for the opportunity to speak at this esteemed gathering; post this she introduced issues of air quality, air pollution, and the need to give rural women access to clean energy. One need not be a smoker to suffer from a heart attack. The toxic air that we breathe is equally harmful. In a similar vein, cooking with firewood as opposed to cooking with clean energy is also harmful and those, especially the poor, who do not have access to clean energy, are at a greater risk of being affected. Interestingly, air pollution does not stay where it is generated. Dr Abubakkar stated that Nigeria was among the first 10 polluted cities in the world. As the largest importer of diesel and petrol generators, Nigeria as an oil and gas country is also one of the most polluted. Over 98,000 Nigerian women die annually from the effects of cooking with dirty fuels. Given this, Dr Abubakkar went on to explain the negative impacts of short-lived climate pollutants. Short-lived climate pollutants, especially black carbon, although stay in the atmosphere for a short while, nevertheless wreak havoc. Furthermore, as it is easy to connect climate change with health in the context of air pollution, it is not always

about bad stories. It is recommended that the positive aspect in this should not be missed, that is, we should see these as business opportunities. In this direction, a new sector can and should be built for manufacturing clean cooking stoves. Doing so will also help in reducing poverty and the plight of the economically downtrodden. It is the responsibility of those in positions of power to work for this section of society and help elevate them—the child who reads by the kerosene lamp, the women who cook using firewood, all need to be liberated from the miserable conditions under which they operate. It is with this that Dr Abubakkar congratulated the energy security initiative that Nigeria shares with India. Given that the conditions are similar for women in rural areas in both countries, proving clean cook stoves is of utmost importance. To make this happen the need for financial partners is crucial. This is the sector that needs to be awakened to the importance of bringing about this change. Also, as most are aware, this is most difficult to mobilize.

After this the session chairman then introduced Dr Dora for the next part of the discussion. We don't buy clean air in a bottle and we all share the same air space. Now, as established earlier, if one city is polluted the pollution does not remain restricted to that area alone. It spreads. As an epidemiologist, Dr Dora advises patients

on how to avoid risks to their health. Ministers of health the world over have passed a mandate that deems air pollution as not just a formidable environmental challenge but also a major health risk. When we breathe small particles, it goes into our lung and blood streams, it thickens and hardens them resulting in strokes, heart attacks, even dementia. In WHO we estimated that air pollution, indoors and outdoors, is the same as pollution caused by tobacco and is much worse than HIV AIDS put together. In the light of this global crisis, the idea as put forth by Dr Dora is to collate information so that there is awareness. Right now there seems to be scattered information as different sectors, industries, and people with power only have a partial understanding of the situation. It is with this spirit that the WHO has made a few things mandate. In addition to this, it has also undertaken the responsibility to track a few of these. However, with regard to this, there is the need to make the necessary connection between the exhaustive data that is available and the solution—which, incidentally, is well known. It is crucial that the connection between what is happening in people's lives is made with the data that is available on this. In the area of medicine, Dr Dora spoke of the different training programmes that have been set up for nurses and doctors so that patients are better served not just in terms of the prescription that is drafted

but also in terms of awareness that is crucial in avoiding risks such as these. The usefulness of tracking devices was emphasized in Dr Dora's closing statement.

In the next segment, Dr Sunday Leonard was called to discuss issues pertaining to climate and clean-air coalition of the United Nations Environment.

Dr Leonard addressed the gathering by outlining the focus of his talk—role of short-lived climate pollutants in the overall difficulties of air pollution. Within other pressing concerns, those related to air pollution have somehow been missed. Many people are of the opinion that air pollution should have its own specific goals within the scheme of the SDGs. Among these interactions, the Paris Agreement actually provides linkages between air pollution and sustainable development. As per the Paris Agreement every step taken in this direction should be done in the context of safe developments. There are actually several opportunities for bringing the air pollution discourse under the fold of the Paris Agreement. One of the specific ways of doing this is by looking at particulate air pollutants. These pollutants have a short lifetime in the atmosphere which means that if we get them now we will be able to witness a considerable result on climate change within the next 10 to 20 years, which is also the time frame for the sustainable development



goals. This in turn means that if we take action now, it can help us in achieving the SDG as well as the Paris Agreement targets. A recent analysis that was done by the scientific advisory panel of the climate and clean air coalition showed that short-lived climate pollutants are actually linked to the SDGs including the one on poverty, on agriculture and food security including energy assets, infrastructure, and so on. It is for this reason that Dr Leonard states he

is interested in the efforts that have been made in making the reports as most of the solutions that have been listed, if implemented, will take care of the short-lived climate pollutants as well as other pollutants, such as nitrous oxide, sulphur dioxide. As per Dr Leonard, the main focus should be on seeking to achieve the SDGs as we work towards implementing the NBCCs commitments. Now is the time to work more on short-lived climate pollutants as one cannot

defer the implementation work indefinitely. If we decide to work on it in the next five years we are likely to achieve the Paris Agreement goals while having reduced air pollution rather considerably. Dr Leonard concluded his speech by emphasizing the need for allowing these mitigation steps to get carried out, failing which the consequences will be severe.

The session chairman thanked Dr Leonard and introduced the next speaker. In the light of Dr Leonard's speech the nexus between climate change and air pollution was pointed out. It was brought to everyone's notice that India on October 2, ratified its commitment to sustainable development—the day signifying the gravitas associated with the mission at hand. No better day than Gandhi Jayanti to embark on this difficult but attainable mission. It was also announced that India would generate 100 GW of power generated by solar energy that otherwise would have been generated by burning coal. The fact that controlling climate change would itself control air pollution was stressed.

The speaker Dr Dirk Fransaer opened his speech by reiterating the urgency to respond to the crisis at hand. While we are not there yet in terms of solving the issue, the overall picture of the persistent problem is clear. In this regard, soliciting the cooperation of the government is of paramount importance. Of

all the recommendations, the ninth was said to be the most economically viable. However, the pitfalls of this are also visible as it was supposed to reduce the carbon levels in not just Europe but globally. In order for this to work effectively the governments should be strong so as to ensure proper allocation and implementation of steps. Additionally, as was mentioned earlier, it is necessary to take into account the ways in which the data on this corresponds with industry proceedings. As there is no dearth of data or methodology, one must engage with it in a manner that may result in actions that are capable of implementation. In this regard, it is also important to think about the future. Keeping in mind the growing trends in every sector, the wise thing to do would be to move towards electric. With this it is estimated that PM concentration will decrease.

The session chairman thanked Dr Dirk Fransaer and added the pertinent point that we should reduce or stop using fossil fuels not because we will run short of it; the idea is to move beyond it and anticipate a situation wherein in the near future we are better placed.

Professor Srivastava, the chairman of the Northeastern Development Foundation, thanked Dr Mathur and TERI for organizing such a beautiful event. Having visited all of Northeast, Professor Srivastava claims there is hardly any

fuel available. The situation is so adverse that that what is available in Delhi in for Rs 400 is available in the Northeast for no less than Rs 1,500! As a result forests are being destroyed for the purpose of gathering firewood. A word of thanks was mentioned to Mr Kamal Bali and Tata as they came forward at the right moment. Dr Mathur was now called to deliver his thoughts on the matter.

To this Dr Mathur responded by saying it is not really the concern of the panel and can be taken up bilaterally. The floor was now opened to questions.

The first question addressed whether the small cities are taken into consideration when it is said that air pollution is a solvable issue. Mostly, small cities have little or no access to clean fuels and diesel and kerosene are the only fuels available. Amritsar is a case in point wherein there are more than one lakh autos and no CNG stations. In such cases what is the way out? Furthermore, if diesel vehicles have been banned, then why are they still being sold? Is there any solution to this problem?

The answer to this was preceded by an appreciation of the question and how it is really a matter that nations across the globe are facing. In order to address this peculiar conundrum, efforts have to be taken at a nation-wide level. Implementation of efforts cannot be restricted

to metropolitan cities. Also, there has to be a coordinating body which will eventually become a network to ensure that proper steps are being taken and carried out. No city can operate in isolation and say it will tackle its air pollution problem on its own.

The next question was directed at Dr Abubakkar. Given that China and India are emitting more greenhouse gasses (GHG) as compared to other countries, how many women have been given clean cooking stoves in Nigeria as this is a major contributing factor to toxic emissions? This situation was likened to the condition of women in Bihar where most use firewood for cooking purposes.

In response to this, the session chairman advised a bilateral discussion should be better given the scope of the concern. In the concluding portion of the session, the chairman was called to share his viewpoints on the matter. It was again reiterated that, given that the Swachh Bharat Abhiyan is in place, now is the time to carry out the necessary changes.

The chairman opened this last segment by making a rather important observation: 'We are looking at two very different things here, one is indoor air pollution, and the other is outdoor and while the causes are different, sometimes they tend to overlap.' In outdoor air pollution the situation has become so adverse that losses

are being readily incurred in order to reduce GHG emissions. Also, as cities become more and more electric, the situation will gradually become better. Opposed to popular notion, cities are heavily polluted not because of automobile emissions but because of a host of other reasons, such as burning of biomass, construction sites raising dust and various other harmful particles, etc. To bring about any change, as mentioned by Professor Ramanathan, considerable action among a large number of stakeholders within and outside Delhi is urgently required. Clearly,

what happens in Punjab and Haryana yields an impact on Delhi. In this regard, the need for a state council is of paramount importance. Second, different organizations within Delhi have to begin the necessary action. Furthermore, how does one control dust from construction? As there are no regulations this implies the government agency—which is not the Ministry of Health, which is not the Ministry of or is not even part of the department of automobile vehicles, and so on—has to change the way it works, what are its measures, what are its recommends. While



this is never easy, the first thing that can be done is to acquire pure developers and get them to commit to a certain set of guidelines. For indoor air pollution, the most urgent and effective step would be to switch to LPG and electric induction cookers.

In the concluding part, the chairman read out

the question: “Which sector in your opinion has the greatest share of responsibility for prevailing air pollution levels in Delhi and the national capital region?” The audience were supposed to vote for the most suitable option—A, B, C, D, or E. The panel was thanked for a most interesting and insightful conversation.



PLENARY SESSION-II





Climate-Water-Energy-Food Nexus

CHAIR:

Mr Ajay Shankar, *Distinguished Fellow, TERI*

PANELLISTS:

1. **Ambassador Jonathon Addleton**, *Mission Director, USAID-India*
2. **Mr Anindya Chatterjee**, *Regional Director, Asia, International Development Research Centre (IDRC)*
3. **Mr Klas Eklund**, *Senior Economist Sustainability, SEB*
4. **Dr Keywan Riahi**, *Director—Energy Program, IIASA*
5. **Mr Ravi Singh**, *Secretary General & CEO, WWF-India*

Sustainable development is defined as the management and usage of resources over a period of time without depleting them. However, ensuring holistic sustainable development in the twenty-first century is a challenge since we're "trying" to achieve harmony with the environment. Interestingly, each time we try to chop it into manageable chunks, it recoils into a single hole and that hole is greater than the sum of its parts. As in other scenarios, herein lie both a challenge and an opportunity. Therefore, climate, water, energy, food and our understanding of these, are crucial to the way we practise sustainable development.

Mr Ajay Shankar, *Distinguished Fellow, TERI*, initiated the session by speaking about the Paris Agreement, its ratification and significance

and the holistic and crucial nexus that exists amongst climate, water, energy, and food.

Ambassador Jonathan Addleton, *Mission Director, USAID India*, set the stage by speaking about USAID's work in India which involves the US and India working in close collaboration to resolve developmental challenges, mitigation of the impact of climate change, promoting global health and food security, and ensuring continued regional integration and stability.

Agriculture in India, especially in terms of employment, is important since the sector employs more than 50 per cent of the population and contributes 70 per cent to the Gross Domestic Product (GDP). India's fruit production between 1950 and 2000 witnessed a four-fold increase which is impressive; also, 70



per cent of the total water used in India is for agricultural purposes. This is in parallel to the global figures as well insofar as India comprises 17 per cent of the world's population and three per cent of the urban land, however, in terms of water use, 70 per cent of the water used in agriculture in India is comparable to the world as a whole. In this first, 61 per cent of the irrigated areas in the country rely on ground water which actually more important and efficient than rain fed agriculture. Another interesting feature in terms of the growth is that the ground water used for irrigation has gone up from around 5 million ha in 1951 to 35 million today, that is, a seven fold increase with a simultaneous increase in food production. And, of course, everything is impressive in India in terms of the numbers such that there are about 18 million irrigation pumps in the country which have connected

the grid power and another 7 million pumps run on diesel. Going forward, one of the huge challenges the observation that the growth of the agriculture sector is being supported by what seem to be unsustainable trends in the ground water and electricity sectors. So, at some point, there is collusion in terms of such concerns. It is pertinent to note that India is already one of the most water-stressed nations in the world;



50 per cent of India's total land area faces extremely high water stress and 54 per cent of India's ground water wells are decreasing. Water resource concerns simply imply that climate change places more pressure on the systems in terms of sustainability, more efficient water usage, more efficient solar water pumps and rain water harvesting methods, climate reserves in agriculture and sufficient water storage; these areas incidentally are also areas wherein USAID works in partnership with India.

Elaborating on the ways in which USAID supports Indian endeavours in the climate~water~energy~food nexus,

Ambassador Addleton highlighted the water~energy nexus project, that is, a public~private civil society partnership to replace energy-inefficient water pumps with the energy efficient ones and at no cost to the farmers. Under this scheme, there is an agreement between the energy services company and the respective discom under which both partners share a certain proportion of the benefits of the energy savings and for every unit of the energy saved, about the baseline consumption from 2009, discoms receive almost 12 per cent of the benefits of the energy savings. Herein, a 35 per cent energy savings was reported in 2012 as there is huge



room for savings across the system and some of these inefficiencies will definitely come into play when we speak about sustainability. Taking this forward, a new water-efficient technology to measure solar moisture and water potential, was introduced. So far, there has been a distribution of more than 13,000 of these tensier metres in some 375 villages of Punjab and Gujarat and in this case, it illustrates the fact that savings 15–20 per cent savings can be achieved in the water area. Moving on, the flagship programme known as the PACE Project, in partnership with India, was recently issued in August 2016 in the presence of the US Secretary of State, John Kerry. The programme is instrumental in the energy domain, particularly in various forms of renewable energy, such as wind and solar. He reiterated TERI's proactive role in initiating and leading discussions/analyses around this theme.

The Session Chair while gratefully acknowledging Ambassador Addleton's address emphasized on the keen role of human ingenuity and innovation to overcome the possible challenges.

Next, **Mr Anindya Chatterjee**, *Regional Director*, Asia International Development Research Centre, addressed the gathering. In terms of the 'nexus', he highlighted the issues, particularly in terms of the sectoral programming and how it may offset risks and vulnerability

in other sectors. He also provided practical examples from the work that his organization engages in India and the region. So, in parts of China for instance, excessive use of pesticides in food production has a huge impact on health, costing billions of dollars a year and adverse effects on farm and biodiversity. He elaborated on his organization's role in supporting research projects in South Asia and China in terms of intensification of livestock and food production and the impact on health and the environment. In India, the need for increasing food production and the increasingly erratic rainfall system has had a serious impact on the groundwater table.

He described how, in the mountainous Hindukush region, there is a subsidy for extracting ground water; how the arid region of Baluchistan is producing apples by extracting ground water and using ground water irrigation which requires huge amounts of energy in a country facing an energy crisis. Eucalyptus trees, once promoted by developed banks and governments, as part of the agro-forestry projects, are now contributing to ground water depletion, for example, in Agrobati sub-basin in Karnataka and Noyal sub-basin in the state of Tamil Nadu. These examples illustrate the importance of negative lessons and thus, provide the context for today's panel discussion. He further stressed on the need to engage in a granular discussion on the need



to move towards a much more integrated and sustainable approach to agriculture, water, food water, electricity, energy, and so on.

Mr Chatterjee also stressed on bringing back varieties of small millets, a traditional staple, which are drought resistant and nutritious. He described how patents are pending with a couple of agricultural universities for an innovative technique that uses nano technology to use hexilo, a naturally-occurring substance, that keeps fruit fresh for a longer period of time. He also elaborated on public-private partnerships between IDRC and the Government of Uttar Pradesh, Tata Trust, JVS Foods Pvt Ltd, and

University of Toronto, for a large-scale trial of iron and iron double fortified salt to anaemia. He also referred to Ambassador Addleton's address on soil moisture sensors and how their use can prevent both water and electricity or energy loss. Similarly, on adaptation, interesting working is taking place to support initiatives to revive and recharge lakes, springs, and streams in Sikkim, designing of flood-resistant toilets in Champaran district in Bihar, and so on. At the level of scientific knowledge, we need convergence of disciplines and a holistic review of the climate~water~energy~food nexus through the supra-sectoral approach at the governance

level as well as via a robust community response.

Providing an outsider's view on the 'nexus' in question, **Mr Klas Eklund**, *Senior Economist, Sustainability, SEB*, and an eminent Swedish economist, stressed on the interconnection between water, energy, and food. He started by emphasizing how production of food can threaten the very life that food is supposed to support if food production is based on fossil fuels and if it wastes water. This is more so since India has huge population growth, is coal dependent, and is characterized by low per capita income. The combination here implies that that India, more than any other country in the world, must be able to on the one hand make energy use more efficient while simultaneously move over to using renewables. Interestingly, this needs to be carried out keeping in mind the growth in population and production of food. This is extremely important in the light of the fact that India (along with Bangladesh) is one of the most vulnerable countries in the world when it comes to climate change, primarily due to the low lands and the rise in sea level. He emphasized on resolving the problem through a convergence of disciplines and an analysis of the entire value chain from start to end as well as the interconnections between water, energy, and food. The economist's solution to the same is to try and calculate the long-term effects of different kinds of policies

and translate these into changes in relative prices today. This can vary from one country to another because it presupposes statistics and knowledge about the future, technological change, and can also be difficult to oppose at the political level. In the context of relative price change, it would be much more profitable in the long run to use solar-powered irrigation since it implies the double dividend of higher production and lower emissions at the same time. Waste can be transformed into fuel insofar as biogas is used for transportation, cooling, etc. An important component in this entire discussion is finance and herein microfinance works better for small/semi-small projects and slightly larger projects. In the long-term, I believe, green bonds are the answer for big projects in terms of exploiting or using the capital market; of course, an in-depth understanding of their purpose is essential. In order to sum up, for me the most important solution to tackle the nexus is relative pricing, thus, leading to innovation technical change and green finance.

The Session Chair added how in India, the nexus becomes complex due to mass subsidies and cross subsidies as well as the enormous political difficulties in attempting to use price signals for the desirable outcomes and theories.

Next, **Dr Keywan Riahi**, *Director—Energy Program, IIASA*, reiterated the existence of

multitude linkages in the energy, water, land nexus and provided examples to support the same. Water is required for energy and so, our thermal power plants require water for cooling; at the same time, there exists thermal pollution because any thermal processes that require cooling also discharge heat. It is in this context, that renewables are put forward as an option or solution. It also needs to be recognized that many of the renewables require water although some actually require more water than the current fossil alternatives. Hydropower requires water due to evaporation while biomass requires water if it is grown and this might leave us with options such as solar PV and wind which do not create some sort of trade-offs within this nexus and can provide energy at lower emissions not only low greenhouse gas emissions but also low pollutant emissions. Thus, creating one solution might create a problem in another direction. He emphasized how the nexus area requires an integrated approach/a systems approach which tries to evaluate different options from all the available criteria. And this poses a challenge for research—since the different criteria have to be aligned—and for policy making—since policy making usually tries to focus and resolve one problem at a time. If problems become too complex, they spread thus, making adoption of integrated solutions difficult. He emphasized

how within this nexus, it is critical to identify such options which create win-win solutions in contrast to those options that create some of the trade-offs. These synergies and the nexus itself is very important because water, energy, and food usually rank high in terms of policy priority compared to other long-term problems like, for instance, climate change. He emphasized on the importance of the Paris Agreement and reduction of the 2°C clause but in the light of long-term ambitions, described the clause as insufficient. In order to find solutions that might help to strengthen the climate policy, it is very important to consider these synergies since these can incentivize climate-friendly solutions which are also progressing on the water, energy, and sustainability fronts while simultaneously solving the climate problem. The synergies are also important insofar as the historical perspectives are considered while thinking about future solutions. For policy making, this implies that solutions need to be linked more with science, also in terms of modelling and economic analysis. He mentioned about how India possesses tremendous capacity in terms of excellent economic and systems analysis and modelling. Solutions which converge on the common ground of the government, scientists, and sectoral stakeholders need to be identified.

Thereafter, the Session Chair spoke about the

importance of rigorous analysis of the systems approach and how within India, there exists an enormous challenge for research on a sub-regional or a geographical area basis on the details of the nexus.

Commending TERI on the incredible themes for discussion, **Mr Ravi Singh**, *Secretary General & CEO, WWF-India*, emphasised on India, in particular, and how there is a need to work more on the water aspect. Describing his stance as a bias, he reiterated that the inflection of the bias, read as a resource as well as an advantage, has to be water since the problem is manageable as of now. He added the component of ‘biodiversity’ to the interdependency water, food, and energy and defined it as an indicator of the health of the planet, country, and the ecosystem not just because of its representational value but also because of its natural corollary as far as ecology is concerned and as a guide to man’s place in the process of evolution. He also mentioned about the role of industry, government, societies, communities, and individuals in the nexus. In particular, the increasing role of industry, both from the production and consumption point of view and contribution to the domestic and global economy.

He emphasized on how it is time that we as partners guide business and industry in a stewardship towards water, environment, and

supply chain vis-à-vis the agro industry and the energy aspect, And this can be a tremendous leveraging solution to ensure better production and better environmental behaviour besides innovations. He also shared his thoughts on the importance of ‘responsible consumption’ and the transportation and management of waste. In this regard, he described the India’s responsibility and leadership—both in the subcontinent as well as in the region—and the parameters of action on the same. India’s consumption pattern and the energy perspective are followed closely by its neighbours. So, there is a high degree of consonance, learning, and transfer of the numerous solutions/policies between India and its neighbours. The basis of the foundation of the Indian civilization is one of the significant aspects. He mentioned about how millet is a significant crop in the Indian context since eight rotis of common flour and two rotis of millets are sufficient for survival for the rest of the day, although taste for the latter is acquired in nature, therefore there is a need to discover it more and see more practically. The threat of biofuels as far as encroaching onto areas will compete for food and there is a need to be careful for the same. As far as the finance sector is concerned, the leadership of certain institutions in India via green bonds and the sectoral leadership of organisations like NABARD who have tried to

bring in end solutions are important and need to be studied and taken forward. Millions of new developments in energy, water, and watershed management are taking place in India and communities, industries, and NGOs are coming forward; however, it is important to carefully certify the successes. For instance, the role of the solar pump in irrigating lands owned by rich farmers and emptying out aquifers at a time when there is a need for water for other communities and other places is something to study and monitor carefully. Finally, he mentioned how waste management is being used for generation of energy and power. Hence, the pricing of power as far as these projects are concerned must follow a different method and the offset should be varied as well because it combines two aspects—one, it is producing energy and the other is it is managing waste. So, management of waste must have a way of being priced separately. Finally, he spoke about close understanding of the traditional Indian way of life wherein we look at our old water management systems, the way food was stored, transported, and consumed, and also the way our houses were traditionally designed such that these may serve as an inspiration for the rest of the world.

The Chair highlighted the emphasis placed on water and millets as described by Mr Ravi Singh

and spoke about change in fashion, food, taste, specific policy instruments required both at the national and global levels.

Thereafter, a Q&A session was initiated by the Chair and a couple of questions were raised. These revolved around the future of organic farming in India; tackling the challenge of decreasing area under millet production; whether payment of ecosystem services has worked to break the nexus under question in other developing countries; the interdependence of agriculture, farming and livestock, and desirability of modern equipments, significance of cattle in modern-day farming, etc.

On the question of the meat industry being the most polluted in future, **Mr Klas Eklund** responded by citing the importance of relative pricing. Meat production utilizes a lot of water and produces many greenhouse gases. However, now with some kind of tax or emissions fee on greenhouse gases, it becomes more expensive and less profitable and so, meat production pays more its effect on climate and land. Thus, there are some ways to actually alleviate the problems being discussed.

On the question of millet production, the panellists shared how in the light of huge focus on wheat and rice, millet as a traditional staple has been neglected along with its many varieties has been lost. So, in the recent upcharge of

interest in millets, attempts have been made to bring back many varieties of small millets, along with its inclusion in public distribution system (PDS), however a lot more still needs to be done in terms of high use scale up millet production. In addition, there is an interest in the private sector in millet as a grain in the form of ragi biscuits for diabetes and weight control.

In spite of all the advantages attributed to millets, there are a few blocks to be overcome, such as dehauling millets, scaling up production, developing supply chains, usage of appropriate farm equipments (in the case of millets, hullers are best suited for small landholdings), etc.

The Session Chair concluded by observing how in India policy options are significant and using the price signal rationally is a good principle to adopt but difficult to implement since the required political and social consensus for the right kind of decisions on pricing is tough to achieve. So, creativity on signals which are non-price related or those which are price related pose a huge challenge. He also acknowledged and expressed his gratitude to the panellists for their presence and analysis.



SPECIAL ADDRESSES





Special Addresses

In the special addresses, the chairman introduced the honourable Suresh Prabhu, union minister of railways and Mr Pawan Chambling, the honourable chief minister of Sikkim, and Dr Ajay Mathur, director general of TERI. Dr Mathur introduced the guests.

Dr Mathur's opened his speech by welcoming Mr Suresh Prabhu and Mr Chambling for agreeing to mentor the session. Both Mr Prabhu and Mr Chambling have achieved an enormous milestone in making the country more sensitized towards sustainable development. While Mr Prabhu led us to the critical point where we began talking about the perils of climate change before anywhere else, it is to Mr Chambling's efforts that we owe the joy of having Sikkim as the first organic state of India.

Mr Prabhu opened his address by emphasizing the importance of the summit. As an event that has materialized after two important global events, this is particularly important as it be helpful in charting a new course to the strategies that need to be implemented. In the wake of the global events, one where the perils of climate change is no longer restricted to academic papers and the other where global leaders have accepted the new sustainable development

course, the need and purpose of the summit is indeed rather appropriate. With regard to the three Ps—people, planet, and progress—Mr Prabhu proposed adding two more, pollution and population. The two were linked such that if we manage to check our population growth, pollution will automatically reduce. It is also important that this first summit is taking place in New Delhi as the climate change framework wouldn't have been a reality but for the prime minister's strong support, participation, and leadership. A similar summit would not have been possible in Paris, which is another P, but the concerns of the summit would not have been a reality had it not been ratified by India and its leaders. This no doubt is a great achievement and we look forward to implementing it. It has taken climate change a long time, passing through tedious, different phases, to get taken seriously as a global challenge. Mr Prabhu gave the following short description of the phases. In its initial phase climate change emerged as viable topic of discussion. In its second phase it became a serious discussion which involved sceptics. In its third phase the scepticism tuned into euphoria which resulted in a big climate change summit—the COP—in Denmark. In its fourth phase it took

a backseat as compared to the economic/bank trouble that came about in the 2000s. Finally, in its present situation, because as a global challenge left unattended to, climate change has steadily grown to become a formidable challenge in need of immediate action. As was established by the business sessions earlier, the topic of discussion was centred on devising strategies to deal with the situation. Business cannot be an adversary, an segregating factor, business cannot be the villain of the peace either, business has to and must be a partner in bringing together different sectors and devising strategies and only then can the results show.



Mr Prabhu was happy in congratulating Mr Chamling for bringing in sustainability at the forefront of a public policy thus making Sikkim one of the best states in the country. Not many states have been able to achieve that, and one can have a sectoral approach to sustainability but in Sikkim one can see how it has been interwoven into the public policy wherein it has become the overarching concern of not just the administration but has become a concern with people as well. This in no uncertain terms is the reason of the policy's success. Surely no law or policy can enforce belief amongst its people. In the case of Sikkim, it is truly commendable that sustainability has become a state-wise concern whereby a proper business model has been put into place. Speaking specifically with regard to railways, Mr Prabhu affirmed how sustainability and railways are parallel tracks that need to be simultaneously attended to so much so that in

the absence of sustainability, there can be no speaking of railways. This, however, needs to be established beyond doubt with action. For this reason, for the first time, the position of an environment directorate has been created. However, creating this position is by no means a way of driving the issue to a neat closure. In order to elaborate the necessity of taking action, Mr Prabhu quoted the example of Hyderabad where one of the offices of the seventeen zones is headquartered. As per the general manager, a 200-year-old restored well turned out to be a massive relief not just in terms of meeting the water demands but also economically as it saved the department a staggering Rs 200 crore every month! The purpose is to recycle, reuse, and most importantly restore. Unless the water bodies have been replenished with the quantities that have been depleted, we cannot come close to solving the water scarcity challenge. Quoting the drought-affected area of Latur, Mr Prabhu talked about how a situation where if the railways was asked to supply water to other areas as well, would it be able to do so? It is in this context that the idea of restoring water to the water bodies was developed. In addition to this, the railway department has undertaken the responsibility of planting at least 50 million trees. Steps have already been initiated in this direction and state and state forest departments

have been brought on board to carry this out. Care is being taken to plant a variety of trees of which a few will be medicinal as well; plants that are endemic to a region are being preserved and planted more in number as opposed to planting



species that are exotic. Additionally, the railway department has also started conducting energy audits and started reducing the cost of electricity. Solar energy is also being harnessed to meet the growing energy demands. Solar rooftops and PV panels have been put up in many places and a few trains have also been set up with these on an experimental basis. It was encouraging to learn that the railway department has started a movement to clean all its station; it has collaborated with the municipal bodies to carry out this task. The idea here is to convert waste to energy and for this to occur, a critical mass of waste needs to be generated. One needs to collaborate with municipal bodies to extract all the waste for conversion. In his concluding section Mr Prabhu, before opening the stage to Mr Chambling, once again expressed his joy at the joint efforts taken to turn sustainability in to a year-long concern in Sikkim.

The session chairman thanked Mr Prabhu for speaking and invited Mr Chambling to speak next.

Mr Chambling opened his speech by addressing the gathering and outlining the broad areas that he wishes to cover. The fact that Sikkim has worked with the concept of sustainability at the grassroots level has received widespread attention is rather encouraging and, for this to become a trend, states must attempt at

understanding the methodology. This is the ‘success story’ that he wishes to speak about at the present gathering. By definition, sustainable development is the means that meets the needs of the present without compromising on the ability of future generations to do the same. Sustainable development has to be nature friendly and Mr Chambling is of the firm belief that it cannot be achieved until and unless it ensures the protection of the environment. However, it is ironic that today in the name of development we are responsible for polluting the very air we breathe, the water we drink, and the food we consume. Forests are being destroyed with the immediate effect of increased carbon dioxide levels in the atmosphere. Our ruthlessness towards the environment has often resulted in natural calamities, such as landslides, floods, and climate change which have finally become global concerns. It has been reported that the height of the mighty Mount Everest, too, has decreased. For centuries nature has been misused as a commodity that can be exploited at will. With increasing pollution, our water bodies are becoming poisonous and many animal species are on the verge of extinction. Our water, forests, and land have been merchandized; the deadly paradox in this case is that development—the yardstick of measuring success of cities, economies, and people—has become the reason



for this massive destruction. Mr Chambling further talked about the situation and, if it is to improve, this war between man and nature must first be brought to an end. In today's competitive modern world, everyone seems to be vying for economic prosperity at the cost of the environment and this struggle is accelerating the destruction of the balance in nature. The race amongst nations for global supremacy has proved to be detrimental for the overall development of mankind. The resources of the smaller and economically backward countries have often been determined by the might of powerful nations. Such an unfair context hampers and disrupts the very spirit of sustainable development. It is time for the world to face the reality—we cannot create our natural resources, they can only be conserved and protected. It is time we begin replenishing what has been depleted and destroyed for our selfish needs. We all have a part to play; small actions taken collectively can lead to real change. It



should be our goal to be environment friendly in every possible way including our lifestyle, our way of thinking, as well as the policies and programmes that we devise and implement. Mr Chambling then shared an anecdote from the time when he first took over the reins of Sikkim's administration and had to make the difficult decision between choosing the need to nurture its environment and preserving its greenery and sparing nothing for its economic development. Both were equally important but seemingly contradictory. At the end, there was really no option. The priority was to become eco-friendly. The state along its people created a new foundation for the development and remained firm against all odds. Despite questions, doubts, and criticism being raised, the new administration remained firm in its resolve to make Sikkim a grand success story it is today. What was envisioned in 2003 came to pass only recently and is truly a remarkable feat. There was no success story to replicate and no technical



machinery to fall back on; it was a self-sustained process because no other state or country had done it successfully before Sikkim. With chemical fertilizers and pesticides, the farming community had little courage and conviction to accept organic farming as a viable alternative farming practice. A historic declaration was made in the Sikkim legislative assembly on February 24, 2003, and ever since Sikkim, along with its people, has worked relentlessly to make it a completely organic state. On December 1, 2015, 13 years after the declaration, this vision was realized. On January 10, 2016 the honourable prime minister formally declared Sikkim as the first and only organic state in the country. The modern system of farming was becoming increasingly unsustainable as evidenced by declining nutrient values, increasing damage to

the environment, and the spate of chemical contaminants in our soil. Therefore, the necessity of having an alternative agricultural method which protects and supports the ecosystems became exceedingly important. Our vision of organic farming is holistic, the state of Sikkim not only sees it as a step to protect its people but also a mission to protect nature and mankind and maintain a balance between the two. In organic farming agricultural practices are in complete harmony with nature; the whole purpose is to be in harmony with the ecosystems. We need balance among all living organisms and getting rid of harmful chemicals from our environment is a necessity. We believe that organic farming is the only sustainable way of doing agriculture without interfering with nature. This back-to-the-root concept is gaining momentum all over the world. If we can revive the traditional system of organic agriculture it



will help us maintain the originality of traditional farming and at the same time improve the economic conditions of our farmers through competitive pricing. Over the decades Sikkim state has been stressing the benefits of organic farming to its people through narratives that can be understood by them; in this direction the following steps have been taken: the basic need for our survival is clean air, clean water, healthy food, and a clean environment and organic farming is the only means of ensuring this. Organic farming ensures economic viability and environmental sustainability. It also generates a feeling of social responsibility amongst people. Not only is it a holistic and nature-friendly approach to protecting our environment, it also promotes soil fertility and ensures a balance between the environment and human activities. Organic farming compliments our drive in promoting ecotourism and also conserves and promotes our rich biodiversity. Following this, Mr Chambling outlined some of the milestones of our green journey which are as follows: the year 1995 was declared as Harish Kranti Varsha or the green revolution year and, as a part of this programme, free seedlings were distributed for plantation and massive afforestation drives were carried out; in 1995 a ban on pan gutka masala was enforced; in 1997 an act was passed on the provision of disposing non-degradable garbage

in public drains and sewerage. Furthermore, in the same year a law was passed prohibiting smoking in public places or even in public service vehicles in the state. On August 14, 1998, a landmark decision was taken by imposing a ban on plastic. In this regard, Sikkim is proud to be the first state in the country to take this step. In 1999, Sikkim enforced its commitment to preserving the environment by launching a scheme called Smriri bans that aimed at developing vast stretches of barren land in to green belts. From important government officials to the local villagers, everyone was involved in the movement. The period starting from 2000 to 2010 was declared as the Harit Kranti Dasa or the green revolution decade. As per this, grazing in forest lands was banned and in 2001 statutory rules were implemented for the mandatory planting of 10 saplings in lieu of every tree that was felled in private holdings. The scaling of Kanchenjunga and other scared peaks has been banned and the development of sacred lakes for commercial purposes has been taken up. The long-pending ban on the killing of wildlife was enforced. Rural households were given free LPG connection in order to prevent cutting of trees for cooking fuel. In 2002 schools across Sikkim started eco-clubs; additionally, eco-development committees started a wildlife advisory board and the state medicinal plant boards were constituted

the same year. Pangolakha Wildlife Sanctuary was also created in 2002. In 2004, MG Mark Gyan in the capital of Sikkim was declared a litter- and spit-free zone. In another significant move, environmental education was introduced in schools. Kitam reserve forests in south Sikkim was declared as Kitam bird sanctuary. The year 2006 is another significant landmark in our journey. In this year, the state green mission with a state-level green mission committee, and a constituency-level green task force was launched. The Sikkim state biodiversity board was established and guidelines were laid down for the conservation of lakes. In 2007 the state board for wildlife, which was followed by the constitution of glacier and climate change commission, was created. The state pollution control board was constituted in 2009. Also in 2009, a unique programme called Ten Minutes to Earth was started. This programme is the first of its kind and ever since it was first broadcast ten minutes have been dedicated to plant trees. On June 25, all Sikkimese plant one sapling and a preannounced 10 minutes is dedicated to this purpose. In 2011 a mission called the Chief Ministers of Forestry and Environment was launched with an aim to make all citizens environmentally conscious. The chief minister's green school rolling trophy was also instituted to encourage a pro-environmental conservation

spirit amongst the students. In the same year butterfly sanctuaries were created at Lakshap in west Sikkim, Sankalan in north Sikkim, and middle cam in Sikkim. In 2012 the ecotourism policy of the state was formed. In 2014 while a ban was placed on the sale and bursting of fire crackers, Sikkim was the first to implement it. In 2007 a ban was issued on the use of diclofenac sodium, and in 2015 a ban was issued on the burning of agricultural waste. In 2016 all the old trees in government forests were identified as Sikkim state heritage trees. The Rathanchu hydel electric project in west Sikkim in 1995 was closed and the firing range Gee was abandoned which had a total area of 27,000 hectares in north Sikkim. In the year 2013, a ban was imposed on the use of styrofoam products; a ban was also issued on scrap tyres. Sikkim has also received worldwide recognition when the Kanchenjunga national park was declared as a world heritage site by UNESCO. Under the mixed criteria for natural and cultural significance, this was the first such recognition in the country. After all these years of struggle the total forest cover of the state has increased by nearly 4 per cent from 43.95 per cent in 1990 to 47.80 per cent today. The objectives of sustainable development cannot be achieved without ensuring larger participation empowerment and social mobility from all

sections of society; people in the lowest rungs of the social and economic ladder should be our focal point. The upliftment of the marginalized and underprivileged should be the cornerstone of sustainable development. The preciousness of human life is central to our governance and Sikkim's social engineering is unique in many ways. Sikkim prides itself in being safe for all and the policy of inclusive growth is the driving force in the attainment of sustainable development. In order to maintain strict adherence to rules and regulations, Sikkim state has been stringent in issuing penalties to offenders. Fifty per cent of reservation is provided for women in the urban and local administrative bodies as well as the gram panchayats; 30 per cent reservation is also provided in government employment opportunities for women in Sikkim. Women enjoy full inheritance rights to parental properties; furthermore, for the socially backward classes, the state has made provisions for reservations in urban and local bodies, panchayats, and in government employment opportunities alike. Folk healers and practitioners of animistic tradition are honoured by way of a monetary honorarium of Rs 600 and are given the title of Samajik Batta. The pursuit of generating a greater quantity of green energy through hydropower power is ongoing and industrial development is based on the policy of

promoting clean and non-polluting industries only. Duly respecting the natural right of its people, the basic needs in terms of food, clothing, and shelter along with achieving primary education for all have been an additional matter of pride for the state government. It is also important to note that in Sikkim there is no extreme poverty. Sikkim is also the only state in the country which gives free education up to college level. Gender disparity in Sikkim is a thing of the past. In fact the number of girls being enrolled in schools is greater than boys. Sikkim has impressively reduced child mortality. In terms of gender equality, women hold equal space in state administration and the work place.

Sikkim has created new benchmarks in terms of diversified development measures to bring about holistic progress and prosperity in the state. Models have been created to prove how well one can live and coexist peacefully with nature while also working towards economic development. Today, as stated earlier as well, Sikkim is the first greenest state, first organic state, first nirmal rajya, first to start capacity-building programmes, and livelihood schools. It is also the first in land use and conservation, first environmentally friendly state, safest, and most peaceful state, first state to provide free education up to college level, first state with the lowest BPL population, first state to ban wildlife

killing, the use of plastic, the sale and bursting of crackers, first state to achieve the highest density of roads, first state to constitute youth commission, first state to get selected by Lonely Planet as one of the top 10 places in the world to be visited in 2014.

Mr Chambling after recapitulating the state's achievements humbly requested the global community to adopt some of its green methods. If these green initiatives are replicated on a global scale, we will not only be able to cope but eventually overcome some of these global environmental challenges. For a start we can try implementing the following steps: one, as per the annual Ten Minutes to Earth programme, if each person worldwide plants one sapling, it would add an additional seven billion trees; two, under the Smiriti Van programme we can sanctify our land and forest by planting saplings in the memory of our near and dear ones and as a mark of respect to our local deities. If this could be taken up as a worldwide resolution it would serve a method for gaining the much-needed ecological balance; three, policies, such as the global ban on killing wild animals, use of plastics and styrofoam products, felling healthy trees, grazing in forest lands, burning agricultural wastes, and bursting of crackers will bring about a long-term change in our ecology; four, formulating and implementing environment-

friendly development policies. These must be taken extremely seriously at the global level. Five, the women-environment conflict is the biggest hurdle in the way of sustainable development; therefore, inculcating nature conservation should be our biggest priority as this is the only way forward for us. In this direction, compulsory incorporation of environmental education in school curriculum will be an apt start. Students are the most powerful agents of change and they are also the future leaders who take the baton from us.

In his final green initiative suggestion, Mr Chambling shared his wish list with the globally acclaimed environmentalists and leaders. He advocated for the following: ban the production and use of non-biodegradable agents, develop a completely organic and chemical-free industry, become free of poverty, hunger, discrimination, and illiteracy. We must resolve to change our consumption-oriented lifestyle to a thought-oriented lifestyle. We must start aligning our thoughts and behaviour with nature conservation and become environment friendly in all our actions. We must turn this planet into a safe place for all living beings, and finally, we must reintroduce environmental purity back to our depleted ecosystem. With these points of implementation, Mr Chambling closed his address to the gathering.



CULTURAL EVENING









THEMATIC TRACKS





Realizing the electric mobility vision



The world is looking forward with Paris agreement towards limiting global warming to 2 degrees and tackling air pollution as a major health hazard. Globally, transport is responsible for 23% of the total carbon emissions and electric mobility has come out as a sustainable solution to tackle this problem. Recognizing the need for penetration of electric vehicles in developing countries, TERI organized a thematic track on the topic- “Realizing the Electric Mobility Vision”, on 7th October 2016, under the World Sustainable Development Summit.

Welcoming the Guest of Honor and the Esteemed Panelist

The session was inaugurated by TERI’s Director General, Dr Ajay Mathur and the session

was chaired by Mr. Shri Prakash, Distinguished Fellow, TERI. The guest of honor was Shri B.K. Chaturvedi, Former Member, Planning Commission Government of India.

Inaugural Speech by the Guest of Honor

In his inaugural speech, Shri B. K. Chaturvedi highlighted the importance of the Paris Agreement and the need to abide the air quality regulations. Out of the 20 most polluted cities of the world, having poor quality air, 13 cities are from India. He further discussed the challenges that the growing Indian economy is facing, such as rapid urbanization, increasing number of vehicles and lack of efficient public transport system and degrading the air quality in urban areas. He emphasized Electric Mobility (eMobility) as a

sustainable solution to these problems. While, mentioning about the Paris Agreement, to switch to 40% renewable energy, he talked about India's mission to establish e Mobility through the NMEM (National Mission Electric Mobility) and the FAME (Faster Adoption and Manufacturing of Hybrid and Electric vehicles) scheme to incentivize eMobility purchases. He ended his key note speech with two suggestions; first, making the e-transport system attractive for the consumers, by providing charging infrastructures and second, by working on improving the battery technology, through Research and Development, to reduce the battery costs.

Opening Presentation on the need for the advent of Electric Mobility in context to the Indian market and the Barriers faced in the propagation of the technology.

The session began with Mrs. Akshima T. Chate, Fellow, TERI, highlighting the important barriers faced in the penetration of Electric Vehicles (EVs) such as upfront cost of vehicles, absence of supporting infrastructure and lack of consumer awareness. She further opened the platform for the panelist to discuss innovative solutions to address these challenges and accelerate penetration of Electric vehicles. Mr. Shri Prakash, talked about the importance of electric vehicles and their contribution in the reduction of air pollution. He said that well to

wheel emission factors should be taken into account for a more holistic approach.

Discussion commenced under the supervision of the chair Mr. Shri Prakash, who distinguished the subject into three different perspectives for the audience to understand electric mobility as a sustainable solution.

Global Perspective: Mr. Andreas Klugescheid, Head of Steering Government and External Affairs, Sustainable Communications, BMW Group, talked about the global perspective towards electric cars. He said that "The World around us is changing faster than before and vehicle manufacturers have to change the way too". He showcased the increase in popularity of Electric vehicles in USA, Europe and China. BMW is expecting the same enthusiasm of electric



vehicles in India. He recommended monetary incentives such as tax benefits and subsidies to promote electric vehicles. He also advocated non-monetary incentives for instance, separate lanes for electric vehicles, free parking spaces and carpooling system. He further cited case of Copenhagen business model ARRIVA, which projects smart future integrating carpooling with smart phones. Mr. Emmanuel Flahaut, Deputy Head, International Partnership of the French Commission for Atomic Energy and New Energy, encouraged focus on infrastructure developments like solar charging stations for electric vehicles. Mr. Kai Fuchs, VP, Industry, Volvo Buses India Private Limited, insisted electric mobility is not confined to 2 wheelers and 4 wheelers but to e-buses as well. Further he mentioned, for school busses that operate for limited period of time on the same route, charging infrastructure could be provided in the schools itself.

Government Perspective: Mr. Abhay Damle, Joint Secretary, Ministry of Road Transport and Highways gave government perspective towards electric mobility propagation, initiatives and concerns in Indian context. He highlighted that India has a large amount of urban centres with a population of 0.5 million (approx.) per centre, and require a large amount of intra-city commute on daily basis, does provide a flourishing market for the Electric Vehicle.

India being a power surplus country and having ambitious targets to increase its distribution capacity provides an excellent opportunity for Electric vehicles introduction to the urban diaspora. Despite such large scale potential for the successful penetration of Electric Vehicles in the Indian Market, Mr. Damle, said that there has been a delay in its introduction to the urban platform. He mentioned that this delay could be due to lack of demand for such vehicles or the issue of affordability. He pointed out reasons for the delay, such as the lack of innovation in the Research and Development of battery technology and added the need for revolution for the same. Cheaper and more efficient batteries can boost up the sales. He also added that the





support of charging infrastructure is of utmost importance to increase the vehicle kilometres. While talking about the target market, he said that four wheelers are the major contributors of urban air pollution (about 50%) and suggested that Electric Vehicles will help in reducing the percentage contribution of these vehicles. He urged the 2 wheeler manufacturers to bring in innovative solutions to replace these vehicles with their electric counterparts, given that India

is the 2nd largest global producers of 2 wheelers. Moreover he emphasized use of electric two wheelers and three wheels for intra-city travel which will result in substantial difference in improving the air quality and reduction in carbon emissions. He encouraged private companies to come up with innovative business models for the accelerated penetration of Electric Vehicles, and gave an example of electric taxi, that will be provided with free permits and free charging at parking lots.

Industrial Perspective: Mr. Sohinder Gill, CEO-Global Business, HERO ECO and Director-Corporate Affairs, SMEV (Society of Manufacturers of Electric Vehicles) while talking about industrial perspective described the Indian market to be favourable for the electric vehicle propagation. He suggested that two wheelers are the most purchased automotive commodity





by the Indian consumers and innovations in this area in the form of electric vehicles would result in positive outcomes. He said that India needs a tailor made solution, a nudge, to plummet into Electric Vehicles. He encouraged e-commerce businesses to switch their logistics (2 wheelers) to electric 2 wheelers. He further advocated grants of subsidy on the second lion battery to assist Electric Vehicles buyers, and promoted fast charging points for electric mobility. Dr. Tapan Sahoo, Sr. Vice President, Engineering, Research, Design & Development, Maruti Suzuki India

Limited, on similar grounds discussed about 5 E's in order to overcome barriers of e-mobility such as energy & enthusiasm, education, effectiveness, enablers, environment and energy security.

Conclusion by the Chairman: The session highlighted the need for innovative solutions to overcome barriers of e-mobility and development of successful partnerships to bring about a revolution in the field of electric vehicle integration to the urban transport system in India.



2nd India-EU Water Forum

Thematic track on India-European Union (EU) water forum focused on the key water management issues in India. The main focus was on cooperation between EU and India to better manage the water in India. The deliberations during the forum focused on the unregulated over-exploitation of water for agriculture, industry and domestic purposes. It was highlighted during the forum that partnership between India and EU could help in exchange of knowledge over water and river basin management. The deliberations pointed out the available best practices with a public-private partnership which could be an approach for increasing water use efficiency and optimal use of groundwater. Speakers from EU shared their experiences and expertise in the forum from various projects which EU has

completed in India and also from many projects which are in the implementation phase. The forum stressed on the exchange of knowledge which is the most important aspect. There is need for adopting multidimensional approach including interventions like rainwater harvesting, groundwater recharging, and enhancing water use efficiency with the cooperation of all the stakeholders.

Session I

Dr Mathur, Director General TERI welcomed everyone. He talked about the Memorandum of Understanding (MoU) that was signed between India and EU in the WSDS 2016. He stressed that there is a need to move forward as per the terms of cooperation of MoU and this forum is





the best platform to initiate the talks. He pointed out that next step of India-EU partnership should be on the implementation side. He also emphasized on the fact that water resources have become stressed today and in future it will become a frightening issue. He highlighted the issues of water stress which is a global issue and stressed on developing the strategies and policies to overcome the water related problems like unregulated exploitation and wastewater management. He talked about some of the common challenges in the water sector like over-exploitation of water, incomplete access to water and mentioned that he is optimistic that these challenges can be overcome by the partnership with the EU and India in various water sectors.

Mr Vella, Commissioner for the Environment highlighted that EU has good relations with India not only related to trade but also related to the environmental issues. He also highlighted that climate change is one of the biggest issues to deal with and within it water is on the top priority.



Mr Vella pointed out that India-EU partnership will cover the issues of water management and will deal in operational mode. He mentioned that integrated river basin management is also an important issue where we have to work in cooperation with the neighbouring countries. He highlighted that there is a need to solve the water problems with the economic plan and together India and EU can develop an integrated plan.

Dr Singh, Ministry of Water Resources, River Development & Ganga Rejuvenation, highlighted key water issues in India and potential areas of cooperation between India and EU. He pointed out that the over-exploitation of water has put immense stress on the water resources and is also affecting their quality. He mentioned that there is an urgent need for management of water resources, promoting optimal use of groundwater, mapping of aquifers and river rejuvenation.

Dr Sarkar, Director - Water Resources & Forestry Division, TERI, in his concluding



remarks highlighted the importance of EU-India water forum and pointed out how this partnership can help to solve some key water issues and help in better management of water resources. He pointed out that institutional cooperation, policy framework and an integrated approach are the best possible solutions to manage the water resources for the future generations.

Session II

Ms Astrid Schomaker, Director Global Sustainable Development, DG Environment,

European Commission, highlighted the water challenges faced by the EU and how EU have answered such challenges. She mentioned that tackling the water challenges in India is a huge task. She pointed out that 50% of the water quality is degraded in EU by agricultural runoff and industrial pollution besides that EU is facing drought more recurrently. She also discussed about the river basin and river sharing situation between EU countries and how it is being managed with bilateral and multilateral cooperation and how such cooperations can be a

success story in the Indian context. She informed that the India-EU partnership is for initiating dialogue with business communities and finding ways to bring investment from banks.

Ms Martina Burkard, Director of the Competence in Motion Unit, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH shared her experience on the promotion of integrated river basin management approaches for the rejuvenation of the Ganges River. Her presentation started with enlisting the main activities at the national level under the Indo-German partnership. The focus of the project was mainly to exchange knowledge between the two countries in the field of river basin management, improving the existing data management systems within National Mission for Clean Ganga (NMCG), and implementing public outreach campaigns to raise awareness for Ganga river rejuvenation. She elaborated on the state level activities for Uttarakhand in which the main activities were capacity building and developing solutions for industrial effluent management, wastewater and sewage management, and public toilet management.

Mr Anshuman, Associate Director, Water Resources & Forestry Division, TERI, highlighted TERI's experience in the domain of water use efficiency in industrial sector and talked about aspects of wastewater recycling

and reuse and how it can be linked with SDGs and INDC. He mentioned about the challenges and opportunities related to enhancing industrial water use efficiency.

Mr Kees Bons, Deltares, highlighted on EU business providing solutions for integrated water resources management in India. He pointed out some of the key issues related to water resources such as sea-level rise, unpredictable precipitation patterns and extreme water levels, land subsidence and pressure on space and the environment. Indicating that these problems need new technological and innovative solutions, he mentioned various ways by which Deltares has been taking different and innovative steps in strengthening the solution and implementing technology throughout the globe. He briefed about the open software philosophy at Deltares and the various countries having drawn solutions from a premier institute like Deltares. He talked about the solutions provided for Singapore Marina Bay, Palm Island at Dubai, and Flood forecasting in the USA and illustrated the activities under Strategic Basin Planning for the Ganga in India.

Mr Stef Koop, KWR Watercycle Research Institute, expounded the concept of City Blueprint Approach and mentioned current and future issues in cities related to water, sanitation, human health and hazards, especially in the on-

going scenarios of urbanisation and changing climate. The blueprint analysis helps in assessing various aspects of a city such as its challenges, existing water management practice and scope for improvement. Illustrating the methodology, in brief, he presented Blue City Indices for a number of cities spread out in different parts of the world and showed how specific limitations in a city's water governance can be found out using the method and encouraged the use of such methods for other cities.

Mr Bastiaan Mohrmann, Co-Head Asia and the Middle East, 2030 Water Resources Group, highlighted the challenges for implementing better water management strategies. He pointed out that 80%-85% of water is consumed in agriculture and if this water is managed a lot can be done for other sectors with respect to water. He mentioned that India has an important agenda of feeding its growing

population and with the stress on agriculture sector; agricultural water footprint is increasing many-folds. There is a need that the agriculture and water community should work together for the better management of agriculture water and he suggested that India-EU partnership can help bridge the existing gap between water and agriculture communities. He highlighted that lot of money has been spent in the water-agriculture sector for development of water conservation and other related infrastructure but not much has been done to improve the water use efficiency in the agriculture sector. He stressed on developing cooperation with agriculture community for water conservation and thus reducing the stress on water resources.

The forum witnessed enriching deliberations from the participants and the panelist and everyone echoed the need for the cooperation and to learn from each other's experiences.



Achieving Sustainable Development Goals: Challenges and Opportunities for Urban India

The thematic track on “Achieving Sustainable Development Goals: Challenges and Opportunities for India”, was organized by TERI in association with the European Commission. The key objective of this session was to exchange ideas between Indian and European Union policymakers and experts and explore the role of SDG 11 in realizing greater urban sustainability.

The session aimed to answer the following questions:

- ❖ How are city governments aligning their urban development frameworks with international development goals like SDG Goal 11 and India’s INDC commitments so as to achieve these targets? To what extent are the existing missions and schemes addressing the issues of SDGs and INDCs?
- ❖ What are the challenges and enablers for cities to develop and implement sustainable urbanisation?
- ❖ What are the lessons learned from the initiatives of EU cities towards sustainable urbanisation?
- ❖ How can the EU contribute towards India’s efforts to achieve SDG 11 on the development of sustainable cities and communities?



- ❖ How can cities be empowered – policy mandate; institutional and financial support; legal provisions?
- ❖ What could be the potential partnership and implementation mechanisms in the context of building sustainable and smart cities?
- ❖ Going beyond the 500 cities for sustainable urbanisation – knowledge transfer/sharing; capacity building. How do we extend the program to other cities and share the knowledge?

The proceedings of the session have been summarised below.

Welcome Address: Mr Ashok Chawla, Chairman TERI

Mr. Chawla inaugurated the session with a welcome address where he emphasized that sustainable development cannot occur without sustainable urbanisation. He commented that in the developing world, urbanisation has been translated as physical planning & infrastructure, which however, forms only a small part of the paradigm of sustainable development. He stressed upon the need for cross learning from various experiences of developed countries which have implemented robust infrastructure systems and good governance framework along with addressing the environmental sustainability in the planning approach of the cities.

Keynote Speech: Ms. Astrid Schomaker, Director of International Affairs, European Commission

Ms. Schomaker focused her remarks on the global urbanisation trends and commitment of the European Union to support sustainable urban development. She observed that at the current pace of urbanisation, by 2050, the global urban population would be the 6.3 billion, approximately double of the current urban population of 3 billion. She quoted the International Resource Panel that 52% of the urban fabric that would be needed to accommodate the population in the 2050, is yet to be constructed. She noted that the SDG Goal 11 for sustainable cities provides scope for global partnerships for knowledge sharing, technological transfer and improved financial mechanism. She deliberated upon the aspirational similarities of the Indian and European cities in promoting urban growth with an emphasis on Economic Development, Social Inclusion, Governance and Environmental Sustainability. She opined that the implementation of the New Urban Agenda would enable cities to have access to improved funding mechanism for development. She shared from experience that intergovernmental fiscal transfers were not enough but intergovernmental knowledge transfers are also needed in order to achieve the sustainable development targets for

cities. She cited the example of the on-going World Cities Project, initiated by the European Union (E.U), which brought together cities from Germany, Italy and Denmark with Indian cities, Mumbai, Pune and Chandigarh in a partnership for transfer of knowledge on the economic, social and environmental dimensions of urban development policy, governance issues relating to urban planning, public participation, regulatory matters and urban transport solutions. She concluded that a partnership with between India and E.U would be mutually beneficial for sharing knowledge and experience on urban policy, and best practices in fields such as urban transport, energy efficiency, and good urban governance, for achieving the SDG 11.

Background Presentation on ‘SDG 11 – Implications for Indian cities’- Ms. Raina Singh, Fellow, Centre for Research on Sustainable Urban Development & Transport Systems, TERI

Ms. Singh set the context for the panel discussion by presenting the current scenario of urbanisation in India and how Goal 11 of the SDGs can be implemented to best suit the development needs of the country. She discussed the 4 key focus areas of the Goal 11: sustainability of city systems, social inclusion & economic sustainability, improved quality of life and climate & disaster resilience. She shared TERI’s evaluation of the

Smart City proposals based on their alignment with the sustainability parameters to meet the targets of SDG 11. The proposals of 33 Indian cities, which won the first round of the Smart Cities selection process, were analysed with respect to 21 performance indicators built on a comparative review of existing sustainable urban development frameworks. She highlighted that while most Smart City Proposals out of the 33 winners had incorporated targets for development of hard infrastructure assets, only few tried to include soft assets, such as resilience, climate change mitigation, and inclusive planning. She concluded that these could be attributed to lack



of capacity, both institutional and financial and lack of policy mandate as well as legal support at the city level.

Panel Discussion on ‘Achieving Sustainable Development Goals: Challenges and Opportunities for India chaired by Dr. Panagiotos Karamanos, Team Leader, Technical Cooperation for Environment in India

The panel discussion was chaired by Dr. Karamanos, with eminent panellists from various national and international organizations.

Mr. Hitesh Vaidya, Country Manager, India, UN Habitat discussed the focus areas of the upcoming New Urban Agenda at Habitat III in Quito. He noted that the New Urban Agenda would act as a guiding tool for setting global targets and providing direction for urban development for the next 20 years. He

also observed that biggest challenge for India, in achieving the SDG 11 would be the gaps in governance framework which need to be addressed. He added that the implementation of the New Urban Agenda would determine the successful adoption of the SDGs.

Mr. Pedro Ortiz, distinguished International Metropolitan Expert noted that the rapid pace of urbanisation in India requires the urban planning approach to be more aligned towards sustainable development. He observed that the mandates of the Habitat III set forth a comprehensive approach for planning of modern metropolitan cities to comply with the sustainable development targets. He further explored the need for cities to adopt transverse inter-linkages for effective institutional frameworks. Mr Ortiz also discussed various case studies from India and European Union to this effect.





Mr. K.K. Joadder, Chief Town Planner, Town and Country Planning Organization, Govt. of India discussed the initiatives taken by the government through centralised missions like the Smart Cities Mission, AMRUT, HRIDAY which have similar objectives as outlined in the Sustainable

Development Goals (SDGs). He also commented on the need for citizen participation in the decision making and implementation process in the fulfilment of the Mission objectives.

Mr. Tikendar Singh Panwar, Deputy Mayor, Shimla Municipal Corporation, emphasised on the need for empowerment of the local bodies both in terms of institutional roles and its financial stability to attain holistic sustainability at the local level.

This session brought out the relevance of multi stakeholder knowledge sharing approach for sustainable urban development. It concluded with 4 key takeaways that need to be addressed for achieving SDG 11 India:

- ❖ Supporting Governance frameworks,
- ❖ Social / collective resource mobilization,
- ❖ Empowering local bodies
- ❖ Participatory approach in decision-making





Open Discussion

This marked the end of the panel discussion and the chair thanked all the speakers for bringing forward a diversity of approaches and experiences discoursing on challenges and enablers for cities to develop and implement sustainable urbanisation. He then opened the floor for discussions. The discussion revolved around the following points:

How are the various initiatives by the Govt. of India working towards achieving the SDGs?

Mr. Vaidya responded that till now SDGs could be looked at as aspirational goals. However, they needed to be contextualised in the Indian scenario, by the aligning of the targets of the Centralised initiatives such as Smart Cities Mission, AMRUT, HRIDAY with the goal 11.

What is the methodology adopted in the implementation of SDG 11 in India, which involves an urban planning approach that is sensitive to the stakeholders' needs?

Mr. Joadder responded by saying that through centralised initiatives, such as Smart Cities Mission, AMRUT, HRIDAY, most Indian cities have created Special Purpose Vehicles (SPV) which are responsible for the implementation in collaborate with organizations providing technical assistance to adopt best practices learnt from global experiences for sustainable development.

Is the Smart City Mission adversely impacting for the 74th constitutional Amendment Act?

Mr. Panwar responded by saying that the 74th Constitutional Amendment empowers the elected local bodies in autonomous decision making and financial capabilities. Most of the smart cities have created SPVs which are working independently where they may or may not acknowledge the



elected urban local bodies. Thus, there is a need to make the mechanism of implementation more inclusive of local governments in the Smart Cities Mission.

Mr. Ortiz supported by saying that 1% of India's GDP is comprised of municipal expenditure, in comparison to Netherland's share which is 46%. So there is a need to strengthen the urban local bodies for effective implementation of city level initiatives.



Forests in India's INDC

A thematic Track on Role of forests in India's INDC was organized with an objective to debate the roadmap to achieve sequestration of 2.5-3 billion tonnes of Co₂ from forestry sector by 2030. The session started with introductory presentation by Dr. Ashish Aggarwal, Fellow TERI on the role of forestry Sector in India's INDC. He briefly explained the main objectives of India's INDC. Although our forest cover has increased from 2005 to 2015 from 69.02 Mha to 70.17 Mha but area under dense forests have decreased over the years. He mentioned that unsustainable harvesting of fuel wood, fodder and minor forest produce is a major driver of forest degradation in our country. Forests are major storehouses of carbon and have huge potential for carbon sequestration. Carbon Stock

in forests is 7044 MT and have further potential to sequester additional carbon. However, it is difficult to understand the rationale of the target of 2.5-3 billion tonnes of e Co₂ by 2030. It is a huge target which requires large area of land and huge financial resources, both of which are scarce. There are additional issues related to coordination, implementation, monitoring and research.

The panellists included Dr. Prodipto Ghosh, Dr. J.V. Sharma, Dr. A.K. Bhattacharya, Dr. Rajesh Gopal, Dr. Rekha Pai, Dr. Hafiz Syed and Mr. Suresh Sharma.

The panel discussion was chaired by Dr. Prodipto Ghosh, Distinguished Fellow, TERI. He expressed his concerns about achieving the INDCs communicated by India to UNFCCC. He





mentioned that there is possibility of achieving 33-35% of reduction in the intensity of GHGs per GDP by 2030 but targets like achieving 2.5-3 billion tonnes of e Co₂ sequestration from forestry sector and reducing the use of fossil fuel for energy are very ambitious. He also suggested integrating forest management and livelihood of the FDCs for achieving sustainable forest management. Dr. Ghosh highlighted the importance of social forestry for reducing pressure from natural forests and meeting country's demand for timber. He also suggested relocating people from core of the protected areas and involving them for wildlife based tourism to enable them to enhance their income which in turn will provide the sustainable mechanism for conservation.

Dr. J.V. Sharma, Senior Fellow TERI discussed on targets for achieving INDC's mandate. India has submitted a target to



achieve 33-35% reduction in the green house gas emissions along with an additional 2.5-3 billion tonnes of eCO₂ by 2030 from forestry sector. There has been a loss of moderately dense forests resulting in forest degradation. According to GOI, fuel wood is considered as a parameter for emissions in energy sector and not in the forestry sector. More than 93% contribution towards emissions in the forestry sector is from fuel wood. The two approaches to achieve the INDC's mandate are conservation & afforestation. According to TERI, an expenditure of INR 40000 million per annum is required for conservation approach keeping livelihood sustainability into consideration. One third of the target can be achieved by converting open forests to moderately dense forests with the help of assisting natural regeneration, providing livelihood to the FDCs to limit the harvest of forest produce within sustainable limit, empowerment for the

forest governance. In order to achieve this we need a financial support of Rs.100000 million per annum for assisting natural regeneration and Rs.300000 million per annum for livelihood support to the FDCs.

Around 2/3rd of the target can be achieved through afforestation on 5 million hectare non-forest land with the expenditure of Rs.600000 million per annum till 2030. The availability of 5 million hectare additional land is a big challenge. There is need to have more than 1000000 million rupees for achieving this target along with community based forest governance, strengthening of monitoring, reporting and verification and generating political commitment. One of the way to generate financial resource for

forestry sector is through creating national level market for carbon trading. The government has to take policy decision for corporates and industries to be carbon neutral.

Dr. A.K. Bhattacharya, MD, National Highways Authority of India mentioned that transport sector contributes about 5.5% to the GDP. Each % increase in GDP results in about; 1.2% increase in the freight movement and 1.9% increase in the passenger movement. National Highways constitute only 2% of road length, but carry 40% of the traffic. Environmental degradation is the inevitable consequence of highways development and operation. As per MoEF report, total expected GHG emission from road sector by 2030 will be 1212 million tons, out of which





~ 500 mill MT will be from NHs. In 2016 the figure is 400 mill MT for road sector, and 160 mill MT for NHs. For 1 km road construction, carbon emission is 160 MT, whereas for one km plantations the carbon sequestration is just 15 MT, thus the gap is too wide. To circumvent this, realising the immediate need and importance of developing green corridor around the national highways, the Ministry of Road Transport & Highways has promulgated Green Highways (Plantations, Transplantations, Beautification and Maintenance) Policy – 2015 to develop green corridors along National Highways for sustainable environment and inclusive growth with participation of community, private agencies, forest department, institutions and farmers. The Ministry aims to balance the adverse effects by investing in environment sector in order to bridge the gap between development

and sustainable development. NGHM's green corridor development program can contribute in achieving India's INDCs Targets. Approximately 4 lakh acres (i.e. 1.62 lakh ha) land will be undertaken for plantations along national highways in next ten years. Around 10 crore saplings would be planted within next ten years within these areas along national highways. Plantations will be undertaken by professional plantation agencies/ local SHGs /JFMCs/ Cooperatives/ NGOs and start-ups as per the guidelines developed by NGHM. Plantations covering 1.62 lakh hectares (i.e. 4 lakh acres) area at national highways under the national green highways policy will lead to development of carbon-neutral highways in the country. As per one research study conducted by NGHM across 10 NHs, carbon sequestration potential of the existing NH network is around 15 - 21

MT per ha/year. Green Highways projects can fill this vacuum and can be a viable option for enhancing tree cover outside forests. If NGHIM is implemented, it can contribute towards achieving 24 % of India's INDCs target from forestry sector.

Dr. Rajesh Gopal, Secretary General, Global Tiger Forum talked about role of tiger conservation in maintaining ecological balance. Tiger is an umbrella species and the reserves provide a lot of ecosystem services and the annual increment contributes to carbon sequestration. Innovative green business models were proposed by him at landscape level. We can gain a lot from top predator conservation viz. in situ vulnerability reduction and ecosystem revival.

Dr. Rekha Pai, IG Forest, MoEF&CC India said that our INDC goals are highly aspirational and they are a challenge and also an opportunity for us to look on our past management practices. She said that forestry has not got enough attention that it needed. After afforestation, regular monitoring is needed for atleast five years. Factors which are outside the forest but which impact the forest badly are also to be taken care of. Issue of energy demand should also be addressed. She quoted "Forests are all the natural resources and are entities whose value can't be determined"

Prof H. Shaeque Ahmad Yahya, Dean, Aligarh

University suggested that the forest management practices should be a mixture of both modern as well as ancient practices. He quoted "There is enough for everyone's need but not for everyone's greed".

Mr. Suresh Sharma from Seva Mandir, Udaipur focussed that people's contribution is must otherwise forest management is not possible.

After the open discussion, the consensus has been emerged on the following ways and means to achieve 3 billion tons of e Co2 from Forestry Sector by 2030:

1. Around one third of target can be achieved by converting open forests to moderately dense forests with the help of assisting natural regeneration, providing livelihood to the FDCs to limit the harvest of forest produce within sustainable limit, empowerment for the forest governance. To do so ,there is need of Rs.100000 million per annum for assisting natural regeneration and Rs.300000 million per annum for livelihood support to the FDCs . Such resources under social sector schemes will help FDCs for enhancing their income and improving the quality of forests and ecosystem services.
2. Around 2/3rd of the target can be achieved through afforestation on 5 million hectare non-forest land with the expenditure of

Rs.600000 million per annum till 2030. The availability of 5 million hectare additional land is a big challenge.

3. Since existing schemes of the forestry sector are not enough so there is need to involve private entrepreneur and to create national market for carbon trading for generating Rs.1000000 million per annum for achieving this target.
4. Policy and Regulatory regime is needed for Corporate and private sector to be carbon neutral that will create national level market for carbon trading. National level market for carbon trading will provide the opportunity for forestry sector financing.
5. Strengthening of Monitoring Reporting and Verification
6. Need to have policy change to involve private entrepreneur for the conservation, management and protection of natural forests.
7. Emphasis on research and development to enhance productivity of natural forests and development of high yielding clones for agroforestry.
8. Facilitate enabling policy and regulatory regime to promote agroforestry.
9. Promote community based forest governance and building their capacity for conservation, management and protection of forests.
10. Filling the vacancies of frontline staff and their role should be to provide technical support, MRV and regulatory for the conservation, management and protection of forests.



Dr. Prodipto Ghosh concluded the discussion with remarks that India has the potential to achieve target of sequestering 2.5-3 billion tonnes of e Co2 from forestry sector by 2030 provided we are able to generate political commitment

for forestry sector along with suggested policy interventions with the availability of additional land for afforestation and required financial resources.



Pre-COP 22 Corporate Consultation: Role of Indian Industry in Meeting India's INDC Goals

Speakers: Amb. Ajai Malhotra, RR Rashmi, Girish Sethi, Industry Representatives

Chair: Amb Ajai Malhotra

The program is being held under the aegis of India Greenhouse Gas program, an initiative of TERI, CII and WRI. Mr. Girish Sethi set the context of the thematic track with his introductory remarks on the challenges in the implementation of India's NDC goals. He also stressed on the need for measurement and management on GHG emissions in India.

Special Secretary RR Rashmi highlighted the importance of the role of Indian industry in achieving the INDC goals, especially those relating

to GHG intensity reduction, increased share of non-fossil fuel based power capacity, as well as the carbon sink targets. He also added that the post 2020, the nature of international negotiations would change towards a legally binding regime, post which the NDCs of countries would be held accountable for compliance. However, he also noted that compliance mechanism must take into account sovereignty concerns of developing countries. Mr. Rashmi also stressed on the need for careful study of the different domestic policy instruments available such as regulations and market-based mechanisms. He also outlined India's existing initiatives in the energy sector such as increasing coal cess as well as the Perform,





Achieve and Trade (PAT) scheme which seek to change consumption patterns and send a signal to the market on the price of carbon.

As far as GHG inventory is concerned, the special secretary added that the development of emissions inventory for India is currently purely on a voluntary basis and that by 2020, there is a strong need for a functional and state-of-art National Inventory Management System (NIMS).

Amb. Ajai Malhotra noted that the climate discourse will change from nationally determined contributions to nationally determined commitments over the next 5 to 10 years. He added that India's response to climate change has been proactive and is reflected in its own domestic economic policies. He urged industry representatives to think about certain key challenges involved decoupling economic development and GHG emissions, the relative



importance of mitigation and adaptation, aligning business action on climate change with India's INDC, and the role of Indian industry in fast-tracking implementation of NDCs. He also added that there is a need for a paradigm shift in thinking about technology transition and that the industry must go from 'L1' towards 'LCC1' approach, i.e. not just consider the lowest cost option but also account for risks related to climate change.

The open discussions were focused on the role manufacturing industries, banks and consultancies can play in meeting India's INDC goals.

As far as energy sector is concerned, there were questions raised regarding the potential of energy efficiency, especially in the small and medium enterprises (SMEs). The issue of technology upgrade in the glass sector, as well as the need for collaboration with developed countries in the area technology transfer were highlighted as important ways to increased energy efficiency.

Representatives from the power sector also spoke about the technological improvements in GHG intensity of the power sector. The special secretary added that all energy sources would be considered in a holistic manner, including hydro power generation. The representative from Railways spoke on the key initiatives of his organization in the realm of environment, including afforestation along railway tracks, water conservation, energy & cost savings through open access mechanism, and improving transparency through M&V of fuel and energy consumption.

The special secretary also noted the importance of the forestry sector and spoke about the government's initiatives to fast-track carbon sequestration program through planting of 300 million trees this year. He stressed on the role of state governments and corporate CSR funding in implementing climate adaptation projects, which can be achieved in close synergy with private and government participation.



Challenges and Strategies to Mobilize Climate Finance for Low Carbon Development

The ambitious climate change mitigation and adaptation plans submitted by countries in their Intended Nationally Determined Contributions (INDCs) constitute the foundation and promise of the Paris Agreement. These are, however, contingent upon the timely availability of financial resources estimates of which range up to US\$ 1 trillion per year by 2050. Accordingly,

financial resources through simplified approval procedures and enhanced readiness support for developing country Parties” (Article 9 para 9). The Agreement also notes the role of public funds as well as of private sources of climate finance.

Introducing the session, Dr. Ritu Mathur (TERI) noted that climate finance has always been a sticky issue right from the beginning.



the Paris Agreement lists consistency between finance flows and a low carbon development pathway as one of its objectives (Article 2). Furthermore, it requires the “mobilization of climate finance represent a progression beyond previous efforts,” and guides financial institutions to “aim to ensure efficient access to

Very often it is argued that there is not enough money available to make necessary investment to bring about the low carbon transition in time. At times the role of public and private finance is debated. The dilemma between high upfront costs and long term savings has always marred the choices with regard to investment decisions.



Emphasizing on the fact that many of the INDCs are conditional, she invited the panelists to reflect upon the challenges, developments and emerging opportunities for addressing the finance puzzle of low carbon development.

Sharing the perspective of a financial institution, Mr. Himanshu Shekhar, Associate Vice President, Responsible Banking, Yes Bank underlined the strategic priority in making investment decisions that can lead to maximum impact with limited quantum of resources. Linking the question of finance with the anticipated trajectory of technological development, he pointed out that committing all the resources at one go may not be a wise decision. A cautious choice has to be made involving waiting for technological advancement and enabling more impactful investments. He argued that a responsible financing should

avoid lock in less efficient investments. In the meantime, however, innovations in mobilizing finance for climate action, as well as building capacity to do so, are very important. The Green Bonds, for example, have mobilized more than INR 1600 Crores supporting about 1300MW of renewable energy investments. He emphasized on the critical role of innovations for reducing risk. He suggested that innovations not only mean developing new approaches to financing and financial tools but also careful blending of existing financial tools. In particular, the use of public funds for reducing risks and capacity building for enhancing access to finance are the critical areas where innovations are needed.

Ms. Xueman Wang, Team Leader, International Energy Efficiency Finance Facility, of the World Bank provided an overview of the challenges for accessing finance. She noted that

there is no dearth of resources in capital market instead there is a lack of bankable projects at required scale. Underlining the momentum of innovations in climate finance, she noted that the idea of Green Bonds, which was initially experimented with by the World Bank, has been completely taken over by the commercial banks. More than 60% of global Green Bonds are expected to be issued by the Chinese commercial banks. In fact, the private sector seems to be in hurry for making investments. The real challenge with regard to financing climate action is not so much of mobilization (although very important) but the fact that the willingness to pay the premium for “green” is low. The uncertainties in terms of expected returns and concerns over

risks prohibit both private sector and financial institutions to invest in climate change projects. Many a times these risks are not real but only perceived risks. Elimination of perceived risks through models of risk sharing or risk guarantees will play an important role in enhancing demand and access to finance. She also noted that while carbon pricing is important, it is not a silver bullet.

Mr. Siddharthan Balasubramania, Country Head – India, Global Green Growth Institute noted that the global climate is very conducive for climate action. The fact that the low prices of crude oil have had a little impact on the trend of increasing investments in renewable energy projects is a very good sign. Nevertheless, it is





not sufficient. He argued that a paradigm shift is taking place in the decision metrics of the financial institutions. The Green Climate Fund, for example, has identified six new criteria for providing financial support to projects. These criteria are different from, but not exclusionary to, the traditional approaches to project financing.

This will percolate down to commercial banks and hopefully change the definition and language of a 'bankable project'. It is likely that better quantification of climate benefits of a project will result in access to more resources. Unfortunately, 73% of the GGGI countries haven't mentioned cost estimates in their INDCs. Hence, capacity building towards making credible cost estimates and explaining the bankability of projects is very important.

Mr Koyel Kumar Mandal, Senior Advisor, GIZ argued that bringing different types of actors into a partnership can take us very far. Identification of risks and actors who can absorb those risks along with the ways to bring those actors together can address many of the challenges in mobilizing finance for climate action. He provided examples of experiments with business models by GIZ in India along these lines. Citing the experience with the Umbrella Programme on Natural Resource



Mangement, providing INR 500 Crore loan for 300 projects in India, implemented by KfW, NABARD and GIZ along with a number of other partners, he pointed out that with persistent training and capacity building the programme was able to shift a grant oriented approach to loan plus grant approach for implementing these projects. He also shared GIZ's ongoing efforts at building partnership among the corporate houses to use their budgets for Corporate Social Responsibility activities for a larger project with bigger impact in a programmatic project mode. He emphasized that opportunity based incentive mechanisms can be instrumental in forming such partnerships.

During the discussions, the panelists recognized that the grant component of funding has important role to play and reasserted that if efforts are directed at capacity building of project developers and financial institutions, debt financing can also be equally attractive and effective. It is important that mechanisms are developed with an aim to bring down interest rates. The participants also noted that while

there are many successful examples of effective and efficient financing, not all of them are scalable and at times the constraints imposed by the need to balance multiple objectives functions as a barrier to scalability of climate projects. The trade-offs between multiple objects, many a times do not allow diverting resources away from less climate friendly projects to climate friendly projects. However, the global trend indicates that such trade-offs are increasingly tilting in favor of climate friendly projects exhibited by the fact that despite low crude oil prices investment in renewable energy continues to grow over last few years. It is nevertheless important to consider the financing challenges on a case by case basis. Citing examples of institutional innovations at national level were also cited such as the Council of Donor Agencies in Philippines, SEBI criteria for municipalities to access capital market, introduction of many domestic funds in India (CAMP, NCEF etc.), the participants noted that the need for innovations, capacity building and consistent engagement is paramount due to the diversity of contexts and actors.



Role of Smart Grid Technologies in Power Sector Reforms for promoting 24X7 affordable & environment friendly 'Power for all' in India

SPECIAL ADDRESS:

1. Mr. Erik Brandsma, *Director General, Swedish Energy Agency*
2. Ms. Kumud Wadhwa, *Deputy General Manager, Power Grid Corporation of India Limited*

MODERATORS:

1. Mr. Erik Brandsma, *Director General, Swedish Energy Agency*
2. Mr. K. Ramanathan, *Distinguished Fellow, TERI*

PANELIST:

1. Ms. Maria Sandqvist, *Director Executive, Swedish Smart Grid Council*
2. Mr. Ludvig Lindstrom, *Country Manager (India), Swedish Energy Agency*
3. Er. Alekhya Datta, *Associate Fellow, TERI*
4. Mr. Sandeep Pathak, *General Manager (Advanced Utilities), Schneider Electric India*
5. Mr. Hiren Chandra Borah, *Scientist-'C', Ministry of New and Renewable Energy, Govt. of India*
6. Mr. A. K. Srivastava, *Addl. General Manager, Power Finance Corporation*
7. Mr. Akshay Ahuja, *Business Analyst, India Smart Grid Forum*
8. Mr. Debi Dash, *Manager, Communications & Member Relations, India Energy Storage Alliance*
9. Mr. Ajay Gupta, *Head of Strategy (India Region), Ericsson*

Summary: Concept of smart grid is evolving world-wide with the progress in communication and data handling technologies. It provides business and development opportunities to stakeholders, helps in achieving high penetration of distributed energy generation and energy storage and also solves the challenges in demand

side management. Ms. Kumudh Wadhwa explained the role of National Smart Grid Mission, Govt. of India in developing policies and regulations and also implementation of smart grids in India and also preparing the roadmap. Various technical challenges faced in the implementation of 14 smart grid pilot projects



were also deliberated. In the technical session, Ms. Maria Sandqvist, Director Executive, Swedish Smart Grid Council, and Mr. Ludvig Lindstrom, Country Manager (India), Swedish Energy Agency presented the smart grid scenario in Sweden in terms of implementation strategies and achievements. Case-study of smart-grid pilot project in Panipat, Haryana was presented by Er. Alekhya Datta, Associate Fellow, TERI.

The panel discussion was moderated by Mr. Mr. K. Ramanathan, Distinguished Fellow, TERI on “Need of Utility-specific Implementation Roadmap, Regulatory Aspects, and Adaptation Challenges of Smart Grid Technologies in Indian Distribution Sector” had participation

from various Government agencies, industry and implementing agencies of the country. The panelists observed that with the evolvement in smart grid technologies, new business models need to be developed which involves participation from both consumers and the industries, e.g. implementation of Time of Day tariff (ToD). This would help in driving the market and thus enable private and public utilities to embrace the smart grid technologies. Panelists also observed that high capital investment involved in smart grid technologies are justified by the advantages it brings which include in loss reduction, theft control, improved reliability and demand side management.



PLENARY SESSION-I





Habitat III Agenda - Sustainable Development Goals and Implications for Cities

Chair: **Mr S Sundar**, *Distinguished Fellow, TERI*

Co-chair: **Prof. Om Prakash Mathur**, *Senior Fellow and Head, Urban Studies, Institute of Social Sciences*

Keynote Address: **Mr Durga Shanker Mishra**, *Additional Secretary (UD), Ministry of Urban Development, India*

Panellists: **Mr Yuri Afanasiev**, *UN Resident Coordinator and UNDP Resident Representative*; **Ms Anita Arjundas**, *President & CEO, Mahindra Lifespaces*; **Mr Cyrille Bellier**, *Deputy Executive Director, Strategy, Partnerships & Communication Directorate, AFD*; **Mr Andreas Klugescheid**, *Vice President Governmental Affairs, BMW AG*; **Dr Shipra Narang Suri**, *Vice-President, General Assembly of Partners towards Habitat III & Co-Chair, World Urban Campaign*; **Ms Xueman Wang**, *Senior Carbon Finance Specialist, The World Bank, Sustainable Development Network*

The session explored the role of Sustainable Development Goals (SDGs) in realizing sustainable urbanization. The role of SDGs in promoting urban growth, with focus on economic development, social inclusion, and environmental sustainability was, highlighted. By 2050, India will be primarily urban. There is need to the implications of SDGs in cities and explore the capacities required for cities to achieve the targets. There is also a need for change in the lifestyles in order to achieve sustainability, which can be done by localizing SDGs. SDGs are a comprehensive methodology to address sustainable development, and interconnectivity of the SDGs will help in achieving sustainable urbanization. A new urban agenda can be

achieved by adopting a multistakeholder approach and stakeholders can engage by involving themselves in five areas: knowledge, advocacy, monitoring, innovation, and advisory on finances. Knowledge plans need to be linked with investments. Additional sources of finances are needed to address the challenges of urban financing. Importance of private sector's role and right model of public-private partnership was emphasized during the session.

The Chairman of the session Mr S Sundar welcomed everyone and started by expressing his view that we lived in an urban world that had recently passed a threshold where over a half of the world's population lived in cities. While he felt that it was a huge challenge, it was also a



big opportunity because if we planned and ran the cities correctly these could be much more sustainable. There were huge opportunities in terms of the concentration of people, resources, energy, etc.

In his keynote address, Mr Durga Shankar Mishra highlighted that economic development, social inclusion, and environmental sustainability were the three focus areas of all the seventeen sustainable development goals (SDGs). He also said that among the seventeen SDGs, goal number 11 was the one related to the sustainable cities and habitat and that was primarily the main focus area of the Ministry of Urban development, Government of India. Apart from that many other goals, such as 1,5,6,8, 10, and 12 were also indirectly related to those activities that were being undertaken by the Ministry of Urban Development. He felt that primarily

people were moving from the rural areas to the urban areas, the cities are growing not only because of the natural growth but also otherwise because of the migration from the rural to the urban areas for better opportunities in education, health, entertainment, employment, business, etc. He also stressed that achieving sustainable urbanization, protecting the heritage and the culture, protecting the self-inclusive and accessible green and parking spaces, and safeguarding sustainable and resilient buildings was important. He also highlighted that India's huge population was growing at an alarming rate and the way it was growing, it is predicted that by 2050 India will be primarily an urban country where the urban population would cross 750 million, which is more than 50 per cent of the total population. He felt that it was a huge challenge to cater to the various kinds of



requirements or aspirations of the people who were migrating from the rural to the urban areas. He stated that various programmes of the Central government had been released wherein the government was trying to address this growing challenge and convert it into an opportunity. He also spoke about the 'Clean India' Mission of the Indian government. He also spoke about other programmes of the government, including the 'Smart Cities' Mission. He informed that cities that aspired to participate in the 'Smart Cities' Mission were the ones that wanted to provide 24x7 water and electricity, and good environment, education, employment facilities, and various other infrastructures to their citizens in such a way that would utilize all sources of renewable energy and would strive to adopt more and more energy conservation measures. He felt that these smart cities would act as the lighthouses for the future cities. He also talked

about various other initiatives of the Indian government. There were many programmes for improving the livelihoods of the citizens in urban areas so that the SDGs could be achieved. He stressed that the government was making all the efforts in involving the citizens in the planning process of the cities. He also talked about the urban transportation scenario in India, including the vast connectivity of the Delhi Metro train as the government had invested in a big way in the metro programme. He informed that the government had come up with a transit-oriented development policy and that policy was getting implemented in various cities. The government was converting schemes into implementable programmes so that it is able to deliver to the citizens and making the whole delivery process as citizen-centric involving the citizens and getting their ideas and converting those into projects and schemes, that is what the Government of India was currently working on.



Mr Omprakash Mathur started by highlighting the adoption of the SDGs by various countries. He stressed on the universality of the international benchmarks as they were applicable to the developed countries as much as to the developing countries. He felt that as 70 per cent of people would begin living in the urban areas by the year 2050, cities would be the places where the battle for sustainability would be won or lost. The matter was also generating tremendous amount of global attention. The UN had already come out with the global sustainable development report 2016. He also highlighted that India had a long way to go when it came to sustainability index. The most difficult task was perhaps the localization of the seventeen goals to the level of the cities. He also felt that global indicators that best reflected sustainability needed to be identified. He also very succinctly pointed out that there can be no sectoral sustainability but it has to be a holistic approach.

Mr Yuri Afanasiev highlighted that SDGs were actually a way to look at things in a comprehensive and methodological way and certainly countries such as India have their own programmes and strategies, as India was now developing its own national development strategy or vision. He felt that everything else was connected to three goals, that is, (i) poverty, (ii) environment and sustainability, and (iii)

urbanization. While urbanization was a challenge in densely populated countries such as India or other parts of Asia, cities were also the solution to the problem if we could correctly implement the plans in the next fifteen years. To further support his views, he highlighted that cities were a place where it was a lot more easier and cheaper to provide public services because everybody is concentrated in a relatively small area. So, cities needed to grow vertically rather than horizontally. Services, such as health, education, transportation, etc., were easier and cheaper and usually better quality could be provided in urban environments rather than in rural environments. He also highlighted that in cities humanity could achieve the lowest carbon footprint per capita.

Dr Shipra Narang Suri first of all informed everybody that she was there to talk about the role of stakeholders and stakeholder engagements and the Habitat III process. She said that she had been co-leading the general assembly of partners, which was the key stakeholder coordination platform for Habitat III and which had made certain very specific recommendations in this process. She briefly discussed the history of the UN Centre for Human Settlements (UNCHS) that was established in 1976. She informed that nowadays we were talking about issues not just of urbanization and urban growth and developing countries facing problems of



poverty but we were also talking about things such as shrinking cities, declining cities, climate change, conflicts, resilience, etc. So this, she felt, was truly universalization of the urbanization discussion it meant that urbanization was not a problem of the poor countries alone. This was a new shift in the urban agenda. She highlighted that all types of cities and all types of countries and the broadest spectrum of stakeholders must get involved in the process. And that was truly where again the process of Habitat III had been quite innovative and pathbreaking and she hoped that it would set a precedent for the future. Also, she said that stakeholders had a very important role in crafting the new urban agenda

and the new urban agenda cannot be achieved without a multi-stakeholder approach. And stakeholders have the right, and the capacity and the willingness to contribute and to lead in key areas, such as, knowledge, advocacy, building awareness, innovation in the business sector, etc. She felt that while Kyoto Protocol was extremely important it was just the beginning of the process. She again stressed on the critical role of stakeholders and pledged to continue to work on the identified areas.

Ms Xueman Wang started by saying that one of the major challenges in the implementation of the SDGs was related to governance as we needed to figure down from national governments, to

states or provinces and from provinces to cities. She gave examples of three cities, that is, New York, Shanghai, and Johannesburg regarding the way they were actually taking action for sustainable development in cities. She listed the initiatives that the World Bank was taking to promote sustainable cities.

Mr Cyrille Bellier first of all highlighted that there were three SDGs that were really important—inequalities, governance, and sustainable cities, as all the three SDGs were new. He also agreed on the view of other speakers that the battle of SDGs would be won or lost in cities. He also felt that we needed to find a way to leverage the international public money and highlighted the inequality in terms of access to resources. He informed that the smart city initiative in India was very important because it forced the state and citizens and all the

stakeholders through participatory approaches to have an integrated view of the challenges in the region.

Mr Andreas Klugescheid felt that SDGs were certainly a framework for orientation and they were already more impactful than the millennium development goals. SDGs were something that people could relate to, and that businesses could relate to these in a way that has not happened before. He informed that BMW had a good record in sustainability activities, but it did not mean that the company would just rest on the laurels; perhaps they would work all the more towards fulfilling the sustainable goals. Responsible production was one of the SDGs important for BMW because they were a production company. Climate action and sustainable cities were also important SDGs for them. He highlighted that apart from public transportation, the individual



transportation medium, that is, the car will play an important role in the cities in the future as well. He said that it was important to set up the so-called centres of competence and mobility—a unit that dedicatedly deals with urban and city needs and BMW was consulting cities in getting their transportation systems right.

Ms Anita Arjundas felt that we really could not underplay the business case and economic issues for sustainable cities. She stressed that there was a strong economic case for sustainable cities and we should keep emphasizing that frequently so that we have more and more participants coming into the fray. She also talked about creation of micro cities or small cities and the role of the private sector in a public–private partnership in infrastructure creation. She felt that private sector really needed to step into the space and play a role towards fulfilling common goals, working towards common frameworks and being able to define the investment philosophy. The financing

ability of such projects was extremely critical for the private sector to be able to come in and play a significant role. She highlighted that their company had worked towards job creation and because she felt that it was the most important underpinning of creation of a sustainable city as the new urban agenda talked about opportunity creation as the very important aspect of how cities will develop going forward. And so the whole focus was on job creation as the starter. She gave a few examples of how her organization had been managing and developing some cities to try to orient them to be self-sufficient and sustainable. And she thought there were lessons there, to get more and more private sector to participate in PPP mode in the creation of urban infrastructure.

Finally, the Session Chairman summarized that it was a very interesting session and asked the audience to give a huge applause to all the speakers.



SHOWCASING
THE TERI





Showcasing the TERI– Mahindra Centre of Excellence

The inauguration of the Mahindra–TERI Centre of Excellence for Sustainable Habitat was graced by Mr Anand Mahindra, Chairman and Managing Director, Mahindra Group; Mr Anirban Ghosh, Chief Sustainability Officer of the Mahindra Group, Dr Ajay Mathur, Director-General, TERI; and Mr Sanjay Seth, Senior Director, Sustainable Habitat, TERI. And it is a happy occasion because it is marking. The focus of this new centre would be on how to design buildings that are both greener and cheaper. The centre would contribute through research and innovations on materials and technologies, drawing on both traditional and modern methods and customising them for the Indian environment, and the results of all the centres research will be available in the public domain in the form of ECG use tools designed to help the construction industry as a whole build a more sustainable future for India's cities. Ms Anita Arjundas inaugurated the centre formally by cutting the ribbon. And with that in mind I would like to invite Anirban Ghosh to share Mahindra's latest secret with you.

Mr Anand Mahindra called the event a momentous occasion for the Mahindra group.

He went on to say that the group started contemplating setting up its own centre of excellence for sustainable habitat a few years back as in the urban context, 70% of India's built inventories is yet to come up. Looking around the world for partner led the team to TERI. The centre would work towards output that will benefit the larger community of construction industry in India with respect to housing stock.

Dr Ajay Mathur expressed his delighted with the partnership. Influencing the design of buildings that will be built in future is the key to sustainable India. This centre of excellence would help the larger community address the problems regarding sustainable construction and buildings. This centre would be carrying out experiments on various kinds of building materials and putting it in the public domain. It would also work in different climatic zones to put out these results so that the builders and developers everywhere have a far greater range of choices as far as sustainable buildings are concerned.

Mr Anirban Ghosh on behalf of Mahindra and Mahindra announced their internal carbon price of \$10 per tonne of carbon emitted. Mahindra



& Mahindra became the first Indian company to make this announcement, which is extremely important for corporations in India if not the country itself. Mahindra & Mahindra would

investing \$10 per tonne of carbon emitted as the carbon price in the business. This money will be used for pursuing low carbon technologies and consistently bring down the carbon footprint of





the business in line with its business commitment to reduce its greenhouse gas emissions by 25% over the next three years.

How would the Centre of Excellence work?

Mr Ghosh: There are actually many ways in which carbon prices operationalized: Mahindra & Mahindra has chosen the simple path. That is, for every tonne of carbon emitted, the group will invest \$10 on technologies that will help reduce our carbon footprint in the future. Here, there is a clear commitment of investment. It is a firm belief of the group that making a commitment for investment is a simpler, straight way of dealing with the problem.

Dr. Ajay Mathur: So we would expect that for example all the buildings amongst other things and the cars that you make go on becoming more efficient and at the same time they also start investing in technologies for day after tomorrow.

Mr Ghosh: Absolutely right! It is indeed a good



fortune to have business leaders like Anita, who have taken the lead in moving towards avenues of green business. In fact Anita's business is committed that every building it builds is either gold or platinum certified. It is probably the only developer in the country to do so. And just like Anita, Dr Goenka—leading the automotive business—spares no effort to ensure move towards green direction. Mahindra & Mahindra were the first in the world to commit to doubling our energy productivity by 2030. The carbon pricing commitment is on the same line because it will make investments to make EP100 happen.



PLENARY SESSION-II





Sustainable Development Goals on Water: Challenges and Opportunities

Chair: **Dr S K Sarkar**, *Distinguished Fellow, TERI*

Panelists: **Dr Genevieve Connors**, *Program Leader, Water and Sustainability, India Country Office, World Bank*; *HE Mr Sławomir Mazurek*, *Deputy Minister of Environment, Poland*;

Dr A Ravindra, *Director, Chairman, Centre for Sustainable Development & Chairman, Institute for Social and Economic Change & former Chief Secretary, Karnataka*;

Ms Astrid Schomaker, *Director Global Sustainable Development, DG Environment, European Commission*;

Dr Alok Sikka, *International Water Management Institute (IWMI) Country Representative, India*

The session highlighted that the major water demanding sectors around the globe were agriculture, industry, and domestic, with agriculture consuming 70 per cent. The pathways leading to achieve SDGs related to water was an important issue that international and national policymakers should focus on. All the deliberations focussed on targets in the Goal 6 (sustainable management of water including water quality, water use efficiency, etc.) of SDGs and a linkage with Goal 12 (sustainable consumption and production). The speakers highlighted the challenges, such as those related to finances, lack of harmonization amongst the different water governing bodies, etc., in achieving the SDGs. A global water governance

platform, better cooperation among the water-sharing states/countries, and knowledge sharing were identified as 'Key Solutions' for successfully achieving the water-oriented SDGs.

The Chairman of the session **Dr S K Sarkar** welcomed all the panellists and all others present in the session. He said that like hunger, lack of access to water was a silent crisis being experienced by the poor people and tolerated by those who could afford it through financial resources or other technologies. To explain the water crisis, he said that only 0.4 per cent of the global water resources and fresh water resources were available for consumption. He apprised that 70 per cent of the water worldwide went to the agricultural sector, approximately 22



per cent to the industrial sector, and around 8–9 per cent went to the domestic sector. He also said that by 2030 our demand would be 40 per cent more than the available supply of fresh water in the world. So, we were moving towards a situation where many countries will see water stressed conditions and even water scarcity conditions if you looked from the angle of the per capita availability of water. India also faced similar problem and uneven distribution of water in the world was creating a big problem for many people in the world. He also talked about sustainable development goal 6 and goal 12 and

the associated challenges of achieving the goals. He deliberated whether the challenges were on the policy front, or on the institutional front, or the technology front or on financial front. These issues were being faced by all countries, including India.

Dr Genevieve Connors began by discussing about the SDG 6 on water. She said that there were actually six targets that were related to outcomes regarding improved water and/or sanitation. And there were two regarding the processes that need to be followed in order to achieve those outcomes. She brought out very clearly the holistic approach which was being adopted under SDG vis-à-vis the millennium development goals (MDGs). She felt that capacity building in international cooperation



was important in this regard and also said that often people associate the MDGs with just water supply and sanitation services. The SDG on water was actually much bigger and it was important to determine the measurement of the SDGs that were much more ambitious and broad-based than the MDGs. She also felt that it was important to realize that matters were complicated by the fact that the targets were actually aspirational. She also said that different countries need to customize their goals that would be absolutely critical towards the end of 2030 to meet the SDGs. She also highlighted that there were many key challenges to achieving the SDGs but we needed to focus on two of those challenges. One is that in order to achieve this kind of ambition we will need to work on a war footing. She also said that financing needed to be mobilized very carefully across the business sector and the private sector, and India had a huge CSR pool, NGOs, and also households; therefore, household level expenditure would be the key to achieving the goals. She also felt that there were huge synergies and overlaps between India's NDC and the SDGs set for India. Dr Connors brought out clearly the challenges particularly finances and investments required especially in the agricultural sector where there was a lot of consumption of water. She also stressed that a lot of focus and political commitment was required to achieve all the goals of the SDGs.

HE **Mr Slawomir Mazurek** highlighted that the world was facing many water challenges as many people in the world did not have potable water to drink. Even Poland did not have enough water



for agriculture. He informed that they needed to start a new policy about management of water in Poland and it was also very important because it also had the element of the implementation of the EU law and water framework direction. He felt that even though Poland had good quality water for drinking and sanitation purposes but countries and international committees should work together and undertake conditioned efforts for meeting the SDGs. The key for better future was cooperation and sharing experience.

Coordination among players and different countries would be very useful for everybody.

Dr A Ravindra highlighted that the focus of SDG 6 was on ensuring availability and sustainable management of water and sanitation for all. He related it to the SDG 12 that talked about ensuring sustainable consumption and production factors. He stressed that water should not be forgotten while discussing sustainable development and consumption and it was also important to ensure that the consumption and production of water was sustainable. He elaborated his point by giving examples of two sectors, that is, sustainable management of agriculture, and sustainable management



of water for urban areas. He apprised that enormous quantities of water was used for irrigation, nearly 80 per cent of the water withdrawals were towards agriculture. But, it was one of the most unsustainable uses of water in the field of agriculture and irrigation. He also stressed that although water was a State subject but at the same time when it comes to Inter State water, the Central government has to play a key role. He felt that water pollution was endangering many rivers in India and if attention was not paid to improve the water quality we could actually lose many rivers. He also said that the consumption of water was so unsustainable that we were extracting groundwater without any kind of regulation, although there maybe some rules and regulations in some states but they were hardly enforced. He also highlighted the huge water losses that were happening throughout the country and so we needed to be accurate with our data and take steps to prevent wastage of water. He also touched upon the question of water governance because ultimately the management of water resources would depend on the institutions that govern them. It was also necessary to have a coordinated view and coordinated systems for planning and for judicious use of water resources. He felt that unless we took a holistic view of water management the present system

would persist forever. He concluded by saying that we needed a proper understanding of the various problems relating to water management and climate change. And more importantly, there was a need for involving the people and the citizens in measures, such as conservation of water, preventing water losses, and using water in an optimum way without wasting. Thereafter, the Session Chairman applauded Dr Ravindra for brilliantly pointing out the challenges in the case of water governance and how it could be done effectively.

Ms Astrid Schomaker started her discussion by stating the fact that the SDGs were for everybody and that means action was necessary



in the developed as well as in the developing world and in cooperation between the two. She felt that in spite of having many good practices to share there were still many challenges ahead that we needed to tackle. These challenges were related to water quality due to increasing chemical pollution. She also spoke about the five possible pathways that had been identified in Europe that would enable everybody globally to move towards SDG implementation. She informed that the possible pathways could be legislation and its implementation, cooperation, a wider perspective looking at how the SDGs could be leveraged by looking at interlinkages between various policy areas, innovation, and finally financing. She felt that along with legislation, the implementation of legislation was also important. She also said that we needed to look at leveraging the SDGs as a whole and look at other policy approaches that will be beneficial for water. She also talked about using less water in the production process, recycling using less chemicals, etc. She also said that it was very important to bring innovation to the market. She informed that they had created the European Innovation Partnership for Water in Europe where they tried to look at the number of challenges and what everybody could bring to the table. She also spoke on financing and the pricing part.

Dr Alok Sikka talked about the challenges to harmonize the synergies and the complimentaries between the INDCs and the SDGs. He felt that bringing in a more holistic approach by synergizing all the complimentaries was a major challenge. He also felt that there was a great dependence on groundwater, in the south Asian region and particularly in India.



He informed that the first solar pump energy cooperative association was set up in Dundi. He also talked about different kinds of measures related to the enhanced groundwater recharge. He also expressed his views on resource recovery and reuse and recycling through some smart and inclusive interventions. He also felt that convergence was the major mantra to have a holistic and an integrated approach. The major challenge was bringing in the inter-ministerial convergence, coordination, and monitoring to bring in more synergy. Dr Sikka also brought out the mapping between the INDC targets which India had adopted and how one can link with the SDGs that was extremely important in the present context.

After taking a few questions from the audience the Session Chairman concluded the session by highlighting that we all had to work together, we had to take action on many fronts and the panellists had given various useful suggestions that could be hopefully implemented in many countries, including India.



PLENARY SESSION-III

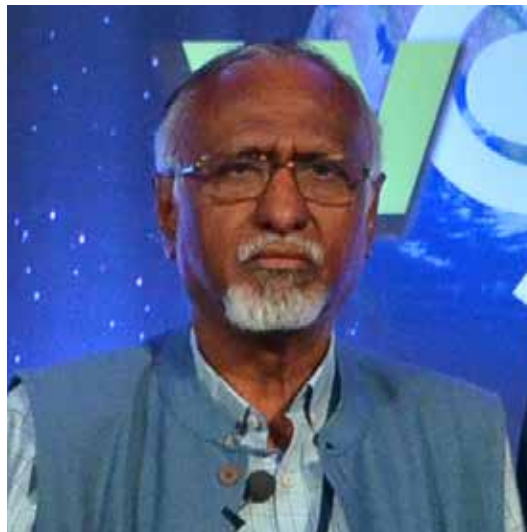




NDCs: Plans, Policies, and Priorities

The chairman opened the session by stressing the importance of the NDCs that form the core of the Paris Agreement and how the success of the Agreement depends on how well the NDCs are executed. With this as the overarching theme of the session, the panel members—Mr R R Rashmi, the special secretary, the Ministry of Environments Forests and Climate Change; Professor Hironori Hamanaka, chair of the Board of Directors, the Institute for Environmental Strategies; Dr Ajay Mathur, director general of TERI; and our chair this afternoon Dr Pradipto Ghosh distinguished fellow at TERI, were welcomed on stage. Mr Eric Brandsma, director general, the Swedish Energy Agency, joined the discussion a little later.

Dr Pradipto Ghosh, the session chairman, introduced the topic of the afternoon's session—NDCs: Plans, Policies, and Priorities. So far we have had the INDCs, now with the recent ratifications and the Paris Agreement coming into force, hopefully in thirty days, we will have ably converted into NDCs. A lot of people are surprised by how large and ambitious they have been, especially how the Indian INDC is shortly due to become the NDC is also extremely ambitious.



Mr Eric Brandsma, the first speaker, was introduced and invited to open the session. As the director general of the Swedish Energy Agency, Eric worked as Vice President Corporate Responsibility and Sustainability at E.ON Sverige AB, Sweden.

With the landmark Paris Agreement, it will be interesting to see what happens in the next five years when we can start counting down towards the 2050 targets. Described as a 'perfect storm', with a rapidly falling cost of renewable energy, it was assumed, would stop the growth



of renewables around the world. However, this, especially since last year has not been the case. There is growth in the renewables sector in spite of the falling oil prices. The local air pollution issue, security issues, and the sustainable development goals from the UN, all elements contribute to this ‘perfect storm’ that creates whole new energy systems around the world. Also, in Sweden, as per the recently adopted targets there will be hundred per cent renewables in the electricity system and electricity generation by 2040. Given this, the Paris Agreement goals will soon have ambitious targets for energy efficiency, transportation, and all the other steps that constitute the Paris goals. A key thing that needs

to happen here is that we should start looking at singular, starting points from a production and generation perspective. For the system to work it needs to be interlinked—the transport system should connect to distribution and transmission. While energy efficiency is a key element here, a bigger problem is energy storage and integrating this cost-effectively is also equally challenging. Doing so will make it more developed and decentralized. Like Sweden, India has the potential to move towards a situation wherein there is surplus capacity that is then given out at low prices. These, no doubt, will generate more business opportunities, new players in the market, and partnerships.

For Sweden, the transportation sector is the highest contributor of CO₂ emissions and here is where the authorities are working hard in getting biofuels introduced into the market. In this regard, there will also be an immense push on electrification, which, in the near future, will play an important role in the private automobile sector.

Professor Hironori Hamanaka, the chair of IGS Board of Directors, was invited to speak next. While serving with the government of Japan, he devoted his administrative career to inter-governmental negotiations in areas including the Kyoto Protocol.



In his address, Professor Hamanka discussed the issues relating to NDCs, its long-term strategies, global stocktake transparency framework, and capacity building. The Paris Agreement also provides further opportunities for policy integration that is the development of long-term, low greenhouse gas emission development strategies, and linkage between NDCs and long-term strategies. By linking NDCs and long-term strategies, all countries can plan and implement cost-effective NDCs with concrete policies and tools from a broad range of long-term perspectives. Countries should utilize the process of developing strategies as a platform for all relevant stakeholders including

local governments, the science community, and the public to discuss and share views on national development strategy. Doing so will develop a sense of ownership which is critical for the success of the programme. Given this, a concern here is how to raise the ambition of the NDCs and what kind of modalities and information are necessary to do so. Enhanced transparency frameworks will provide inputs to the global stocktake. It is important that the process is open and inclusive. The modalities of the stocktake should be structured so that the facilitative process is created where parties can learn and contribute to the process, and this would further enhance the momentum towards climate action. The Paris Agreement established an enhanced transparency framework for action and support with built-in flexibility which takes into account the different capabilities of various parties involved. The framework has been designed in such a way that the transparency structure for mitigation action provides an understanding of actions to track progress towards achieving individual NDCs and to inform the global stocktake. In order to ensure the comparability, the parties need to develop a common framework to improve the comparability of the implementation of the NDCs. A key challenge here is to see whether the framework can improve the comparability of

NDCs while allowing a certain level of flexibility to accommodate diverse capacities of parties. To strike the balance between comparability and flexibility, a commitment-based approach is worth considering which can be done using a measurement reporting verification system with different requirements for different types of commitments bearing in mind that each of these types of commitment has its own challenges. Finally, capacity building is vital to support many developing countries to fully meet the requirement of the Paris Agreement, especially its transparency framework. The following are the five key areas that should be enhanced for the effective implementation of capacity building under CBIT: (a) to assess the existing capacity-building approaches and to improve the understanding of the effectiveness; (b) to assess progress in capacity building which is critical to understand the current state and change of capacities over time with respect to the implementation of the transparency framework and NDC; (c) development of a national capacity-building plan that needs to be integrated into a national implementation plan for the NDCs for addressing the wider scope of requirements to cover not only mitigation but also adaptation and means of implementation; and (d) effective coordination among various capacity-building actors is critical to share

information on good practices and to discuss strategies and identify the common challenges.

Dr Ajay Mathur, who was invited to speak next, opened his address by reiterating the question raised by the previous speaker, Professor Hamanka, that is, how do we ensure that the NDCs are met? If one looks closely at the NDCs, almost all of them include every country's determination to increase the amount of renewables; with 16 or so exceptions, most have fairly substantive goals on energy-efficiency enhancement. These form the bulk of actions. Among these there are other enabling mechanisms, such as smart grids, storage, and so on. How do we make these happen? Every

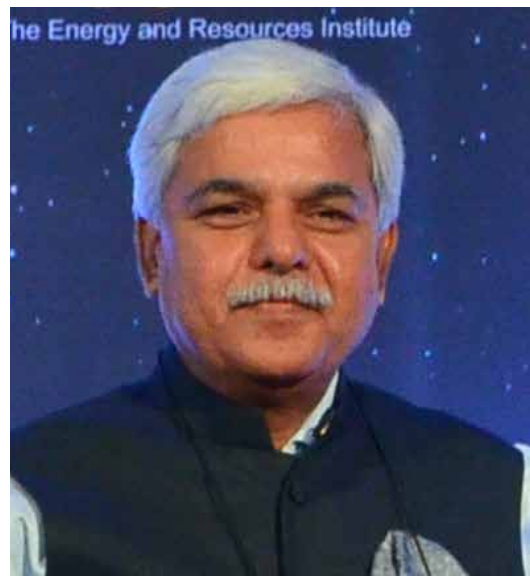


country as it goes ahead will need to ask the following questions: (a) where is it that these are needed and who will do it; (b) what is the business model within which it will occur; (c) what is needed for these to get completed; (d) what is the soft capacity; and (e) what are the policies that are needed for this to happen? Dr Mathur stressing the need for transparency spoke about the necessity of feedback that ultimately enhances capacity building. While each one of us knows the challenges of introducing a new set of goals for a government to achieve, one need not always carry a lot of stakeholders; furthermore, one does not typically have enough data to make decisions, and as one moves ahead, technologies and prices change along with industries that may declare that they are running in losses. The point is that there are no correct answers to any of these issues.

In this context, it is important to have a peer-to-peer support network for these kinds of actions. If Mr Eric Brandsma has successfully installed a smart grid network in Sweden, it is necessary for him to share and extend his support to others. Apart from asking the right questions, the second important step is to structure a process that can capture benefits as they go along. There is no doubt that the prices of renewables will continue to fall. Consequently, if one captures a huge amount of the benefits today, and tomorrow the

prices are lower, has one lost something? Short-point NDCs present a unique case that we are trying to accelerate action and are doing it in a timeframe that is relatively limited. In other words, the way we handle changes, such as identifying technologies, robust policies, getting feedback, etc., ensures how prices decrease over time. Additionally, getting the business model right is also a challenge. These are the key challenges in which each country, each agency, each business house will have to find its own answers.

Mr R R Rashmi, the final speaker for this session, was called to address the gathering.



Mr RR Rashmi opened his address by stressing the importance of the NDCs which has come into effect after the Paris Agreement. According to him the success of this will depend on the way in which one can achieve the NDCs domestically and how they are treated in the global context in various international negotiations. Reiterating that the NDCs are ambitious, Mr Rashmi adds that they are flexible as well. According to him, this flexibility is the hallmark of the Paris Agreement and the fact that all countries can express their contribution freely is the indicator of the success of the Agreement. Referencing the Cancun Pledges and the goal of reducing emission intensity by 20%–25%, all possible efforts are being made in this direction.

The NDCs that have been offered under the Paris Agreement—that have now become absolute—are basically a more ambitious form of the Cancun Pledges. Now the question is: How do we achieve these NDC in the next 15 years? In this direction, Niti Ayog has been tasked with the responsibility of bringing the various roles under the fold of the different planning processes. The vision and challenge is to integrate all these, create a plan of action, and request the ministries to account for these in their budgets and programmes.

Like other programmes which are waiting to be implemented, the main question here,

too, is that of financing. Capacity building and technology, the two things all the speakers here have emphasized, require financing. The current Cancun Pledges is an example of the difficulty in financing such programmes wherein a slew of methods are being tested so as to raise the required finances. In an attempt to raise capital, a cess on coal which has raised Rs 3,000 crore has been levied. While there are some experimental, market-oriented sectors where there are guaranteed funds, this needs financing to be upscaled. Additionally, some regulatory changes need to be introduced which are difficult to predict. To reiterate that the NDCs are flexible, the ministries must try and evolve legal measures that can be easily adopted. There are two things that are happening in Paris in the run up to 2020, namely, a) there is an emphasis on the subnational entities that are coming into play, thereby helping the government and the countries meet their goals and b) the emergence of facilitative processes and the associated instruments which are available to the international community to help the countries achieve these targets.

Given our experience of CDM, we do not have clarity about what kind of market we would want to see in the future which makes everybody comfortable. At the same time there are different groups of stakeholders coming together to

form coalitions and helping the countries and communities in achieving their goals. While these are all welcome, we need to be cautious of not getting detracted from the final goal.

The session chairman closed this segment by thanking the speakers for their precise inputs, in particular by highlighting the ambition of the INDCs, their weaknesses, the means of their implementation, and so on.

The next session was preceded by a shot interlude on the possibilities if Mr Donald J Trump were to win the US Presidential elections. Dr Ajay Mathur was the first to speak wherein he mentioned the famous daily graph run by the New York Times showing the possibility of a win for the two candidates. According to him, if Mr Trump wins this, he is likely to withdraw from the Kyoto Protocol. Assuming he decides to withdraw from the Paris Agreement in a month's time, that process itself is lengthy and by the time the exit is complete, the presidential cycle will be over (this is a four-year-long cycle). The second conspicuous thing that might happen is that he may not push the various agencies on the different executive programmes on climate change that President Obama had started. Given this, another thing that might occur is that whether Mr Trump wishes it not, he will have to address these issues. In US, the number of people who want this answered has increased.

Mr Eric Brandsma was of the opinion that irrespective of the November outcome, there is a growing leadership on these types of issues. To withdraw from the Kyoto Protocol would not be good as the US is a country that has an enormous carbon footprint. If an international business operating globally would like to pay more attention to its supply chain, then the customer base needs to consider these issues vis-à-vis sustainability. Given this, it will be difficult for Mr Trump to withdraw from all climate change-related developments. Mr Hamanka agreed that if Mr Trump were to be elected, there would be some impacts, especially in the domain of federal policies. However, given the vast contribution of countries, agencies, and businesses, the momentum will not be adversely affected.

After this, the floor was opened to participants for a short Q&A session. The first question was related to the ICT initiatives and how it can play a big role in education and health. Ignoring the fact that the session was strictly about NDCs, Dr Mathur conceded that in order to achieve the NDCs, ICT is a key element. A proper ICT implementation will not only boost business but will also increase energy efficiency.

The next question was for Mr Eric Brandsma wherein he was asked to talk about what backup options Sweden has when monsoon occurs.

While Sweden does not have monsoon the way India does, nevertheless it has a significant hydropower that only provides electricity but also regulation in terms of the base power. By doubling solar and bio energy during summers, along with strong storage options, by 2040 there should be a large supply of electricity.

The next question was for Mr Rashmi wherein the importance of good legislation in the water sector was talked about. Given that there is no regulation in the water sector in India, the question was about when it can be implemented. In response, since, ideally, this should have been answered by the Ministry of Water Resources, and because this is a regulatory measure, it will depend on consultation with various stakeholders. To add to this, Dr Sarkar, who is a former Secretary Ministry of Water Resources, talked about the National Policy, 2012 wherein positioning regulators in all the states should be carried out as it is a state subject.

The next question came from a researcher from Goa on energy. The question was directed towards knowing how these were to be implemented. While in Goa regional plans were made to take into account the different sensitive eco-zones, once the government came into power, for the last four and a half years, the plan has been kept on the backburner. Contrary to expectations, all activities are being outside the plan.

As a response, the session chairman mentioned that the scope of the present discussion related to NDCs and not the regional plan for Goa to be implemented by the Goa administration. However, it was suggested that a writ be filed in the Supreme Court to override the political authorities in Goa and support the implementation of the original regional plan.

The next question was presented by Karen Stacy from the Financial Times and was related to the 65 gigawatts worth of sanctioned coal power with many more in the planning–approval process and how, if at all, will it impact the SNDC targets.

Among the panellists, Mr Rashmi chose to respond to this question. According to him, the sanctioned coal power will not hinder the implementation of the outlined goals. With regard to this, there is already an ongoing programme with the government wherein coal-fired power plants are undergoing inspection and audits so that their efficiency and capacity utilization are improved. Even though coal will continue to be a major source of power generation, it will not come in the way of the implementation of NDCs, especially because the NDC are a mix of several ambitious measures from various sectors.

To this Dr Ajay Mathur added that we have about less than 200 gigawatts of coal-based power stations and, as was mentioned, 65 are

at various stages of construction, approval, and so on. Also, eventually, there will be a few more which will be built; however, the power plants that exist today are used for lesser durations of time (approximately less than 60 per cent). This essentially means that as we go along, we will reach something of the order of 300 or 325 gigawatts of coal power. Simultaneously, until such time as this happens, we would have achieved 175 gigawatts of wind, solar, and other renewable sources of power. Given the NDCs condition that at least 40 per cent of the power mix should be non-fossil fuel, we are well placed to meet this.

The next question came from Dhruv Gupta from Sea Balance Solutions, and was directed at Professor Hamanka. While as of now the NDCs are going to result in a global warming of 2.7 °C, is something being planned to encourage countries to, perhaps, do more to reach 2°?

The question was received positively by Professor Hamanka and it was affirmed that the institute is very much interested in working with the partners to overcome the mentioned problem. As has been mentioned, the collection of the current NDCs cannot ensure that the world as a whole would not be aimed to achieve the long-term goals of the Paris Agreement. The Paris Agreement provides three mechanisms through which the involved countries and parties can enhance their ambitions. These three closely

interlinked mechanisms are: global stocktake, transparency mechanism, and the NDCs long-term strategies. Without going into a detailed description, there are a number of issues that we need to find out to ensure effective mechanisms, their designs, and implementation. It is hoped that the Paris Agreement soon comes into effect. Doing so will put more pressure on those involved in chalking out the necessary rules and regulation for the implementation.

After the Q&A session, the floor was opened to the panellists to deliver their final statements. The first to come on stage was Mr Eric Brandsma. According to him, the only way to track progress is to keep the pressure on. The situation of the ‘perfect storm’ in Sweden, is an encouraging picture of the positive developments taking place in the fields of business and sustainable development, which incidentally can go hand in hand, plus there is prosperity in changing course that can and will facilitate possibilities of developing a society, creating jobs, and delivering on the Paris Agreement.

Dr Mathur added to what Mr Brandsma had to say. According to him, there is little doubt regarding the fact that views and perspectives of the business have changed; we are now proactively looking at opportunities. Additionally, there is a radical change in public, business, and political opinion. The final thing that will



determine the success of the Paris Agreement is the transparency—the more we know about what is happening, the more we will start seeing what we can do ourselves and where stricter measures can be implemented so that we, as a country, can deliver our share of the deal.

Mr Rashmi, who spoke next, said that he, too, shared the optimism of the other two speakers. The NDCs are not merely a challenge; they present an opportunity for our country as well. The NDCs will help us in determining our ability to cope with the demanding targets that we have taken upon ourselves over the next 15 years. It is hoped that businesses will find the right mix of measures to cope with it. It is also hoped that minimum expenditures will be made during this period of transition.

Professor Hamanka, who was the last to speak, affirmed that during the Kyoto Protocol that was held 19 years ago, the key player was the government, especially the government of developed countries. However, now the situation has changed a great deal. The number and involvement of key players have increased and now includes many business leaders, subnational government leaders as well as mayors and governors. In other words, this has now become a wider movement with players from diverse backgrounds contributing towards achieving the outlined goals. In other words, as mentioned by Dr Mathur, peer-to-peer learning networks are set to gain importance in the near future.



PLENARY SESSION-IV





Sustainable Infrastructure for Africa's Transformation

In this plenary session, the focus was on how Africa's sustainable infrastructure is changing. Africa is sometimes seen as a late convert, lagging far behind in the innovations that are taking place in the sustainable energy sector. As examples of how Africa is rapidly transforming along the same lines, the rapid spread of solar in East Africa combined with mobile money transfer and new, smart energy technologies can be seen as advancements that are changing the way energy technologies are revolutionizing life for millions.

The session chairman, <name>, welcomed the panellists to the session on the infrastructure needs in Africa. At the global level, one of the interesting stories for more than a decade has been the revival of the shift in growth and development. Dr Araya Asfaw, the first speaker, was called to talk about Africa's needs for sustainable development over the next few decades. Meaza Ashenafi, who has been deeply involved in gender issues, has worked on human rights. One of the important things that connects her interests with ours is how, recently, she founded the first women's bank in Ethiopia. The

next panellist Martin Heller, secretary general of summit at Johannesburg, was introduced. Nalin Surie and <Is Dr Ajay Mathur the next to be introduced?> were introduced next. Dr Araya Asfaw was asked to begin the session.

Dr Asfaw opened the address by thanking TERI for the opportunity to speak about Africa's transformation vis-à-vis its infrastructure development. Citing as example the case of the Horn of Africa—one of the fragile regions in Africa that have become a global concern—the population issue was highlighted. Currently in the Horn of Africa, there are eight countries with a population of over a 130 million in the region of which the major share belongs to Ethiopia. Furthermore, Ethiopia takes the lion's share of land as well. If measures are not taken at the right time, the population in the decades ahead can swell to a number bigger than the US. From the 1950s up to now, the population has quadrupled, and given that 40 per cent of the population is below 14 years and more than 50 per cent is between the ages 50 and 65, the trend is becoming difficult to break. Energy poverty is a major issue and one of the major causes of

afforestation is fuel wood. Over the last decade, the Government of Ethiopia has made a major plan to transform energy usage and the other is the expansion in hydroelectric power. While in 2010, the power consumption was about 20 watts per person, by 2025 the electricity generation will reach about 12.5 GW (which means, approximately, per person consumption

hopefully be inaugurated in the recent future. Surely one is looking forward to this kind of a switch wherein diesel is slated to get replaced by an electric rail. In terms of energy security and economic stability, since oil is a volatile market, this kind of energy security has an important role to play. Over the next five years, the government is planning to lay 5,000 km of railway tracks



will scale up to maybe 100 watts). For Ethiopia this is not a lot. It is common knowledge that Ethiopia shares all its rivers with neighbouring countries which in turn means that it shares the electricity generated by hydropower. This clearly sheds light on the possibility of demand increasing persistently. Speaking more of the demand side, the government, too, has taken major undertakings, especially in the transportation sector; a 740 km electric railway track will

across the country. While the investment will be no less than 25 billion dollars, this initiative will have the following two advantages: (a) better accessibility for the goods and services market; (b) better regional integration. Furthermore, if every country in the neighbouring region has the same kind of strategy, hopefully by 2030 we can have substantial infrastructural development in the Horn of Africa. Doing so will also boost economic integration and stability as common



resources will be used. While there is no denying the fact that infrastructure is very important for the growth of the economy, investment, also a necessary pre-requisite, needs to eventually pay off. In a sense, if billions of dollars are being invested for better internal integration then over time the economy needs to reach a point where it can start generating profits. Additionally, the issue of how labour movements across countries impact the economy needs to be analysed.

Ms Mesea Ashnefai was called next to address the gathering. Ms Ashnefai opened her address by stressing the importance of knowledge transfer and the importance of voicing concerns at a global forum such as this. As five of the fastest-growing economies are based in Africa, taking a closer look at the content of this development is and ought to be interesting. Given this perspective, a range of questions, such as—is it sustainable? Is it environmentally and



ecologically advanced? What is the role of the women and youth? And, comparatively, how is sustainability understood in different parts of the world?—arise. The next issue was about women and gender equality and how the issue of gender mainstreaming cannot be business as usual. According to Ms Ashnefai, gender mainstreaming is not an add on but a key strategy vis-à-vis sustainable development as sustainability is about inclusivity and participation of the most marginalized parts of society. To many the link between infrastructure and women will not be clear. To illustrate with an example, in Africa most of the food is produced by women and they are the sellers as well (they carry food to the market). In this regard, access to roads and a proper network in place is of great importance. Furthermore, if we are talking about clean water, women spend about 4 hours looking for a clean,



usable source every day. This is not an optimum utilization of human resources; the time that is spent in looking for a clean source of water can be utilized differently and effectively. The 4 hours that is spent in vain can surely be utilized either in educating the women or training them for a specific vocation; they can even spend that time with their family. We also know about the health damage that is caused because of the use of biomass fuel and we also know how intensely clean cooking energy is being promoted in most developing countries, including Africa. Tying up with the concept of knowledge transfer and power, unless women have agency they cannot access even the radio, which, incidentally, is a ready and inexpensive source of information. As an example, Ms Ashnefai spoke of how the radio

airs important programmes related to health care and pregnancy.

On a different note, Ms Ashenafi spoke of her role as the founder and chairperson of the women's bank in Ethiopia. This bank was established by 11 women and about 70 per cent of the equities are owned by them. Primarily a women-centric commercial bank, it is considered to be one of Africa's pioneer initiatives to integrate knowledge transfer and to be able to invest in green businesses. The following are the talking points which, going forward, Ms Ashenafi would like to focus on: (a) the implementation of sustainable development strategies; (b) to have a conversation about the linkage between the UN sustainable development goals and how these can be financed; and (c) Africa's approach to the

above-mentioned points. Given these, especially in the light of inclusive sustainable development, a top-down approach can no longer work. To achieve the desired integrated approach, we must empower all the stakeholders and implement strategies that the youth and women can follow. With this the session was concluded.

Mr Martin Heller was called next to address the gathering.

Mr Heller addressed the gathering by introducing his organization (Renewable Energy and the Energy Efficiency Partnership [REEEP]) and his role in it. REEEP is a front-runner organization that tries to find new ways of engaging to solve problems of the deployment of renewables, of energy efficiency, and, especially those of energy access. In that sense, the organization does a considerable part of its work in Africa, especially in eastern and southern Africa with a special focus on a line of work labelled as invest, learn, and share. The company is interested in finding investment opportunities and learning about market developments for new, frontier markets, that is, markets that are not functional in the conventional sense but can be improved and with it the livelihoods and prosperity, too, can be enhanced.

Apart from helping companies to evolve, REEEP establishes systems through which the policymakers and financiers can gain additional

information about the sector—they can learn about the sector and approach it from the perspective of market analysis. These markets show a great deal of commitment, engagement, and creativity. It is important to acknowledge that every developing country cannot have the same infrastructure and education and banking systems. Having said this, it is remarkable how Kenya has emerged as a global leader in mobile banking with more than 50 per cent of its trade happening through it. This indeed is a strong development that is essentially geared towards helping people branch out with their respective initiatives. With the current focus on Zambia, a rural electrification project financed by the Swedish government and the CEDA is underway. While Zambia pays close attention to the big mining areas, in its rural and peri-urban areas the grid extension is very weak. This programme, a 20 million euro project, is a grant that aims at attracting and stimulating the deployment of solar home systems. A new way of deploying off-grid systems or of buying off-grid systems is being tested to see if it is feasible. For the evaluation to be foolproof, proper monitoring and evaluation bids need to be set up at the very beginning of a project so that the learning from each project can be drawn out. Not doing this will be equivalent to losing half its value. In this manner REEEP is very keen on implementing

better learning systems. As mentioned earlier, REEEP concerns itself with establishing systems that can draw out the required information and data from businesses; this also refers to financial flows and how companies overcome other market barriers, how companies engage with customers, price points, etc., and how the lives of customers are impacted. According to Mr Heller, when we come to conferences such as this, people, it seems, are no longer concerned about the technology. The focus seems to have shifted to financing and business models; this, however, is only one side of the story. While there is no denying that we do need to focus on financing and business models, technologies, too, are developing rapidly which in turn will impact the crucial issue of price point. Bringing the costs down will help in the sale of products as this in many ways will be the touchstone of the efficiency of the systems. This battle of logistics is poised to get more interesting as various developments are taking place in Africa today. For many reasons, Africa has emerged as a fascinating entrepreneurial space that has an incredibly great future.

The session chairman concluded Mr Heller's address by underlining the expressed key concerns. Not only do we now know what is there in terms of infrastructural development in Africa, we have also focused on what one could describe as soft infrastructure, infrastructure

skills, and the banking systems without which the other things cannot take place. Mr Nalin Surie was called next to deliver his address.

Mr Surie opened his address by stressing the importance of reserving an exclusive plenary session to discuss the related developments in Africa. As we know, the African Union Agenda 2063 outlines critical enablers for Africa's transformation which include the international community that respects Africa's vision and aspirations. The community calls for learning from the diverse, unique, and shared experiences and the best practices of the various countries and regions that reflect the African approach to transformation. It has always been India's effort to help Africa's in its transformation while respecting its aspirations. As we know, Africa in its essence is much like India so much so that its diversity, culture, and religion form a mosaic that is at the core of India as well. Home to many old civilizations, Africa is marked by its economic and geographical diversity. Taken together, Africa, undoubtedly, is the continent of the future and it is the shared responsibility of the international community to ensure that Africa's potential converts into reality. It is also a continent that can be a major source of international economic growth in the years ahead. It is a major force, a great source of clean energy, for energy security, and maintaining



environmental sustainability by retaining its tropical diversity. When speaking of sustainable infrastructure for its transformation, Africa's maritime dimension is equally important to bear in mind. The chairperson, too, had mentioned this in his opening remarks. Africa's shores are washed by two oceans and the Mediterranean Sea. Of the 55 states, 31 are coastal and seven are island states. This has obvious economic and infrastructure-related dimensions attached to it. Apart from the fact that a considerable number of African countries are growing at a reasonably

high growth rate, it is equally important to note that of its own volition more and more African countries are transitioning to a democratic governance. As we all are aware, India's links with the eastern coasts of Africa go way back in history. In the distant past it was the super continent, Gondwanaland, which broke off and became Africa, South Asia, Australia, etc. India's links with Africa have sustained in the modern era too and these are not simply limited to the struggle for decolonization and against apartheid. From the early 1960s, India has willingly offered

its developmental expertise, experiences, and resources to the different African states. To begin with, India's focus was on infrastructure development, especially human resource development and setting up of institutions. While this remains a very important dimension of India's continuing collaboration with Africa, India's own abilities have grown in nature and scope and the activities have substantially broadened. As a result, today India is an important partner for Africa in its quest to achieve the objective it has set for itself within the framework of the African Union. The most recent manifestation of India's collaboration with Africa began in 2008 with the first India–Africa forum which was followed by the second in 2011, and in recent time, the summit in New Delhi where the entire continent was represented. In his opening address at the third Africa summit, Prime Minister Narendra Modi made it clear that India's collaboration efforts will inter alia contribute to the fulfilment of Africa's visions—vision of a prosperous, integrated, and a united continent. At the summit the prime minister promised that India will help connect Africa from Cairo to Cape Town, from Marrakesh to Mombasa, and will help develop its infrastructure, power, and irrigation, help add value to resources, and set up industrial information technology parks. He added that India will

continue to help develop Africa's human capital, including the health sector, will expand tele-education, continue to build institutions by helping in developing the agricultural sector, make available India's space assets and technology to act as a developmental multiplier, and expand India's flagship pan-African e-network project. The commitment is also to deepen the India–Africa partnership in clean energy, sustainable habitat, and the blue economy. Given the above-mentioned statements, it would be clear that India is committed to help in the development of sustainable infrastructure in Africa. This commitment matched by a financial commitment runs into several billion dollars. The required funds are in the process of being spent in consultation with our African partners on the basis of needs identified by them. According to Mr Surie, given the paucity of time, quoting numbers to corroborate India's commitment to Africa's transformation is neither required nor necessary. India has had considerable experience in developing programmes in Africa and the areas where implementation is needed have been identified. Corrective measures are being taken to ensure that we have learnt from our mistakes and our future programmes are more efficiently implemented. Africa's infrastructural needs are huge, its potential for producing renewable

energy is equally great, and yet investments in infrastructure do not produce immediate results and require a long-term commitment on the part of the developer and yield relatively low returns. This, however, is not a conundrum to which there is no solution. The potential of Africa as a source of future growth for the world economy is now well understood. Non-traditional donors vis-à-vis infrastructure and other projects have in recent years made serious inroads into Africa and are playing a more significant role not only in the development of individual countries but also in enhancing sub-regional and regional connectivity. Of late, a huge quantum of the financial resources for this are from coming from government sources and these investments and projects emerging there from will undoubtedly make it easier for new investments to be attracted in the infrastructure sector from other non-government sources. This should also make it easier to put in place public-private partnerships in sectors, such as transportation, water management, agriculture, and solar energy. More importantly, perhaps, the multilateral financial institutions and the G20 must step up. India has for long and consistently argued at the G20 that the international community must focus on the development of infrastructure in the developing countries. This will have the added advantage of generating demand and help

mitigate the continuing impact of the global financial and economic crisis. In so far as India is concerned, it is also the expectation that the Indian private and public sectors will take advantage of the lines of credit offered by the Government of India for use in African countries for setting up projects related to infrastructure. In this context, it is pertinent to recall that we in India have accumulated considerable experience, particularly with respect of the IT sector, railways, hydropower, electric transmission projects, and water management in Africa. Other areas include solar energy and it is our hope that our partners in Africa will take up the offer made by Prime Minister Modi to join the international solar alliance. Similarly, India's offer of space technology can play a game-changing role in helping transform the infrastructural landscape in Africa. It is important to recall the important role space applications have played and continue to play in the development of the Indian economy. The benefits of this are already clear in Africa through India's pan-African e-network project which is now operational in 42 of the countries of that continent. In conclusion, it would be beneficial to reiterate that Africa, given its vastness and diversity, comprises 55 states that are at different stages of development. There are also regional organisations in Africa which have plans for integration. The approach to the

continent has to be conducted at three levels, namely, bilateral, regional, and pan-African. No one country or financial institution or a group of multinational companies can alone address Africa's sustainable infrastructural needs. The need is for collaboration and to avoid duplications, to set common standards, and to look at the developmental context rather than the limited

context of bottom lines and of the extraction of resources. In this context, it is also important to ensure that Africa's rainforests are not only sustained but that their illegal destruction is stopped and the damage done is repaired. Africa's ecosystem must be sustained and enlarged not only for the sake of Africa but for the sake of the world's ecological sustenance.



SIGNING OF MoU-II







SIGNING OF MoU-I





MoU between TERI and the French Alternative Energies and the Atomic Energy Commission (CEA)

One of the striking things about TERI is its vast number of collaborative initiatives with various worldwide leading institutions. This afternoon another such endeavour is poised to join the fray. The sixth form of a Memorandum of Understanding (MoU), between TERI and the French Alternative Energies and the Atomic Energy Commission (CEA) was signed. Both institutions are known for carrying out cutting-edge work to cover some of the vital areas in this field that include energy storage—an area in



which TERI is establishing a world-class battery platform. Smart energy for smart cities including the use of solar electrical mobility and solar PV forecasting techniques—a technology that is vital for the larger take-up of solar power—is an absolute must. And last but not least, strategizing on how best to integrate renewable power in to India's electricity grid on a large scale is an important milestone to cover vis-à-vis renewable energy. Hence to commence the signing of the MoU, his Excellency Alexander Ziegler the

Ambassador of France to India, Dr Emmanuel Floa, deputy head, International Partnerships at CEA Tech, and Mr Shiris Karot, director, Energy Environment Technology Development at TERI were called. After the folders were exchanged, a mark of signing the MoU, Ambassador Ziegler was requested to address the gathering.

Ambassador Ziegler opened his address by thanking Dr Ajay Mathur, Dr Ghosh, and Dr Floa and stressed the importance of the summit, especially since the Paris Agreement is slated to get implemented before the next COP. At the time of opening the event, the honourable President

Mr Pranab Mukherjee stated that providing clean energy is a top priority and a formidable challenge that the world is facing. Innovation will play a key role in the development of technological solutions for renewable energy and our main challenge will be to develop solutions that which will allow us to reconcile enormous energy needs the world over, especially in India where the necessity of establishing a cleaner development model has reached a critical urgency. Technologies exist but they have to be efficient, affordable, and demonstrative of the fact that they can be used on a daily basis. In





this context, collaborations between two major institutions, TERI and CEA, will be of high significance as it will allow us to share at an international level best practices and knowledge. CEA which is France's alternative energy and atomic energy commission was recently ranked by Reuters as the world's most innovative public research organization. All over France, 16,000 technicians, engineers, and researchers in no less than ten government-run centres are working everyday towards research development and innovation mostly in the field of energy while covering sectors, such as health and security as well. An institute that is part of the CEA and employs 1,400 people conducts technological





research on new energy technologies including crucial topics, such as energy storage, hydrogen projection and management, solar thermal photovoltaic, and biomass. This new cooperation, namely, the new collaboration that we have decided on today will give TERI and CEA the opportunity to develop a competent integration of renewable energy and more specifically solar energy while including key aspects of storage and integration. The electric mobility project will also play a significant role in reducing India's carbon emission including the transport sector which contributes nearly 15 per cent of India's energy-related CO₂ emissions.

His Excellency Alexander Ziegler closed his address by wishing TERI and CEA the very best in all their future endeavours.



SPECIAL ADDRESS





Special Address: Mr Amitabh Kant

The closing session was graced by Mr Amitabh Kant, CEO of NITI Ayog, the National Institute for Transforming India of the Government of India, and Mr Jayant Banthia, Former Chief Secretary of Maharashtra, joined him on stage as Chair for the session.

Mr Jayant Banthia started the session with his concise thoughts on the last three days of the event and some of the things that organizations such as NITI Aayog may take up. Demographically, the current global population of 7 billion is likely to hit 8 billion by 2024, 9 billion by 2050, and 10 billion by 2100. These are what are called the medium population projection by the UN. India's population correspondingly would be 1.3 billion, 1.4 billion, 1.6 billion, 1.8 billion, and it is not likely to stabilize before 2070. With this growing population arises issues of greater amounts of food and water, better air quality, etc.; that is, questions about sustainable development. Therefore, it is a good time to revisit and redefine development; economic growth needs to be environment friendly. The next question then is how to resolve this conflict between growth versus sustainability: according to Mr Banthia, there are three key parameters—economic development, environmental sustainability, and

social inclusion. For example, the move away from the MDGs to the SDGs: MDGs were of developing countries, SDGs are now for all.

The state of Maharashtra undertook a special study in collaboration with TERI six years ago on hundred-year projections for variability in temperature and precipitation. (Incidentally, Maharashtra was the first state in the country to get such a study done.) The report of the study suggested that within Maharashtra, there would be a rise in temperature by three to four degrees and precipitation is going to be more intense while the quantum will remain same. One of the implications of these findings is on health issues. Over the years, the intensity of the heat particularly in the urban areas is creating a lot of distress. And, given the fact that India's population is also aging, it is going to be a matter of greater distress on the aging population. Also, with rapid urban growth in India, environmental issues and urban health issues are going to be more and more challenging in the years to come. On the other hand, cities such as Mumbai, Hyderabad, and Bangalore experienced floods this year raising challenges in urban displacement of populations.

All-round development, whether it is on health



system, social issues, agriculture, or environment, requires good governance. There are challenges in good governance, including for sustainable development. In order to provide evidentiary support of the changes made in the 15 years available for implementation of the SDGs, good data quality data is essential.

Mr Amitabh Kant began his address by bringing the focus on rapid urban growth in India and the fact that it is going to continue to urbanize rapidly, whether we like it or not. Going by the latest McKinsey's Study, 700

million Indians are going to reside in urban areas by 2050; every minute there are 30 Indians moving from rural areas to urban areas and this is inevitable. Therefore, it is important that the kind of unplanned urbanisation that is taking place in India be stopped and very well-planned urbanisation be taken up.

Cities actually account for just 3% of the Earth's landmass, yet these account for almost 80% of the global GDP and house almost 60% of the world's population; these are also responsible for almost 8% of CO2 emissions in the world.

When America and Europe were urbanizing, land, gas, and water were all very cheaply available; they could create cities like Atlanta where 98.2 percent of the people travel by cars. So, America had the luxury of creating the most polluting cities in the world. It is important not to make same mistakes that the Americans did, the Chinese have already made those mistakes, created sprawling cities; and my belief is that the process of urbanization has ended across America, it has ended across Europe, it is nearing its completion in China. But the process has just begun in India.

India will see tremendous urbanization in the next five to six decades than the country has seen in the last five thousand years. Therefore, it is very important that India charts out its own path of innovative, sustainable urbanization. It has the scope for becoming model for urbanizations for the world. In Indian context, it is very important



that as we embark on this path of smart cities, we need to embed our cities with good public transportation, recycle our waste, recycle our water. In India, 84% water actually goes for irrigation purposes and just 12% for industry and 4% for human consumption. With the practice of providing free water and electricity, states such as Delhi, Haryana, Rajasthan and Punjab are increasingly turning into deserts. The actions are ruining not only our own generation but also future generations.

As far as sustainability is concerned, India is fully committed to the sustainable development goals; the country is deeply committed to the various pledges made in Paris in 2015 and has taken a vast number of measures relating to this. In this regard, the Government of India launched the 100 smart cities programme and focussed on 175 GW of clean energy, which are extremely ambitious programmes. No country



in the world has ever done this: no country in the world has planned for 100 smart cities, fifty metros. No country has done the kind of LED procurement which India has done. These are mammoth programmes that need to be sustained, encouraged, and expanded. And this cannot be the responsibility of just the government because, at the end of the day, it is not just the government making commitments but the government of behalf of the people: you cannot have smart cities till you have smart people. It will be very difficult for India to achieve sustainable development goals or to achieve its commitment at the Paris summit unless and until each individual becomes active participants and player in this.

The biggest radical restructuring that needed is in our education and health systems. India can't be made into a sustainable nation till

education and health and nutrition system are restructured. India is also passing through a window of demographic transition where 72% of population is below the age of 32, and sustainability can't be achieved if 39% of the children are stunted. So, a focus on nutrition is needed. Similarly, sustainable development goals cannot be achieved if you have a class 5 student who is unable to read and write in his/her mother tongue and that is happening to almost 40% of our schools. Therefore, it is very





important that the education system and health system need to be restructured, with a strong

focus on nutrition. That alone will enable India to become a sustainable nation and achieve a quantum jump towards achieving its sustainable development goals. Agreeing with Mr Jayant Banthia, he further emphasized that it is about good governance becoming good politics, and at the end of the day it is about this good politics really delivering on ground.

The event also witnessed release of TERI's latest publication, *People, Planet and Progress: Beyond 2015* by Dr Ajay Mathur, Director General of TERI; Mr P G Chakraborty, Distinguished Fellow of the Green Growth and Resource Efficiency, TERI; as well as Mr Amitabh Kant and Mr Jayant Banthia.

On the occasion, Dr Chakraborty mentioned that the book is second in the series of our global sustainable development report, the first report



was released in 2015. The book covers six planetary issues and six issues of the people and also traces the progress that the various countries and regions of the world have made over the years. The book studies planetary health and how development can be achieved in a harmonious manner: how people from all regions of the world can work and develop together without

seriously impacting planetary health. These are some of the issues put forth in a theoretical and conceptual framework and analysed with data.

This is a monumental publication in the sense that many issues as well as regions were covered in a limited time frame actually. A lot of young professionals from TERI have worked together to make this publication possible.



CULTURAL PERFORMANCE AND DINNER









KEYNOTE ADDRESS





Professor Jeffrey Sachs, Director—The Earth Institute, Columbia University (via video)

Chair: **Dr Ajay Mathur**, *Director General, TERI*

Dr Ajay Mathur, *Director General, TERI* initiated the session by introducing Professor Jeffrey Sachs, Director—The Earth Institute, Columbia University (via video), one of the most influential thinkers, doers, and advocates related to sustainable development in the world.

Professor Jeffrey Sachs began his address by describing how the historic Paris climate agreement has gone into effect because the requisite 55 per cent of countries covering 55 per cent of the global emissions have now ratified the agreement reached last year and India's significant role in the same. It has been one year since the sustainable development goals (SDGs) were adopted and less than a year since the Paris Climate Agreement was first adopted but is already in effect. And, thus it is a good time to, therefore, discuss the practicalities of what can really be achieved. Upon adoption of SDGs, the 193 member states of the United Nations agreed on the basic concept of achieving improved economic development in terms of something new and beyond what we measure directly by our gross national product (GNP) and by increase of the output per capita. Therefore,

the aim should be economic development that is socially inclusive and environmentally sustainable in order to achieve quality on the path of economic development. India, today, is at the crucial crossroads where economic growth is now robust but the challenges of achieving economic development that is simultaneously inclusive and sustainable is the paramount challenge. He went on to speak about the huge challenges in terms of fundamental concepts that form the basis of economic growth and should be built on strong investments in people, quality investments in infrastructure, and protection of the environment. In terms of India, this is a paramount test as well. If one reviews the content of the 17 sustainable development goals (SDGs), universality of access to the basic goals, needs, and investments in human capital that can ensure the inclusivity of economic development,



and a transformation of technology that ensures development consistent with environmental sustainability is at the core. For India, it seems that SDGs 3, 4, 5, 6, and 7 are of tremendous importance. SDG 3 focusses on the core of the economic development and universal access to health services; SDG 4 emphasizes on universal access to quality education from pre-k at least through skilled occasional education; SDG 5 speaks about how universal access should engage the population; SDG 6 mentions that there should be access to safe drinking water and sanitation for the population; SDG 7 emphasizes that there should be universal access to modern energy services, electrification, and modern and safe cooking fuel for the entire population. In this context, it is significant to note that the sustainable development challenge is tough and urgent because the objectives of investment in human capital and basic infrastructure need to

be combined with environmental imperatives and these are the two goals covered under SDGs 11, 12, 13, 14, and 15. Interestingly, all these are immensely significant for India as well.

SDG 11 aimed at sustainable cities and communities will have to accommodate at least another 300 to 400 million Indians over the next thirty years along with ensuring safety and cleanliness. In this regard, it is important to note that Indian cities, today, are beset by massive air and water pollution, lack of green spaces, crowded congested traffic, and many other great challenges of mega urban areas. SDG 12 calls on our cities to recycle waste attractively and check the release of toxic substances by closing the circle of production so that today's waste becomes an input for production rather than release into the environment. This is obviously of paramount significance for India's wealth because a significant part of India's environment

is hindered by toxic chemical releases into the air and water. SDG 13 addresses climate change and its impacts via the essence of the Paris Climate Agreement. This, in fact, is one of the most complicated challenges worldwide and India represents one of the toughest cases all over the world in its endeavour to increase access to energy services. However, to do so along with a simultaneous reduction in emissions associated with energy services to protect the climate, poses a double challenge due to India's need for energy services. At the same time, it aims to meet the conditions of the Paris Agreement to limit global warming and aim for well below 2°C at a time when we are already more than halfway to the limit already established. SDGs 14 and 15 focus on the environmental mandate of protecting life under water and on land. The terrestrial ecosystem in many parts of India is already profoundly degraded since habitats have



been lost and India's remarkable biodiversity has already been pushed to the limits of survival for many diverse species in India with great risks due to further climate change. The road on the path to achieving sustainable development goals is tough and their operation is also a profound challenge. He went on to reiterate how no major region in the world, as of today, is completely focussed on the issue in a proper way insofar the attention spans or the ability to focus on these challenges is really a huge challenge.

Professor Sachs also discussed a few common pointers in the Indian and American context as he found certain similar challenges in the two countries. In particular, he emphasized on the technological challenges. Almost all of the sustainable development goals require the application of cutting edge technologies, especially advanced information technologies and their role in enabling mass delivery of high



quality help, education, and infrastructure services and the deployment of advanced energy systems. In order for India or the USA to enjoy a high quality energy system, it is imperative to deploy advanced power grids renewable energy systems and new material technologies in a sophisticated way. He went on to mention how India unquestionably has one of the most ingenious and clever leaders in the development of information technologies and so, it becomes imperative that India plays its role in resolving its own issues as well as protecting the interests of the developing world. As an advanced nation, India's unique identity in low cost ranking in e-governance and many other major breakthroughs will ensure that the country surges ahead towards introducing new and innovative approaches to succeed in the sustainable development goals. A significant aspect of the new technologies is the invention of new methodologies, systems,



and practices, rather than a mere emulation of the advanced countries. Further, achievement of these goals will require wholly new delivery systems, technological approaches, standards of transport, power generation, and education, all building on the advances of information technology.

In terms of long-term complicated problems such as energy transformation or quality education systems or good health for all, it is important to maintain consistency in terms of plan of action along with adequate planning. He enumerated how the although the US has boldly bartered the climate change agenda, a basic framework for carrying out a long term decarbonisation of the US economy is still lacking. At the same time, he acknowledged how India has maintained its commitment to the common energy agenda. Professor Sachs, while describing TERI as a great intellectual centre and think tank

for India, urged the Institute to devise a focussed approach on how to accomplish the sustainable development goals and take forward the agenda of the Paris climate agreement which includes planning on the energy trajectory up to the year 2050 and even beyond. He stressed on finding a serious, analytical, and intellectual approach, mobilising the best of India's minds in order to form pathways to success for these objectives.. If India can come up with successful models, the integration with the rest of the world will be extraordinarily powerful. It is important that both India and United States work in unison with the other major regions of the world and the African Union as well so as to achieve long-term pathways that are consistent with the goals

According to Professor Sachs, it is a challenge for the world to fathom the plans and pathways for success of the SDGs. What are the long-term trajectories that assess in a technological, financial, and organisational manner and in what ways our national or federal governments willing to adopt these strategies and impart these to the states? He expressed hope that WSDS will bring together path leaders and engineering

leaders to map out the technological possibilities. And in each of the critical areas, that is in health, education, infrastructure, climate, and urban design, the basic fundamental challenge is one of mobilizing best technologies and ensuring long term planning and democratic participation to achieve the Goals.

He concluded by reiterating that the 193 member states, including India, USA, the European Union, Russia, the Gulf Countries, countries of the African Union countries, and others, all agreed that on achievement of the sustainable development goals and the Paris Agreement post hard negotiated agreements. In his view, equanimity is a signal of urgency in a world that has few common grounds of agreement and in this light, pressed upon India's unique intellectual leadership towards this end.

Next, Dr Ajay Mathur spoke about the Professor Sachs brilliant overview of both the challenges as well as way forward in his address. He also requested I think it is him to conduct a state of the SDGs address at the inauguration of the next WSDS.



THEMATIC TRACKS





Youth Ecopreneurs



The Energy and Resources Institute (TERI) and Genpact organized a thought provoking session titled, ‘Youth Ecopreneurs’ on 8 October 2016 at the India Habitat Centre, Lodhi Road, New Delhi. The session was held as one of the thematic tracks during the World Sustainable Development Summit (WSDS) from 5-8 October 2016. The objective of the session was to depict the Genpact – TERI journey of project LEADearthSHIP that essentially focused on going beyond the confines of text-based and a linear training process into versatile grounds of education, integrating internet and social media to channelize the potential of the youth. The agenda is attached as Annexure A.

Welcome Address

The ceremony commenced with a welcome address by Dr Ajay Mathur, Director General, TERI. Dr Mathur said that this forum was about discussing how to go ahead looking at opportunities for the future. He added that more and more young people attend college to become entrepreneurs and have new ideas and abilities to take risks.

Introduction to the thematic track, ‘Youth Ecopreneurs’

The welcome address was followed by an introduction to the thematic track by Mr Prabir Sengupta, Director- Knowledge Management and Distinguished Fellow, TERI. In his address,



he gave an introduction to project and spoke about the relevance of this programme. He shared that India is a very young country with more than 50% of the population below 25 years of age. He also shared that the youth must focus on developing their entrepreneurial capability by understanding socio- economic issues. He added

that the project is very unique in its approach and has impacted many people in different ways.

Special Address

The session was followed by a special address by Ms Nandini Kocchar, Assistant Vice President, Genpact who emphasised on the fact that





winning is not important now a days, it is what one has learnt from the entire experience. She shared that this project has seen very innovative projects with initiatives ranging from initiating outreach in communities, mapping current socio-economic problems, engaging stakeholders in projects and so on. She spoke about how youth today must cooperate and collaborate with each other to achieve desired results. She praised the students by saying that it requires a lot of courage to work on issues such as menstrual health of women in slums, breaking gender stereotypes and protecting stray animals. She concluded her session by sharing that it is the practical experience and knowledge that are more imbibed and relate to 21st Century skills.

Overview of Genpact – TERI journey of project LEADearthSHIP

Ms. Ragini Kumar, Associate Fellow & Area Convenor, Environmental Education &

Awareness, Sustainable Development Outreach & Youth Education, TERI. Ms Kumar shared a brief journey of LEADearthSHIP and why it was important for youth to take such initiatives at their own level. She spoke about the various components of LEADearthSHIP and highlighted the work undertaken by the students and colleges.

LEADearthSHIP film was also launched during the event which showcased the development through learning opportunities for the fellows and how they worked towards these opportunities through knowledge, skills and values with their acquired education.

Opportunities for Youth Ecopreneurs

This session brought together young entrepreneurs from the field of ecology, biodiversity and environmental protection together on one platform. The session witnessed discussion of ideas and experiences of these people covering their struggles, challenges and sources of

inspiration. Each entrepreneur spoke about how they were prompted to work towards a cause and what helped them in achieving their goals.

Mr Sumit Sabherwal, Director, A&S Creations spoke about his enterprise that works for providing radio collars to animals like tigers and leopards for their safety and security. He shared with the audience that he got this idea overnight and started to execute it with the help of his close friends. He shared that he started with only three people but now his enterprise employed 40 people who aspired to work for bringing about a change.

Mr Pravin Nikam, Founder, ROSHNI, an NGO working towards providing menstrual health solutions to women and young girls belonging to marginalized families across Pune also spoke about his entrepreneurial journey. He shared that each individual aspiring to become an entrepreneur should be ready to take challenges, embrace failure and be ready to innovate and collaborate. He shared some of his personal experiences that had inspired him to work on an issue which is considered as a taboo in the Indian society.

Mr Vimlendu Jha, Director, Sweccha, shared that there is no fixed formula to become an entrepreneur. According to his belief, it is based on instinct, problem, opportunity and the person him or herself. All the speakers emphasized

on the fact that context is very important in initiating an entrepreneurial venture. It is not the ideas that guide the way, but the entire execution of an idea.

Two highlights of the sessions:

- ❖ Collaboration rather than competition is the key to success for an entrepreneur
- ❖ Problems could be common but solutions should be different based on context and opportunities

Quotes from speakers:

Mr Vimlendu Jha, Director, Sweccha: “Young people these days attribute more virtue to ideas. However, virtue is not in the idea but in its execution”. Mr Pravin Nikam, Founder, ROSHNI: “We need to venture where we have never been to provide innovative solutions”.

Setting the theme

Ms Rachna Ghiya, Founder- CrispTalks, Curator-enTRIPreneur.in, City Mayor-Entrepreneurcafe.org started the discussion by saying how innovation lies in every action and thought process of ours. One just need to process a little bit, shape it up and then bring it out in the world. She from her life example narrated how a simple thought/ idea can pinch one at any juncture in life and it is young minds, who can take it to a next level.

Presentations by project teams

Project Youth for S.P.L.A.S.H (Strengthening People's Life: Accentuating on Sanitation and Hygiene)

Project Youth for S.P.L.A.S.H was launched with a perspective to develop and promote integrated participatory learning on issues of water quality, sanitation facilities, and hygiene behaviours aimed at creating healthy homes in urban slums and urban villages of Delhi and Uttarakhand. The team identified Lalbagh area of New Delhi and undertook several focus group discussions with the people to understand the current situation of WASH in the communities and identifying the key indicators. Follow up visits and regular engagement with the women and children were done to achieve sustained results.

Poster competitions and knowledge workshops were organized to sensitize and educate people on the relevance and the need to understand the issue with much seriousness and also devise plausible collective actions.

Project Directing Discourse

Project Directing Discourse aims at carefully integrating the ancient water resource management ways through the historical sites and their significance today. The project emphasizes

sustainability in conjunction with heritage by highlighting the ancient water management systems juxtaposing past water conditions with the present. Additionally, it also aims at generating sensitization towards the deteriorating condition of the monuments and a push start towards their conservation through small conjoined efforts. It reaches out to a range of audience belonging to different age groups and backgrounds engaging them in a discourse of history through workshops incorporated with relevant activities. The project also intended at empowering school students with the knowledge of Delhi's history so that they appreciate the heritage on their home land through heritage walks.

Project T.R.A.S (THINK RESPONSIBLE, ACT SUSTAINABLE)

Project T.R.A.S aimed at reaching the objectives primarily through awareness, education, and engagement of students; optimizing usage of electricity, water, and fuel and waste management. The project started with a formal assessment of students through questionnaires followed by training and orientation programs, talk shows (Kya Aap Jantey Hain), displaying videos on the LED, posters, and public announcements on PA system and Street Plays in the institute. Segregation of waste and weighing

was done conjunction with workshops. A training session on ‘Future Hospitality Managers’ was organized witnessing a massive participation of around 230 students from the campus. Many such initiatives were undertaken under the project. The team directed their efforts towards achieving a sustainable environment through a holistic approach that had magnifying impact on the campus and at large the environment we all live in.

Felicitations of Winners

The Special Prize Distribution Ceremony as part of this session was marked by the presence of Mr Prabir Sengupta, Director- Knowledge Management and Distinguished Fellow, TERI; Ms Nandini Kocchar, Assistant Vice President, Genpact; Ms Livleen Kahlon, Associate Director, Environmental Education and Awareness, Sustainable Development Outreach & Youth Education, TERI. The distinguished guests motivated and encouraged the young fellows to keep up the good work and come up with more innovation, development and implementation of their sustainable product by positioning it in a challenging environment.

The felicitation of winners was made to the top 3 teams of Campus Impact Challenge who competed with each other for the ‘Genpact Campus Impact’ award. The 8 teams had to



present their projects highlighting the activities conducted, important achievements and milestones, challenges faced and target groups and impact on them. In addition to this, the felicitation was also made to 3 outstanding sustainability projects of LEADearth Fellows for the ‘LEADearth Fellowship Outstanding Project Award’.

Please find below the names of top 3 Campus Impact Challenge awardee and best 3 sustainability projects of LEADearth Fellows:

Genpact Campus Impact award

- ❖ **First Prize:** Be Desi (Duty to empathize sterilize and immunize) Adopt a Desi, Motilal Nehru College, University of Delhi
- ❖ **Second Prize:** T.R.A.S. (Think Responsible, Act Sustainable), Institute of Hotel Management (IHM), Pusa
- ❖ **Third Prize:** Sanitation Health: Need of the hour: Shaheed Rajguru College of Applied Sciences for Women, University of Delhi

LEADearth Fellowship Outstanding Project award

- ❖ Ankush Bhatia, TERI University; Sachin Paynand, TERI University and Nitin Yadav, Dronacharya College of Engineering for Project Solar Chirag
- ❖ Shubhi Singh, Kamla Nehru College, University of Delhi; Ishita Khosla, Delhi College of Arts & Commerce, University of Delhi and Mukul Gupta, Dr. Bhim Rao Ambedkar College, University of Delhi for Project Flashback
- ❖ Ishita Jalan, Delhi Technological University; Yugal Shandlya, Sri Venkateswara College, University of Delhi and Niharika Sharma, Janki Devi Memorial College, University of Delhi for Project Directing Discourse

Concluding Remarks

The concluding remarks was delivered by Ms Livleen Kahlon, Associate Director, Environmental Education and Awareness, Sustainable Development Outreach & Youth Education, TERI .Ms Kahlon conveyed her gratitude to all the participations, faculties and panellists and presenters for their time and participation in the event. She expressed her satisfaction with the interactive nature of the discussions while congratulating winners and was delighted at the extensive networking that had taken place, which she hoped would continue going forward.



International solar Alliance

WELCOME ADDRESS:

Dr. Ajay Mathur, *Director General*

SESSION CHAIR:

Mr. Upendra Tripathy, *Secretary MNRE, Ex officio Interim DG, ISA*

SPEAKERS:

1. Mr. Guy-Cedric Werlings, *National Focal Point of ISA, France*
2. Mr. Jaco Cilliers, *UNDP Country Director*
3. Mr. Jean-Pascal Pham-Ba, *Secretary General, Terrawatt Initiatives*
4. Mr. Inderjit Singh, *Additional Secretary, MNRE*
5. Mr. Shirish Garud, *Director, TERI*
6. Mr. Dr. K. S. Popli, *CMD, IREDA*
7. H.E. Ms Brigitte Collet, *Ambassador for Renewable Energy, Special Representative of the French government for the International Solar Alliance*

The International Solar Alliance (ISA) is a joint venture effort by India and France to bring together countries with high solar resource. It was launched to promote accelerated deployment of solar energy in pursuit of the objectives set by the Paris Declaration on COP 21. The alliance would have participation from 121 countries which fall between Tropic of Cancer and Tropic of Capricorn. ISA make joint efforts through innovative policies, projects, programs, capacity building measures and financial instruments to

achieve its goal of bringing clean, affordable and renewable energy within the reach of all.

During the Welcome address, Ajay Mathur said that ISA is the platform to accelerate change. As Jean-Pascal Pham-Ba, Secretary General, Terrawatt Initiatives, mentioned, it has four principle aims to achieve change of scale in the deployment of solar energy, to achieve objectives set by the Paris Agreement on climate change (date), to achieve climate justice and take solar energy from ritual market to developing



countries, to achieve change of scale possible from financial and technical point of view, to achieve new modes of collaboration and co-operation among countries and all stake holders. He also mentioned that the solar revolution can be triggered by sharing information between nations through digital platform. Through this, the knowledge gap between countries can be

addressed. By implementing successful business models replicated on large scale i.e multiplicity of small heterogenous projects. He stressed that obstacles for solar energy can be addressed by harmonization and aggregation of demands.

Next session was handled by Jaco Cilliers, UNDP Country Director. His vision about ISA is a like cross stitch network i.e strongest stitch

between different countries to share knowledge and resources, and to promote clean Energy and make the environment friendly.

Shrish Garud mentioned five key focus areas of ISA:-

- a. Promote solar technologies and investment in the solar sector to enhance Income generation for the poor and global environment.



- b. Formulate projects and programmes to promote solar applications.
- c. Develop Innovative Financial Mechanism to reduce cost of capital.
- d. Build common knowledge e-portal.
- e. Facilitate capacity building for promotion and absorption of solar technologies and R&D among member countries.

Mr Guy-Cedric Werlings, National Focal Point of International Solar Alliance, France, emphasized the goal to bring about change in the scale of deployment of solar energy across the world,

and said, “We are the first ‘buyers group’ of countries. The idea is to borrow surplus energy from solar rich countries and give it to developing nations that need it. We want to be a platform for knowledge exchange that promotes decisions and action. Only through harmony can we overcome the challenge of scaling up solar energy.”

Mr. Dr. K. S. Popli, CMD, IREDA The total

investment required for the development of ISA is more than USD 1000 million, which is expected to be contributed by countries and corporates on a voluntary basis. India, being a host country, is making monetary contribution of USD 16 million. He discussed about voluntary corpus contributions.

Ms Brigitte Collet, Ambassador for Renewable Energy, Special Representative of the French government for the International Solar Alliance, talked about India’s active participation in Paris Agreement and how India demonstrated



leadership for the same. As per her, agreement should be translated into action to achieve clean climate change, specially to achieve low carbon energy. ISA addresses the problems faced by humanity today regarding gas emission, electricity production etc.

Mr. Inder Jit Singh, Additional Secretary, MNRE explained about the financial aspects of ISA. He pointed out that currently global



investments in Renewable energy is more than Conventional Energy. He believes in successful demonstration of projects so that we can achieve trust from different financial institutions.

Keynote Speaker Upendra Tripathy covered all aspects of ISA and also answered the questionnaire session from other dignitaries. As per his estimation \$1 trillion will be required for this purpose. He convinced different financial



institutions. Different financial institutions' like ADB, world bank, etc have earmarked a small percentage of their funds for renewable energy. He said that it is for the first time that an international organization is being headquartered in India and the alliance will be an independent international body not a set up meant to promote

India's interests. He also said that many more countries have showed interest to join as a part ISA.

Highlights of the event were launching of the first edition of the journal on international solar alliance and also introduction of new interns associated with ISA during the ceremony.



Collaborative Regional Learning and Brokering Knowledge to Enhance Resilience to Climate Change in South Asia

SPEAKERS:

Chair

Mihir Bhatt, *CDKN and AIDMI*

Aditi Kapoor, *Red Cross*

Vandana Chauhan, *AIDMI*

Raghu Babu Nukala, *GIZ*

Damandeep Singh, *CDP India*

South Asia is one of the world's fastest growing regions in terms of population and urban growth. Scientific assessment indicates that Climate change challenges are real and urgent.

As many countries make final preparations in coming months for Marakesh COP and Paris ratification, there is a growing need for policies that take an integrated approach to combat climate change, not just within a country but holistically as a region too. And ground zero is South Asia, where 24% of the world's population live with high growth potential.

Climate change affects both natural and human systems and the extent of impacts varies from one region to the other. As a result, it has

huge socio-political and economic implications. In South Asia, we are uniquely placed as we share the same climate, our water resources and land features including synergies in the social and cultural fabric. The transboundary nature of impacts in many cases are evident including the issue of floods and flash floods, water scarcity and drought and migration and extreme events of heat and cold waves, which have been on an increase. The paper, titled Assessing the Costs of Climate Change and Adaptation in South Asia, forecasts that six countries - Bangladesh, Bhutan, India, the Maldives, Nepal, and Sri Lanka - will see an average economic loss of around 1.8 percent of their collective annual gross domestic product (GDP) by 2050, although South Asia has low per capita GHG emissions. Therefore, regional cooperation is the need of the day to explore the solution space to enhance resilience of communities in the region.

CDKN has been working in the region (primarily with Bangladesh, India, Nepal and Pakistan) for past 7 years of high quality impactful work. One of the major achievements



of CDKN has been its ability to affect collaborative regional learning synthesizing experiences and information into usable knowledge that may be replicated amongst and within regions at the national and sub-national level.

Losses and damages could be reduced with effective regional cooperation on grounds of timely communication for planning and action, on structuring of policies and practices that allow for better coordination and distribution of resources to prevent social and economic disruptions. Regional networks could play an important role for a climate compatible development. The fifteenth Summit meeting of the South Asian Association for Regional Cooperation (SAARC) in 2008 reiterated the need for increased regional cooperation in tackling climate change, in particular need for building

capacities and on awareness raising. Regional, national, local platforms, forums provide the right environment for sharing of experiences. Organizing “Collaborative Regional Learning and Brokering Knowledge” on key topics could be an approach for promoting regional resilience to climate change. Exchange visits demonstrating the use of successful technologies/ techniques, sharing of practices and knowledge products that have worked would benefit the societies in large. A large scale regional programme on raising awareness and capability development on climate change issues is therefore critical.

This session brings together experiences from the countries in the region that has potential for wider impact and utility than its immediate geographical and policy domain. The speakers in the session will reflect how climate change

issues are common across the region with varied impacts, through a “shared learning and scaling-up approach” Key questions are: What have we learned about regional collaboration? What works? What can work better?

The question we consider then, is how can climate and policy practitioners, such as development partners, government agencies, NGOs, academics or others involved and concerned with sustainable and equitable development, apply these in practices – that is: Share and learn from each other – what works and how they can be replicate to achieve climate compatible development.

The Event: The session aimed at discussing and building on strategies for knowledge sharing and collaboration to enhance resilience in South Asia. The session discussed and acknowledged that knowledge sharing is an important basis for collaboration within South Asia. The panelists



also highlighted by the panelists that regional cooperation should involve addressing the inequality of resilience and should also identify the already existing resilient communities; human capital in terms of knowledge and actual action. The panel also identified another area of collaboration for South Asia through sharing prosperity within the region.

The session agreed that knowledge is an important basis for collaboration within South Asia. One of the next steps will be to develop tools or methodologies that take rural, urban, ecosystem level for collaboration by regional organizations. This will build more local capacity and regional capability. Further, we must design a South Asia wide strategic support group. Further, a donor dialogue that leads to direct and meaningful investments towards alleviating areas in need must be developed. An integrated social development and disaster risk management approach that aims simultaneously to reduce risks, adapt to climate change and look at the development agenda is an ideal strategy. Convergence of these three aspects is crucial. Climate smart disaster management approach is on such strategy. It is aimed at tackling disaster risks, enhance adaptive capacity and build capacity. In the future, we need to build the capacity to capture and integrate traditional knowledge.

The panel spoke about the steps towards climate resilience and risk management including the development of tools or methodologies that take rural, urban, ecosystem level for collaboration by regional organizations. This will build more local capacities and regional capabilities. The panel discussion also highlighted the role of panchayats and governments in making adaptation a local effort through putting public resources in to proper use. Integrated risk management method was identified by the panel which also includes ecosystem health to study climate resilience issues. Further, panel also recommended the need for a design for South Asia wide strategic support group. The panel emphasized the requirement of donor dialogue series in South Asia that may lead to direct and meaningful investments towards alleviating areas in need.

Mr. Mihir Bhatt stated that this event aimed to discuss and build on strategies for knowledge sharing and collaboration. Knowledge addresses inequality. It is assumed that resilience building will work equally. If not addressed, it could result in unequal resilience capacity. Knowledge allows for the identification of stakeholders and potential human capital.

Adaptation is a local effort. Panchayats drive adaptation resilience. It was found that the government and Panchayat has enough resources. Money isn't the limiting factor as it is often thought. We need to think about putting these public resources to proper use so that we see results. Further we cannot work in silos as we often do due to man-made boundaries (e.g. state/national borders). We have to look at a larger scale because there are links and synergies at work. Integrated risk management method





where ecosystem health is included is the way to study climate resilience issues. Further, gender should not be an “add-on”. The most vulnerable groups will be women even within castes or various economic strata. Gender concerns should be mainstreamed in all actions.

Since Paris, there has been a considerable increase in cities responding to climate action.

The idea is that it takes collaborative action from cities to achieve resilience. “Every minute, 30 people move to urban areas”. We need to create infrastructure and capacity to accommodate for this. Sustainable urban planning is an extremely crucial exercise in order to build climate resilience cities.



Scaling Up Energy Efficiency in India



The Thematic track on ‘Scaling Up Energy Efficiency in India’ was hosted in collaboration with the Energy Efficiency Services Limited (EESL). The track was deliberated on issues related to Energy Efficiency measures and policies with special emphasis on their process of implementation, challenges and achievements. The session was chaired by Mr. Sanjay Seth, Sr. Director, TERI. The session was opened by Mr. R.K.Rakhra (AGM, EESL). He started by stating “Energy is a critical parameter for Nation’s Growth, the per-capita energy consumption signifies the social economic index of a country”. In his opening remarks and highlighted the need for the scaling up of energy efficiency in India. In his opening remarks he stressed in order to achieve maximum benefits, the focus should be on to act and provide end user solutions,



instead of just focusing upon the supply side management only. He mentioned about various schemes like Standard & labeling, PAT scheme ECBC which were formulated under the Energy Conservation Act 2001 and have already achieved significant results in the past. The programs like UJALA (DELP) scheme & National Street Lighting Programs are examples of scaling up Energy Efficiency done by EESL in past. He suggested that price reduction can be achieved through demand aggregation and also mentioned about the future plans of EESL to do the bulk procurement of energy efficient air conditioners smart meters and industrial motors in the coming years so as to achieve reduction in Energy Consumption and CO2 emissions in the coming years.

Mr. Sanjay Seth, Sr. Director, TERI gave his welcoming remarks to the delegates and addressed and introduced all the panelists. He



appreciated EESL's work in the lighting sector especially for the LED program. He highlighted energy efficiency plays a critical role in the moderation of increasing the demand without compromising on the quality of the output and this can be acquired in small gestations and can be done at 1/5th the price of the installation





setup of a megawatt with added co benefits on the GHG reductions. Till the year 2015 various schemes by BEE led to about 6 % of the savings of the total electricity consumption, and the aim of BEE is to increase is to about 10% by 2018, though he also said that this is just acceleration and cited honorable prime minister's words "We should not be talking about accelerations, we should be talking of transformations". In order to achieve these transformations a group of secretaries was set up, which deliberated on various issues, and identified four large areas Industrial, Buildings, Transport and Appliances where the work in progress but a rapid pace is required to achieve the transformative effect.

Mr. Seth introduced Dr. Satish Kumar, Chairman, AEEE to share his experience and remarks. He stated Energy Efficiency as a three legged tool. He said there are three primary actors which accounts for the transformation in the field of energy efficiency, Government, Business and the Civil society. The



Government is responsible for the formation & implementation of policies and regulations. The businesses play a key role in bringing new and innovative technology in the market and figuring out ways to implement new policies in the least cost manner. Lastly he mentioned about the civil society and organizations like AEEE, TERI or any other Non-Profit Organizations, which are required to maintain the balance with the policies needed at times. In his remarks he further stressed upon four major areas, starting with Codes and Standards that have been set up till date and mentioned various policies and suggested to explore at what kind of impact can be brought in terms of energy efficiency, also it is equally important how the policies are being implemented at different geographic locations in the country and what are the various concerns and challenges faced by the states, and how can those challenges be dealt. In his second point he strained to project the increase in cooling demand scenario, that India is going to face

in near future and asked about what kind of standards are present for cooling appliances. Currently the cooling demand globally stands around 50-60 GW annually which is just one-tenth of the global heating demand and comes majorly from the developing regions of the world and it is projected that maximum cooling demand would come from India. He suggested the strategy of “Lean- To cut down wastage and Energy Demand, Mean- Using the most energy efficient equipment available & Green- to emphasize on the use of renewable energy” to tackle the growing energy demand along with this, he also suggested of putting more focus on smart manufacturing and data mining as they act as a viable information for future reference. In his third topic he talked about three mega transformations that are taking place in the transport sector firstly the thrust towards the electric mobility with the prices falling and the range increasing, and is essential for making the electric vehicles mainstream. Second megatrend is the hired car models that is taking place, and



in about fifteen to twenty years it is expected that the car ownership by people will become insignificant and most of the cars on road would be owned by rental companies and could be hired by people at the time of requirement which will in-fact increase the resource utilization. The third trend taking place is the self-driven technology, all these technologies if brought together will bring about a major shift in the



automotive market. In his concluding remarks he briefly mentioned about his fourth point, to achieve all of these transformations there is a need to attract investments in scaling up the energy efficiency and appreciated the work done by EESL on this front. He commented upon the lack of participation from the financial institutions and the end customers from the workshops. He suggested that there is need to set a goal for more deals to be done for more energy efficiency projects to be taking place in the states if there is a participation of public sector enterprises.

Mr. Sameer Pandita (Assistant Energy Economist, BEE) discussed about the experiences with the Perform Achieve & Trade (PAT) scheme. When the Energy Conservation Act was implemented in year 2001, there were no mandatory provisions and the act all together was not focused for Industrial Energy Efficiency, it was in 2010 mandatory provisions were introduced. He mentioned about the steps taken by government for the implementation of new provisions and about the basic work structure of the PAT scheme and it's achievements in its 1st cycle. The PAT scheme was a regulatory mechanism aimed to reduce energy consumption of industrial units. The first phase of the PAT scheme was started in the year 2012 and by March 2015 the achievements made by the PAT

scheme were spectacular, it saved almost around 8.67 million ton of oil equivalent worth of energy and around 31 million ton of CO₂ abatement. He also mentioned the future PAT cycle has set targets for achieving reduction in the energy intensity in between 2016 and 2019 by 7%. The proposed future framework of the PAT cycle is to convert them into a rolling cycle so that each year there is new cycle with addition of new provisions each year and also operationalize Partial risk guarantee fund on Energy Efficiency (PRGFEE) & Venture capitalist fund on energy efficiency (VCFEE). He also mentioned about the challenges they faced regarding the trading on the Energy Saving Certificates, due to the non-compliance of as many as 21 units with the



PAT cycle 1. He concluded with the key learnings and mentioned Energy efficiency makes sense for Industries to remain competitive in the backdrop of increasing energy prices. Monitoring and Verification of Energy Consumption and Savings is important in Industries. There is Need to encourage venture capitalists/FDI investments for scaling up of energy efficiency in the Industries. Need to upscale indigenous Industrial R&D and manufacture Energy Efficient appliances and equipment under “Make in India “to lower the cost of Energy Efficient Technology.

Mr. Hemantha Kumar (Manager, Technical, EESL). Energy Efficiency Services Limited (EESL) is a joint venture of four public sector units established in the year 2009. The main objective of EESL is to bring about market transformation in energy efficiency by implementing demand side measures & the company and is said to be having a share capital of 60 Million USD. He mentioned about the various programs held by the company and their magnificent achievement as alone the national LED program known as DELP helped avoid peak demand of over 2671 MW, it is said to be the largest program run in India for the domestic efficient LED lighting and has replaced 140 million conventional lamps with annual power saving of 18 billion kWh of energy. It is estimated with the completion of the LED program, annual electricity savings from

reduced consumption of electricity are estimated at about 114 billion kWh leading to an annual savings of US \$6.7 billion* and reducing about 85 million tons of CO₂. He then explained the working model of the LED program of demand aggregation and price reduction and how to reach the end user using the distribution agency and giving the facility of even no cost EMI to make it more affordable for lower income group people. He mentioned about the agricultural demand side management and savings are being achieved through change of inefficient submersible agricultural pump-sets with energy efficient pump-sets in which BEE 5 STAR rated pumps given free of cost with maintenance support for 5 years and the achieved energy savings of about (25-37%) is used to pay back the investment. He concluded by giving a few examples where energy savings were achieved doing retro fitment of energy efficient lights fans ACS and showcased the EESL Dashboard.



M A Patil (Director, FICCI) highlighted the industrial perspective on the Implementation of Energy Efficiency Projects. He mentioned about the survey that was done by FICCI on the PAT scheme, a questionnaire based survey was done and the experiences from the industries were carefully analyzed and presented as per the Pat phases. The key findings of the survey and the success achieved by the PAT cycle included change in the management outlook towards energy efficiency, proactive investments and technological interventions to achieve reduction in the energy intensity, the data monitoring and accounting came in account which was not a major concern earlier, whereas still scheme administration and facilitation, the quality of the data received, the complexity of the methodology and the verification and monitoring in terms of data quality and quantity and prediction of ECerts quantity and price are still a concern. The observations suggestions made by FICCI were regarding the major Energy conservation measures that needs to be taken for the process side improvements, and to focus on newer technologies which alone can save a substantial amount of energy and the great to need to create awareness about energy efficiency.

The session concluded on an optimistic note to roll out the technologies at the right time and in the right place and guaranteeing the right mix with



regard to policies and investment as key areas to focus upon and understanding the priority of growth in India and its efforts of encouraging newer clean technologies, while concluding the session Mr. Seth also suggested BEE to take up the key findings from FICCI and work upon the major challenges still faced by many industries and mentioned about the operationalization of the two energy efficiency funds The PRGFEE which provides the guarantee of about 50% of the amount with a maximum of around 10 Crores and as far as VCFEE fund is concerned it provides an equity about 2 crores initially but later on the proposal for increasing the fund is still in discussion with the ministry.



Ensuring Sustainable Consumption and Production Patterns (SDG 12) through Higher Education Learning

PANELISTS:

Dr. Shaleen Singhal, *Head, Department of Policy Studies, TERI University*

Prof. Shri Prakash, *Department of Policy Studies, TERI University; and Distinguished Fellow, TERI*

Mr. Jitendra Kumar, *Adviser (Natural Resources and Environment), NITI Aayog, Government of India*

Mr. W.K. Rathnadeera, *Senior Programme Officer, South Asia Co-operative Environment Programme (SACEP)*

Dr. Samdrup Rigyal, *Director, Department of Planning and Natural Resources, Royal University of Bhutan*

Dr. Lakshmi Raghupathy, *Former Director, Ministry of Environment & Forests, New Delhi; Adviser, Environment & Waste Management and Visiting Faculty, TERI University*

Prof. Nilanthi Bandara, *Department of Forestry and Environmental Science, University of Sri Jayewardenepura, Sri Lanka*

Prof. Udaya Rathnayaka, *Department of Food Science & Technology, Faculty of Applied Sciences, Sabaragamuwa University of Sri Lanka*

Prof. Chella Rajan, *Department of Humanities and Social Sciences; Co-ordinator, Indo-German Centre for Sustainability, IIT Madras*

TERI University's thematic track titled, 'Ensuring Sustainable Consumption and Production Patterns (SDG 12) through Higher Education Learning' at the World Sustainable Development Summit 2016 was organised in order to stimulate discussion on the importance of enabling education policies and academic research for behavioural change and formation of social norms that can promote sustainable consumption and production (SCP) patterns.

Dr. Shaleen Singhal remarked in the opening address, "We need an enabling environment particularly in the policy domain for mainstreaming SCP", and that the move towards SCP requires the participation of different stakeholders in the economy, including businesses, industry, consumers, policy makers, media, researchers, and academic and other developmental cooperation agencies. It is important to reflect on the trajectory of low-carbon growth and simultaneously that of sustainable development. Answers to issues in sustainable development lie in existing policy frameworks and indigenous strategies



for development in that they are rife with opportunities for augmentation, restructuring and environment-oriented planning at the local, national and regional levels.

Education has been identified as one of the main drivers for achieving SDGs and plays an impactful role in devising strategic policies for sustainable development. Education for SCP and innovative pedagogical approaches to sustainability aim to provide knowledge, skills and values for creating actors of change, both individuals and groups, to promote sustainable policies, lifestyles and ease the transition towards a sustainable economy. To that end, involving and developing knowledge platforms, particularly in higher education, is key in that that advanced research in areas of sustainability can

be disseminated to a larger audience including incumbent policy makers and governments. Food and agriculture, urban planning and infrastructure, energy, consumer goods, etc. may be some of the major research areas where advanced academic and professional research can augment existing policy frameworks.

Dr. Singhal highlighted the initiative in this area being taken by TERI University, in collaboration with the United Nations Environment Programme (UNEP) under the EU-supported SWITCH-Asia Programme, in terms of introducing postgraduate learning courses focused on Sustainable Consumption and Production aimed at mid-career policymakers from the government sector. The course, part of TERI University, M.A. in Public Policy and

Sustainable Development, aims at capacity building and inspiring policy makers to imbue aspects of sustainability into policymaking strategies along with imparting practical knowledge and skills for restructuring existing policy designs in this period of transition towards sustainable economies. The learning outcomes from this programme are hoped to help in the replication and advancement of similar programmes across other tertiary education institutions across south Asia.

Other initiatives by TERI University in this domain have helped bring together ongoing advanced research on sustainable development issues, with a special focus on Sustainable Consumption and Production, of researchers in higher education institutions across India and the south Asian region.

Mr. Jitendra Kumar from NITI Aayog, delivering the keynote address in the proceedings,



emphasized on the importance of effective application of the knowledge gained during higher education learning at the ground level to localized socio-economic structures keeping in mind limited resources and inflationary consumption trends. This applicability may come in the form of redesign of production technology and/or processes, administrative and financial support for eco-friendly production methods, and importantly through ongoing research into best-practice policies for production and consumption norms in industry.

Mr. Kumar introduced the 15-year vision document, the 7-year strategy document and the 3-year action plan (detailing the key performance and success indicators) for all sectors of the national and region-specific economy currently being developed by NITI Aayog which while aiming towards achieving the national development goals will simultaneously





aim to achieve targets under the 17 Sustainable Development Goals. According to Mr. Kumar, targeted research and strategy development through collaboration with higher education institutions can help in the identification and prioritization of the key areas for sustainable development and thereby effective strategic implementation of the policies needed to achieve holistic national development.

The panelists, during the session, concurred that advanced knowledge and a well-rounded skillset of policy makers and graduates today are necessary to structure and successfully implement sustainable development policies in future. While the significance of SCP and resource efficiency is well accepted in India, imparting knowledge to policy and decision makers is hoped to facilitate

an enabling environment for comprehensive integration of SCP into policy making.

The emerging concept of a sharing economy is an alternative to the current individual privatized consumption trends and increased research, and importantly, education policies need to shift focus towards the drivers of these alternative or sustainable lifestyles. Incorporating Sustainable Consumption and Production into higher education geared towards existing and incoming policy makers brings with it the added advantage of promoting inter-disciplinarity and cross-sectoral benefits for achieving sustainable development. Further, in view of contemporary social norms that encourage unsustainable production and consumption patterns, there is an urgent need for an all-encompassing and

holistic awareness-generation for promoting Sustainable Consumption and Production. This can be achieved through exposing decision makers to issues, challenges, and opportunities to mainstream sustainability in policymaking. Policymaking should also be trained to effectively integrate aspects of sustainable lifestyles in consumer behavior which may have existed before economies shifted to unsustainable consumption and production patterns.

Mr. W.K Rathnadeera from SACEP indicated that higher or tertiary-level education is crucial for producing thinkers, educators and practitioners who can highlight current issues and complementary solutions to the roadblocks surrounding sustainable development at the

local, national and regional levels. SACEP is actively involved in collaborations with higher education institutions on research and dialogues on sustainability and inter-governmental cooperation on environmental policy.

According to Dr. Samdrup Rigyal from the Royal University of Bhutan, the youth and the young research community of a country are the forerunners of the drive towards environmental conservation and conservation of natural resources and ecosystems. Educational institutions have a vital role to play in generating awareness and encouraging research in areas of sustainability and policy development incorporating environmental concerns. Higher education institutions in Bhutan collaborate



with the government and the industrial sector to provide guidance and consultation on national environment conservation programmes as well as providing a knowledge platform to policymakers. Dr. Rigyal also highlighted the existence of a knowledge gap between policy, education and practice regarding SCP and SCP practices, which however, may be seen as a starting point for introducing nationalized education programmes and awareness-generation initiatives for sustainable consumption and production targeted towards all sectors and stakeholders in an economy.

Dr. Lakshmi Raghupathy indicated that government policies need foundational support in terms of technical inputs and evidence-based research in order to effectively implement said policies. Educational institutions provide a multidisciplinary approach to learning and engagement which can be utilized to effect while creating a knowledge base for young researchers, practitioners and policymakers working in the sustainability and environment sector. This aspect of education is important since sustainable development necessarily encompasses targets that are cross-cutting in nature even when development strategy is segregated into distinct goals.

Prof. Nilanthi Bandara from University of Sri Jayewardenepura concurred with the role

multi-disciplinarity plays in imparting education for sustainable development, not confined only to curricula but also incorporated into teaching pedagogy and on-site training programmes. Education and learning which incorporates environmental concerns are key drivers for changing production patterns and consumption behaviours as well as setting a benchmark for future generations to aspire to. According to Prof. Bandara, it is also essential to create a conducive environment for networking between universities at the regional level.

Prof. Udaya Rathnayaka from Sabaragamuwa University of Sri Lanka referred to the challenges faced in incorporating sustainability and aspects of SCP into consumer consciousness given the role advertising and marketing play in shaping consumer behaviours. This aspect of public behaviour, according to Prof. Chella Rajan from IIT Madras is the flip-side of society and social concerns being one of the three characterizations of sustainable development and particularly, sustainable consumption and production.

According to Prof. Chella Rajan, changing consumption and behavioural patterns requires not just overhauling the infrastructural and administrative systems but rather a sea change in how consumers view sustainability and the ease of transitioning to a mindset of sustainable practices. Therefore, there needs to be research

in higher education institutions on sustainability from a social standpoint taking into account social and peer-based influence, as well as, research into the drivers of contemporary and alternative lifestyles.

The panel session ended with a Q&A session with the audience members and a short film

created by TERI University, in partnership with UNEP on the topic of sustainable consumption and production. The film delivered an introspective view on the cost borne by society and environment given current patterns of unsustainable production and consumption patterns.



PLENARY SESSION-1





Energy Transitions: Perspectives and Priorities

Chair: **Dr Ajay Mathur**, *Director-General, TERI*

Lead Presentations:

- Global Energy Transitions: **Mr Paul Simons**, *Deputy Executive Director, International Energy Agency*
- India Energy Transitions: **Dr Ritu Mathur**, *Director, Green Growth and Resource Efficiency, TERI*

Panellists:

- **Dr Anshu Bharadwaj**, *Executive Director, CSTEP*
- **Mr Jaco Cilliers**, *Country Director, UNDP India*
- **Mr Ashok Lavasa**, *Secretary - Finance & Expenditure, Ministry of Finance, India*
- **Mr Sumant Sinha**, *Chairman & CEO, ReNEW Power*
- **Mr Upendra Tripathy**, *Secretary, Ministry of New and Renewable Energy, India*

The plenary session initiated with screening of a film on TRISHA—TERI’s Research Initiative at Supi for Himalayan Advancement—TERI’s research institute at Mukteshwar helps organic farming as well as aids the income of local farmers by providing them high quality planting materials and other useful products.

The Session Chair began the session by mentioning about the discussions underway at WSDS regarding the urgent need to shift from fossil fuels to renewables. He also spoke about the Government of India’s commitment to move in the same direction and referred to the encouraging words on that front as received from

Ministers of the Government of India, such as Shri Piyush Goyal and Shri Suresh Prabhu.

Dr Ajay Mathur, Director General, TERI, began by referring to the inevitability of the shift towards usage of clean energy sources. However, he also spoke about the absence of a clear approach towards the shift. In this regard, he spoke about the subsequent panel discussion and its endeavour in identification of the first few steps in the direction of moving towards cleaner energy.

Next, Mr Paul Simons, Deputy Executive Director, International Energy Agency (IEA), initiated his lead presentation by acknowledging



the strong collaboration between TERI and the IEA. After conveying greetings of Mr Fatih Birol, Executive Director, IEA,

Mr Simons went on to describe the 29-member IEA, with its focus on energy security and energy transitions. One of the significant pillars of the IEA has been to transform the organization into a global hub for clean energy technologies and energy efficiency in order to support the energy transition effort that is underway post COPs. He stressed on the 20 year old partnership with India as part of many different projects, ministries, and other organizations.

Further, he identified two major themes that are occurring post COP; first, the lower fossil fuel



prices with their huge impact on many aspects of energy, including the clean energy spectrum, and second, after CoP, the big political shift that has occurred in climate policy and the commitment of countries to their NDCs and beyond. So, these two factors are mingling together. Another positive indication is that renewables capacity has been moving extremely high in 2015, thus resulting in a decoupling of global growth, post the rise in CO₂ emissions. This, according to him, has been the context for the energy transformation that is, at present acquiring pace in India. Energy has been at the heart of India's drive for development and modernization. India has witnessed tremendous energy growth over

the last several years but it continues to be a very low per capita consumer and energy access still poses the major challenge. Reforms are underway but it shall be prudent to review at trends across the globe and their probable impact on India. India's significant role in the overall global energy demand is visible upon an analysis of the global demand, based on estimates encapsulated in the World Energy Outlook, insofar as overall demand increases by about a third going up to 2040. Although a total decoupling of economic growth from energy growth in the OECD members countries with absolute levels of energy demand is likely to decline, these will be more than made up by growth in the developing world and most importantly visualize a leaping ahead of China as the single most important driver of global energy consumption. On percentage basis, this is perhaps more dramatic than the figures shown in the presentation because Indian energy growth is expected to be about 3.4% per annum while that of China at about 1% per annum.

India is on the verge of a major transformation with a number of drivers not present in other countries around the world in terms of income, population, access to infrastructure, and industrialization. In terms of renewables, such as onshore wind, solar PV, and LEDs, clean energy costs have been declining rather dramatically over the past seven years, and this is largely due

to success in India. There's a lot more to be accomplished in terms of improvement in terms of energy efficiency. Back in 2005, about 40% of the total energy consumption was covered by some type of mandatory energy efficiency policy; this has increased to about 28% in 2014 and is expected to go up to about 40% by 2040. Referring to the successful India-IEA LED programme partnership, there are plans to expand the same to partner countries, such as Indonesia. Linking the LED programme to climate challenges and CoP 21, Mr Simons reiterated that delayed action in terms of the energy transition will reduce the options available to countries and make the transition more costly. For fuel switching, that is largely coal to gas in terms of power, nuclear needs to play a role along with carbon capture and storage. So, the overall energy intensity of the global economy needs to be about 20% lower by 2050 but the carbon intensity needs to be 65% lower and this will be a massive challenge for all countries. As noted earlier, a primary focus on energy efficiency and renewables would make the most significant cuts in terms of CO₂ emissions but a minimum cost energy supply will require contribution of all low carbon technologies. Besides, energy technology innovation, and investment policy, there could be other technologies that come along and leapfrog those already available. The focus of the IEA has

been on the available technologies, steps taken by countries with existing technologies to ensure progress, and the magnitude of the progress.

Further, as part of his presentation, Mr Simons made a note of the current worldwide status of different technologies, technologies that have not been making particularly good progress, and a status update of the 2°C temperature goal. Although promising, carbon capture and storage has not really moved into a significantly positive spot in terms of their development on a commercial scale. The absence of adequate worldwide carbon pricing has also hampered the progress and the use of biofuels has not been as per expectations. Basically, low fossil fuel prices on the one hand and lack of large technological leapfrog changes in modern biofuels on the other have not occurred so quickly. So we see there are some technologies that are not moving so quickly. Technologies, such as solar PV and onshore wind along with electric vehicles are the order of the day. There are about one billion electric vehicles on the road and battery and storage costs are also reducing substantially. It is imperative to visualize priorities to achieve self-sufficiency in sustainable energy today and in the future. Despite all the progress achieved in renewables and their use, a certain stepping up is required in terms of government policies. A greater collaboration between government

and industry is the need of the hour along with availability of better data and indicators on renewables, especially on issues such as energy efficiency wherein the need to measure progress is higher than has been in the past. He also reiterated the IEA's consistent and constant support to the Government of India and other Indian organizations in their effort to successfully launch on a clean and sustainable energy transition.

Next, Dr Ritu Mathur, Director, Green Growth and Resource Efficiency, TERI, in her address shifted focus from the global scene to the Indian scene with reference to the energy space and provided a quick snapshot of India's current position on the same. India has the second largest population in the world; is the third largest coal producer and consumer in the world; and among the largest energy consumers as well. However, in terms of energy consumption in per capita terms, India has a very low energy consumption which still compares in terms of a fraction of the world average. In terms of per capita electricity consumption, India stands about 880 odd kilowatt hours per annum as compared to the world average of 3,000 odd kilowatts hours per annum. In terms of human development index, India is at a level of about 0.6 and has a global rank of about 130. So, in various aspects, the country has a long way to



go forward, particularly in terms of the need to develop and the current development needs of the country. Also, a point to note is that no country in the world has ever been able to achieve a human development index which is greater than 0.9 without an annual energy availability of greater than 40 per capital. So, India being well below that has this great challenge of trying to improve with human development index while keeping and containing its energy use at a sufficiently low level. Also, in terms of India's population pressure, the country has about 2.4%

of the world's area but houses more than 17% of the world's population along with the largest proportion of global poor and about 24% of the global population without access to electricity. Also, 30% of the global population relying on solid biomass for cooking reside in India. So, there is a huge problem of providing access to clean energy and electricity to the population who does not consume modern means of energy. In the same vein, there are several million people without access to safe drinking water and a place to live along with employment avenues. So, there is a huge need to improve infrastructure and basic services at the disposal of the population. In effect, sustained rapid economic growth, extremely important for the social development of the country, is needed and this requires increasing energy use. A quick snapshot of the TERI model, in terms of the projections of final energy demands, informs us about the kind of growth required to meet the basic infrastructure and energy needs of the country. For instance, the primary energy availability could increase by about three to four times of the 2006/07 levels by 2031. Coal, followed by oil, is likely to retain the dominant share because coal is still the cheaper fuel and the transport sector and the oil-related consuming sectors are not very susceptible to making quick and rapid changes. Also, the final

energy demand could rise by about 2.7 times in 20 years from 550 odd MTO in 2011 to more than 1400 MTO by 2031, if the past trend continued. The industry continues to remain the major energy consumer as reflected by the big blue area in the bars and this has a share of about 40% to 48%. The share of transport sector has been on the rise and therefore the ever-present challenge of trying to contain these final energy demands. In this context, energy efficiency is a key element to achieve the much needed decoupling in terms of decoupling the energy and growth element. Further, India's role with reference to overall global emissions as well total emissions in India is about 1,700 odd million tonnes of CO₂ equivalent in the year 2007. The GHG emissions have been growing at about 4.5% during 2000 to 2007. Fossil fuels in India are about 70% of the primary energy supply and therefore the energy sector as a whole contributes to a major share also in the GHG emissions for the country accounting for about 71%. However, if we also look at how the trend of emission intensity has progressed, India has been decreasing its emissions intensity.

Dr Mathur, through her presentation, described PM 2.5 levels during the winter season, status of the levels due to air pollution along with the PM 2.5 levels in 2011 and the situation by 2031 if the past trends were to continue. She

went on to enumerate the status of India's INDCs including a conditional target of about 30% to 35% reduction in emissions intensity of GDP by 2030 from 2005 levels, achieving around 40% renewable energy share by 2030 in terms of the capacity for power generation, and creating a carbon sync of 2.5 to 3 billion CO₂ equivalent through forests. These rather ambitious targets impinge upon us the challenge of being able to reduce our emissions intensity and rapidly increase renewable energy generation avenues. Presently, it seems that fossil fuels, such as coal, oil, and gas will continue to have a large role in the overall energy mix for the country. In terms of power sector transitions, these are likely to play a key role in the energy sector. The total power generation requirement is estimated at near about 4,000 odd TW hours in 2031 and a generation capacity of about 800 odd gigawatts by 2031 which is a six times increase in 25 years. Despite the push to renewables, as mentioned earlier, more than 50% of the generation may need to be based on coal even in 2031. So, apart from renewables, we also need to look at advanced fossil-based technologies to make this cleaner and more efficient. In terms of supply side technology needs therefore, India is likely to need renewables, such as solar and wind, which need to be scaled up to rapidly increase the capacities. The government has already set

very ambitious targets for the rapid development of storage technology, solar thermal, cleaner advanced fossil fuels, and strengthening and management of the grid. In terms of the transport sector transitions, petroleum products increasingly need to be substituted by cleaner alternatives, such as CNG, electricity, or biofuels. The share of CNG as per our model would need to increase rapidly to about 15% by 2031, for example share of electric two wheelers needs to reach high levels of upto 20%. All this discussion is about a futuristic technology level and its best to leave it a little flexible at this point.

The point of showing these numbers is to enumerate that major change and R&D are required in the transport sector, particularly in terms of technologies or feedstock and an improvement of 1% per annum till 2031. Reviewing the residential and commercial sector transitions, the share of efficient appliances—air conditioners, fans, coolers or refrigerators—needs to increase rapidly. Also, in terms of lighting demand, there need to be more LEDs in the commercial sector, higher number of green buildings, etc. With regard to clean cooking solutions in rural areas, we aim at a forward-looking programme for provision of LPG along with other alternatives to step up access to clean cooking solutions and improving the efficiencies of SMEs. In terms of addressing inefficiencies

in the agricultural sector in terms of both water and energy use, it is important that these are addressed via alternative technological solutions. Estimates indicate that at least US \$2.5 trillion would be needed for meeting India's climate change actions between now and 2030. In this regard, we need to note that by 2050, 50% of India's population would be residing in urban area and by 2030, India will add more than 20 billion sq. m of new building floor area with about 85% to 90% of new construction in the residential areas. So we can of course start making changes today, we can start putting in the technologies and the infrastructure today which is already low carbon. India already has a second mover advantage and can take advantage of the technological leapfrogging insofar as there is a need for scaling up all kinds of successful models. Going forward, it is important to identify the key elements in India's dynamic energy sector such that the transition retains an element of flexibility in terms of creating plans within the short-, medium-term, and the overarching long-term perspective. Various challenges exist across consumer groups and these need to be addressed in order to provide customized solutions and appropriate business models. The power sector transition needs to play a significant role and several aspects need to be reviewed. In terms of management and reduction of sectoral energy

demands, energy efficiency is crucial and holistic solutions need to incorporate overall resource efficient development. Essentially, the time to act is now.

Next, **Dr Anshu Bharadwaj**, Executive Director, CSTEP, began his address by reminiscing about his earlier stay at TERI as an intern and TERI's contribution in the overall sustainability dialogue. He went on to enumerate India's energy transitions in a mathematical equation, and summarized how India's NDCs subsume all the other important NDCs, thus dictating the trajectory further ahead in terms of reduction of CO₂ per GDP by 30% to 35%.

The energy sector accounts for 85% to 90% of the overall emissions, therefore the initial focus needs to be on the same along with segregation into two parts wherein the first bracket is CO₂ per kilowatt hour and the second is kilowatt hour per GDP which implies the emissions and this is total energy. The second turn is kilowatt hour per GDP which implies how much energy is required to produce one unit of GDP or how efficient is the energy mix. Further, he went on to display CO₂ per kilowatt hour, the first term, which is difficult to handle and if one sees historical data, the number has been relatively constant for about a decade or more. And this is not surprising because it depends majorly on petroleum as well as the fact that there is



a gradual movement from biomass to cleaner cooking fuels, something which will continue to for the next 20–30 years. And, so, if there is a need to achieve this condition of CO₂ to GDP, the bulk of the heavy lifting needs to be carried out by the second term. That is, any increase in CO₂ per kilowatt per hour will have to be offset by decrease in kilowatt hour to GDP. And our estimates suggest that the kilowatt hour to GDP will have to decline by something of the order of 45% by 2030 to achieve the NDCs. Thus, if India has to achieve the NDCs, there is a need to decrease the kilowatt hour to GDP by

about 45%. In simple words, it means increasing energy efficiency by nearly twice and that is the challenge which lies ahead. He referred to Dr Mathur address wherein he mentioned the various sectors which are likely to play an important role. the first, the residential sector in terms of the appliance, cooling, and space cooling demand is expected to be a major contributor for future growth. So, it is important to ensure that the best possible air-conditioning equipment both for homes and offices is put in place. In industries, as a result of the efforts put in by the Bureau of Energy Efficiency (BEE) in the first two phases of PAT and Dr Ajay Mathur, a lot of work has been accomplished. He concluded by reiterating about the untapped potential in sectors, such as transport and irrigation, along with the vast number of technology options available in each one.

Next, **Mr Sumant Sinha**, Chairman & CEO, ReNEW Power, in his address spoke about the significant developments and changes in the renewable energy and technology domain and expressed hope about a faster roll out of renewables than currently envisaged. He described the government's target of 175 GW by 2022 as extremely ambitious and at the same time, described the steps taken by the government to achieve the targets. Further, he spoke about the dramatic decline in cost of



renewables all over the world, ranging from the latest comparative options in solar and other such options. For example, in the Middle East, the cost of solar has reduced by as little as 3 US cents per kilowatt hour. He also spoke about how India's natural resource base is quite similar to that in the Middle East as also the cost of equipment; the only single difference is the cost of capital. The cost of borrowing and the cost of equity in these countries is maybe 5%–6% while in India, the cost of debt is 11% and the cost of equity stands at 15%–16%. He also spoke about the rapid advent of electric vehicles as a

support for the increase in usage of renewables. In this regard, the Government of India has set a target of achieving an increase of 40% renewable energy capacity by 2030. He also mentioned about a broader agenda of discouraging the use of fossil fuel capacity, its probable cost, and simultaneously encouraging and incentivising people to actually shut down fossil fuel capacity. He reiterated about Indians being extremely good appliers of technology which is developed elsewhere in the world and at the same time, encouraged the need to take one step forward and actually become developers of new technology as well. In this regard, he spoke about the need to begin addressing more fundamental technology issues since those are the ones wherefrom new developments will spring forth. These will aid in visualizing a more promising clean energy future in the next few decades.

Mr Upendra Tripathy, Secretary, Ministry of New and Renewable Energy, India, narrated the journey of transition from megawatt to gigawatt in terms of both the challenges and the ways these were overcome. The inadequacy of land as a major roadblock was tackled via utilizing the land of the railways, defence, public sector undertakings, and the wastelands. He also mentioned about the proactive role of the International Solar Alliance (ISA), the treaty-based international inter-governmental And in



international solar alliance of 121 solar resource rich countries lying fully or partially between the Tropics of Cancer and Capricorn.

Next, **Mr Jaco Cilliers**, Country Director, UNDP India, initiated by referring to the previous speakers and their observation on the process of energy transition. Further, he identified the three challenges on the road to sustainable and equitable energy transition along with the respective cause from the development perspective. The first, central to the sustainable development goals, is the right of people towards energy access such that no one is left behind. However, energy access also implies ensuring



energy conservation (the second challenge) such that energy is not wasted in spite of optimum utilization of energy. The third challenge includes creation of new clean energy options. In this context, he also mentioned about the role of the ISA and other similar initiatives but also spoke about the need to find a balance between maintaining a balance between the new energy options and their judicious use. It is imperative that people arrive at a consensus on the prudent utilization of sources of energy and their conservation. He also mentioned about how it has been a privilege for the UNDP to work in India and quoted examples from the LED



lighting sector or the building sector insofar as innovative ways of reducing energy consumption or in the water sector.

Defining WSDS as TERI's annual pilgrimage wherein people restate their pious intentions and noble thoughts, **Mr Ashok Lavasa**, Secretary - Finance & Expenditure, Ministry of Finance, India, opined that the event also serves as a reminder for the stakeholders to act for achievement of results. In this regard, he spoke about how a lot of purposeful and well directed action is taking place. Once a product is launched, it primarily undergoes four stages—awareness, information, desire, and action. It is



imperative, therefore, to act and take stock of the current position. He also briefly mentioned about his previous work experience in the Ministries of Power, Civil Aviation, Environment, Forest and Climate Change, and Finance, respectively. Further, he spoke about the NITI Aayog (National Institution for Transforming India) and its role in taking forward the country's economic and social agenda. In this regard, he also shared names of the two mother documents—the sustainable development goals (SDGs) and the Intended Nationally Determined Contributions (INDCs)—which shall act as a guide to the NITI Aayog's vision documents to prepare a medium term action plan for the next seven years or so and to look at a vision document for the next fifteen years. However, an important fact is that no agenda for energy efficiency/energy

savings /low carbon growth can move forward without recognizing fundamental needs of the people. It is important to note at this juncture that these “fundamental needs” in the case of energy comprise the compulsive demands of social and economic growth in India represented by the energy sector. He went on to define the three pillars—availability of sufficient renewable energy or electricity, its accessibility throughout the country, and its affordability—on which the energy sector is based. He spoke about decentralisation of the solar or renewable model in terms of electricity distribution architecture.

He also mentioned about the emphasis on energy conservation versus energy efficiency and outlined how between the two (conservation and efficiency), the former is a low-cost solution. According to him, energy efficiency

is accompanied by technology but energy conservation can also be achieved simply by changing habits and adopting a more sustainable lifestyle—a fact emphasized by India in the Paris discussions as well. In this context, he highlighted the significance of a sustainable lifestyle and exercising frugality in the way we live. Mr Lavasa also spoke about how India provides maximum opportunities for investment so as to promote economic development and sustainable growth.

Thereafter, the session chairman invited all the panellists to share their final thoughts on the plenary session.

To begin with, **Mr Paul Simons**, Deputy Executive Director, International Energy Agency (IEA), acknowledged the level of commitment, as witnessed, in terms of pushing ahead on the nationally determined contributions (NDCs). He also appreciated the success accomplished so far in the direction of energy efficiency and extended the support of the IEA in the journey ahead.

Next, **Mr Jaco Cilliers**, Country Director, UNDP India, while recognizing the presence of architects of change, admitted that the real challenge lies in institutionalization, scale up, and showcasing the change.

According to **Dr Anshu Bharadwaj**, Executive Director, CSTEP, emphasized on the importance of behavioural change, especially in

terms of motivational aspects, once it becomes clear that the solutions to energy challenges are in the hands of the people.

Mr Upendra Tripathy, Secretary, Ministry of New and Renewable Energy, India, initiated by acknowledging the increased awareness levels among the younger generation of the environmental benefits of using certain products vis-à-vis others. The purchase of over 16 crore LED bulbs in the last few years makes the message clear. Also, the target of 60,000 MW wind energy along with grid intensity are the paramount challenges as also signing of the purchase power agreements (PPAs) by the states. He spoke about the new schemes such as the one with a dollar linked tariff and the 5000 MW energy creation goal, on a pilot basis, such that the prices reduce substantively. Formulating a financing mechanism where the hedging risk is not more than 3%–4% (at present 5% –6%) is the need of the hour. He also stated how at the global level, the credit roadmap of countries, over the next 5 years is currently being analysed such that there are sufficient credit enhancement mechanisms.

Mr Ashok Lavasa, Secretary - Finance & Expenditure, Ministry of Finance, India, reiterated the on time approach and results of the sustainability agenda.

Mr Sumant Sinha, Chairman & CEO, ReNEW Power, reiterated that India is fundamentally a solar rich country not a wind rich country which places more burden on the wind industry. He also mentioned how the offshore industry, fairly unexamined as on date, with a higher plant load factor is one area that can definitely be developed over a period of time. He also stated that India has an incredible opportunity with the government's active

support and the requisite push in the renewable energy sector to become the clean energy leader of the world.

Dr Ritu Mathur, Director, Green Growth and Resource Efficiency, TERI, in her final words echoed the thoughts expressed by the panellists earlier and spoke about the plethora of options available to take the renewable energy challenge and transform it into an opportunity.



PLENARY SESSION-2





Climate Finance and the Implementation Towards Sustainability

The session was preceded by a poll and the following two questions were asked: Which of the following deserves to be given the highest attention in India's energy sector, namely, (a) strengthening and managing the grid, (b) bringing down the cost of solar by using appropriate business models, (c) ensuring clean energy access to all for cooking purposes, and (d) increasing the role of natural gas in the energy mix.

Option B, bringing solar costs down, resonated with most and though not a clear victory, got many votes. The next poll was about voting for the sector that had the greatest potential for energy efficiency. The options were: (a) residential and commercial buildings, (b) home appliances, (c) the industrial sector, (d) power generation, and (e) the transport sector. The result of the polling showed the industrial sector to be the most important. This was followed by improving efficiency in the residential sector.

Moving onto the specific session on climate finance, the session was brought to order. In an attempt to leverage the right kind of climate finance, the panel was introduced: Mr Sanjay Mitra, Secretary of the Ministry of Road,

Transport, and Highways, Mr Dinesh Sharma, special secretary in the department of economic affairs, Ministry of Finance, and Mr George Sibley, Minister Council of Economic Affairs, Mr Suman Berry, Chief of Economic strategy and business environment at Shell International, and Mr Ashok Chawla, Chairman of TERI. Mr Nitin Desai, distinguished fellow TERI and former US undersecretary general for economic and social affairs, opened the session and addressed the gathering.

While the focus of the discussion in the previous session was largely on mitigation issues, especially since we are talking about energy, however, there are dimensions of finance which deal with adaptation as well. Also, since much of the discussion is on the supply side options, fuel mixes gains precedence and, as anticipated, the demand side management needs equal attention, more so as it poses certain challenges of finance. In a sense, it is not just about the question of looking at generation issues, but also at issues pertaining to the demand side management. In this regard, Mr Sanjay Mitra is best suited to talk about it. Additionally, the cost of finance for commercial and public activities



is also a concern and it is hoped that these will be covered over the course of the session. It is hoped and suggested that we approach these in terms of the mechanisms that are needed to carry out the tasks. While the conventional models will play their stipulated part, we also need something that falls in the domain of the nature venture capital. It might be beneficial to place the financial question in a slightly broader context so that it gets some leeway. Mr Ashok Chawla will begin the discussion after which Mr Sanjay Mitra can take it forward to address the domestic dimension.

Mr Ashok Chawla began his address by stressing the importance of climate finance as one of those concerns that have been around for

as long as we have focused on climate. In this, we are faced with the issue of the flow between developed and developing countries. So far we have followed the attitude of wait and watch and see what the others bring to the table; clearly, it is not easy to collect funds.

As the requirement is very large, the commitments, particularly from the developed countries, need to be in accordance. The following are the specific issues in relation to the demand side requirements at the ground level: (a) risk reduction, especially vis-à-vis finance from the market, (b) cheaper finance, and (c) identifying debt funds. At the enterprise level, forward-looking enterprises have a great deal to achieve and set an example for others to follow.

At the level of government, what is needed is perhaps an active wing in the Finance Ministry which coordinates all the activities relating to sustainable development and climate change. As we know, it is the first few billion dollars that are important after which the activity gains a dynamism of its own. Finally, another aspect that needs attention is not directly related to finance, but is critical for implementation at the institutional capacity. Another aspect not directly related to finance, but critical for implementation, in institutional capacity is TERI's proactive role in the programmes in countries that need technical assistance. With this the floor was opened to Mr Sanjay.

Mr Sanjay opened his discussion by outlining from experience what happens at the ground level. Unfortunately, it takes a very long time for pledges, flows, and commitments to translate into projects. For immediate action, amongst other things, we must shorten this gap. We must

also ensure that we get the amount of money which is promised to us; usually, there is a discrepancy between what is promised and what actually flows in. Often, we are not prepared to absorb this money and the quality of state climate adaptation plans need improvement. In a country like India, it would be wise to rely less on multilateral bodies for funding. Also, the public sector will have to pitch in substantially. For transformative changes to come about, we need to ensure that the project cycle becomes smaller. While the national action plan for climate change has approved only six projects at an estimated cost of about Rs1 billion, the project work is yet to begin; in this regard the PAT initiative led by Dr Mathur was very good and showed quick results. One of the key aspects of PAT was its strong verification mechanism. Sadly, state-level interventions are likely to be diffused and will probably require a different verification mechanism. There are two ideas



that have been proposed for the transport sector. Heavy, commercial vehicles account for 60 per cent of the particulate matter emissions in the country. They comprise only 2.5 per cent of the total vehicle fleet; we have been thinking about a voluntary vehicle or a fleet modernization programme where the owner of an old vehicle, which is say fifteen years old, is incentivized in a particular manner to shift to a newer vehicle. While the transport sector is much vilified, their data, however, is astonishing. A total of 70 million passengers are moved in a day across the country; this is approximately three times the number that moves on the railways. The public

transport system has about 150,000 buses of which 30 per cent need to be replaced. This is at least a 15 billion dollar expenditure which if carried out can make a significant impact on the quality of public transport. Replacing fossil fuel-based fuel with an electric, hybrid or CNG-based fuel is something that the transport ministry has been working on.

Before the next speaker was invited, Mr Desai, the session chairman, concluded by saying he was happy to have the demand side concerns brought in. He now looks forward to looking into the HCV standards and the sort of light vehicles that have been set aside for it. Mr Suman,



the next speaker, was invited to speak on the economic and financing side and the possible price distortions that may be happening.

Mr Suman thanked everyone present and introduced his address with the thought that, schematically, because of the IFCCC, a lot of the focus in climate finance has been on the cross-border issues. Also, to reiterate Mr Chawla's point, we must focus more on domestic finance issues, and some of the discussion should be about domestic challenges. On the cross border side, the old argument—one where the 'rich' countries owe it to the developing ones for financing what is going to be an expensive transition—is a dated one and has little sympathy post the Paris Agreement. If this has any credibility, it is in the area of adaptation, not mitigation. Moving onto concerns more relevant to the domestic front, Mr Suman thinks that the analytical issues are of two kinds, namely, uncertainty and more specifically technological uncertainty and regulatory uncertainty. From this the question that arises is: What are the efficient instruments for dealing with regulatory uncertainty, technological uncertainty, and market uncertainty? In all of these, we are increasingly connected with the global market and the question of fossil fuel price predictability, fossil price risk, and what that actually means to renewable projects.

Mr Desai summed up Mr Suman's address

and described fossil fuel price risk and what it means to us given our current situation. While we would gain appreciation given that the cost of renewables is coming down, we would also recognize that the prices of gas and petroleum are also decreasing. Given this, speculation is rife about how it may be easier for India to meet its carbon obligations vis-à-vis the Paris Agreement by switching to gas rather than going in for renewables. It is difficult to determine how people, those who have worked on fossil fuel resources on to their balance sheets, are going to react. Are they going to do nothing or will they ensure that the prices crash, thereby changing the nature of competition. The point of fossil fuel risk is in no uncertain terms a serious concern, and none of us fully know how we are going to go about it vis-à-vis our long-term goals. To get a perspective on the international dimension, Mr Dheeraj was invited to speak next.

Mr Dheeraj opened his address by thanking the previous speakers and stressing the main concern of the panel—how to stay below the 2°C benchmark. This, indeed, is the question for which everybody is looking for a decisive answer. The answers that have so far come up quote huge sums of money, in trillions, but fail to have an equal impact. As per Mr Dheeraj, it is best not to look at the figures as they are

somewhat unreachable in the foreseeable future. The other main concern that needs to be tackled is the constraints to access public finance in meeting the given targets. By and large the constraint is about the availability of money in the public domain, especially public finance. Many governments across the world do not have the type of money that is being talked about. Added to this, the lack of clarity regarding this issue makes troubleshooting difficult. Mr Dheeraj insists that his knowledge over the last year and a half has not improved his clarity and feels this is one of the major impediments we are facing today. Narrating a short anecdote, Mr Dheeraj talked about the G-20 incident wherein one of the speakers mistook the green finance working group for the working for green finance and presented a paper which was meant for the other! Stressing that few have little understanding of these topics, Mr Dheeraj goes on to explain how those who talk about the green bond and green finance seldom know what it actually is. Next, the speaker spoke about its economics and politics. According to him, while the economics may not be that strong, the politics certainly is; all the spending needs to be done with the consensus between developed and developing countries. Highlighting the reasons for this difficulty, Mr Dheeraj feels there are numerous differences, ‘baggage’, and ‘past ‘legacies’, that

are slowing down the process. According to him, it may be easier to move things locally as compared to doing it globally. In this direction, having an agreement in order is a significant move that will yield positive results. The speaker is of the opinion that even in the absence of the Paris Agreement, had the price of solar panel been lower, we could have harnessed it more and, conversely, if the price of fossil fuel were to go down then we could continue to use it more sustainably. In this scenario, we could have had the luxury to gauge and act with precision. Expressing his bias in favour of the politics side of it, Mr Dheeraj reiterates an old diction wherein it makes sense to invest only if there is a return. Hypothetically, in the absence of an assured return, politics by way of laws can enforce this kind of expenditure and countries, no matter developed or under developed, will not invest willingly. These large-scale investments will only happen once it is made mandatory by law. The next point was about transformational projects, paradigm shifts, and big projects. In a sense, we must think big and work for the greater benefits of the highest number.

The session chairman then introduced the last speaker, Mr George Sibley, to speak next.

Mr Sibley opened his address by stressing how everything is changing; after five years the technologies we are talking about today



will have become obsolete, the diplomatic structures, too, will become different. Given this flux, it is extremely difficult for us to decide on a definite game plan to achieve the stipulated target. Reflecting this, gaining funds will certainly become a challenge. Risks will become increasingly intense and to counter that we must anticipate the things that can go on in order for us to be able to pitch our claim. The technologies—those that have been used to address multifaceted problems have already been addressed in India’s nationally determined contribution—are a mix of a variety of different technologies, and the availability of solar and unavailability of wind makes India’s case different. On the upside, due to the Paris Agreement, things, especially changes both technological and financial, there will be a

process by which changes will occur which in turn will enable how we approach the inevitable variations in our technology and financing. In the financial sector, things do not look very optimistic as the financing that is available is not sufficient and the trillions that are required do not get disbursed due to the unpredictable nature of outcome. Unpredictability of fossil fuel prices; the unpredictability of whether to invest in one or the other instrument not knowing where the technology may be in 5, 10, or 50 years. As a solution, in order to bridge the gap between procuring the required funds and reducing unpredictability, countries that do intensive R&D must double their efforts in solving these problems. In this direction, as can be anticipated, the primary problem may pertain

to how countries can go from being research oriented to being ‘practical’ in its deployment of such methods. The idea is to change the paradigm and ‘de-risk’ the thresholds at which investments occur such that funds will flow into such arenas without unnecessary hindrances. As per the Bill Gates’s breakthrough energy

coalition, an initiative that looks to achieve the above-mentioned goals, the following five points were suggested: (a) invest early; (b) invest broadly again and again; (c) invest boldly; (d) invest wisely; and (e) invest together. With this the session was concluded.



VALEDICTORY SESSION





Valedictory Session

Opening Remarks: **Mr Ashok Chawla**, *Chairman, TERI*

Summary of the WSDS 2016 Proceedings: **Mr Amit Kumar**, *Senior Director–Social Transformation, TERI*

Presentation of Awards:

- TERI University Awards
- TERI Press Photo Contest Award

Valedictory Address: **Mr Prakash Javadekar**, *Hon'ble Minister of Human Resource Development, India (via video)*

Concluding Remarks: **Dr Ajay Mathur**, *Director General, TERI*

Mr Ashok Chawla, Chairman, TERI, initiated the valedictory session of the first edition of the four-day WSDS and spoke about how the event witnessed dialogues and intense discourses in every possible aspect of sustainable future of the Earth. The summit, inaugurated by President of India, Shri Pranab Mukherjee, witnessed participation from 22 countries, five ministers from across the seas, and six Indian ministers. The presence of delegates, from both developed and developing countries, stands as an expression of shared concern for the threat of climate change and the keenness to cooperate. The world today has a level of aggregate prosperity never seen before and the same world also exhibits disparities greater than they have ever been in the past. It is alarming to note that we may increasingly be living in a world

whose existence may not be sustainable. The year 2015 give us pioneering tools to deal with these challenges. The SDGs, as they exist today, gave us enabling opportunities to improve the lives of some of the poorest regions in the world. The Paris Agreement takes us to a new era of optimism and international cooperation to limit the rise of global temperatures to well below 2°C.

Mr Chawla also drew attention to the Greenovation exhibition. Held on the side lines of the WSDS, this exhibition showcased remarkable innovations from all over the world on energy efficiency, water, renewable energy, and sustainable urban development and acted as a window to actual work on the ground. It is particularly gratifying to note that the Summit through its deliberations and discussions has pledged on the table many constructive ideas



and action points. He further expressed hope that the future editions of the Summit will aid in monitoring progress on our actions, share lessons learnt, and find ways of adopting solutions for local communities, wherever they may be.

Next, Mr Amit Kumar, Senior Director, Social Transformation Division, TERI, initiated a summing of the WSDS by quoting the statistics of the Summit, spread over four days, in terms of 33 thematic and plenary sessions, over 290 speakers, including 11 ministers from India and overseas, over 2000 delegates, and over 33 of discussions.

He described how WSDS has been conceptualized as a single platform to accelerate action towards sustainable development and especially climate change. The WSDS brought together policy, technology and community



practitioners in order to share experiences and build new partnerships. WSDS 2016 focussed on actions around accelerated implementation of sustainable development goals (SDGs) and nationally determined contributions (NDCs). Setting the tone, he quoted the Hon'ble President of India, Shri Pranab Mukherjee, "Global action built on partnership is required to achieve sustainable economic and social progress inclusive progress, inclusive growth and protection of earth's ecosystems. This collaboration between governments, private sector, academia and civil society will be a vital source of knowledge innovation, expertise and solutions in tackling the twin and interlinked challenges of development and environment". Pointing out the significance of the Summit, he highlighted that WSDS was the first important event post the two major global

milestones, namely adoption of the SDGs and Paris Agreement and India's prompt ratification of the latter.

Recognizing the leading role of businesses, WSDS 2016 began with the Business Day wherein three challenges on the road to achieving sustainability were identified, namely behavioural changes with innovation, appropriate regulations, and sufficient capital. Further, it was emphasized that both civil societies and businesses should work together to achieve SDGs. The areas of cooperation included product development, early demonstrations and adoptions, and demonstrating implementation through business models. What also emerged strongly was that it is time for companies to think beyond corporate social responsibility (CSR) and consider how to make investments more systemic to contribute to SDGs. In fact, businesses leaders

repeating emphasized on aligning their businesses and business models with opportunities presented by sustainable development and addressing climate change concerns. In a significant statement at the WSDS, Mahindra & Mahindra announced that it decided to impose an internal carbon price of USD 10 per tonne CO₂ on all its investments. The fact that companies that take the lead will benefit from being early movers was also reiterated. Interestingly, peer-to-peer learning and exchange of knowledge were deemed to be extremely effective tools to solve the issue of climate change and sustainable businesses. The four days of discussions, among different stakeholders, clearly established that sustainability should not be a peripheral activity but should evolve as a mainstream movement. Regional cooperation was identified as an area that can significantly contribute to sustainable





energy transitions. Similarly, proper monitoring of progress, challenges, and failures can help in early feedback and course corrections, thus enabling evolution of initiatives and building consciousness for the development process. The role of banks and financing initiatives as a catalyst was underlined very clearly. The three key elements which require immediate attention of the financial sector were identified as risks associated with climate change, changes required to work towards a low carbon pathway, and the issue of internalizing externalities. Time and again, it has been reiterated that there is no contradiction between sustainable development and economic development. There is a need, therefore, to decouple economic growth from resource use and identification of waste-to-product strategies as being crucial for businesses to take business advantages of sustainability. However, there is a need to build a regulatory



framework and enable appropriate carbon pricing and development instruments that mitigate risks in investments. In order to hasten the process of achieving the SDGs, it was felt that these must be entrenched in all policies and strategies of the governments of respective countries. It was also pointed out that implementing the SDGs is about maximizing collaboration and opportunities and not just trade-offs.



At the same time, it was recognized that urban centres are the key to achieving SDGs. As a corollary, it becomes imperative to address the root cause of issues, such as transport and air quality, that are vital to identifying sustainable solutions. Thereafter, he noted how meeting SDGs is critical to improving the everyday lives of all citizens. There is recognition that it cannot be accomplished without the active participation of people in their roles as active citizens, as decision makers at work or as households. There was a universal concern on the lack of quality data and the availability of the right tool that is essential for scaling up of green solutions. For instance, moving from retrospective to prospective changes was envisaged in the way we use transport. Thus, the most likely scenario would be about not owning personal cars but sharing electric cars. The internet of things (IoT) was seen as the key enabler for the energy transformation. On the water-oriented SDGs, a global water governance platform was mooted to provide impetus to better cooperation among the water sharing countries and states. It was also pointed out that forestry has not imparted the due attention it deserves. To overcome energy poverty of Africa's population, the significance of South-South cooperation was emphasized. Underscoring the scale of WSDS, the platform was used to put the formal seal for cooperation between the Government of India

and the European Commission on water and to move ahead the deliberations on International Solar Alliance leading to probable adoption at CoP22 in Marrakesh. He also mentioned how gender mainstreaming was an essential part of sustainable development. For accelerating the action on SDGs and climate change, it was necessary to forge collaborations among countries, national governments and states right down to the local bodies, and businesses in conjunction with collaboration amongst research institutions, civic societies, and communities. Sustained handholding at different levels is the need of the hour rather than mere debates and deliberations. Now it is time to act for planet Earth.

This was followed by announcement of winners of the two awards—the Young South Asian Research on Sustainable Consumption and Production Award 2016 and the TERI Press Photo Contest Award 2016. The former followed a three-day symposium for young researchers on the theme of sustainable consumption and production, a key part of the SDGs. The symposium was held at the TERI University in collaboration with the UN Sustainable Development Solutions Network, the UN Environment Programme, and the EU-funded Swiss Asia Policy Support Programme.

The awards for the three best research papers presented at the symposium were based on links of these papers to sustainable consumption and production targets, the originality of the presentation, and the quality of research. The first winner, Dr KS Sudhakar from the Maulana Azad National Institute of Technology, Bhopal, won his award for research paper on photovoltaics, a step towards addressing water and energy sustainability. The second award went to Ms Ruma Arora Soni, also from the Maulana Azad Institute, Bhopal, for her research topic, sustainable biomass production of micro algae for food, feed, and biofuels. The third award was won by Dr K V Rashmi, M Visveswaraya Institute of Technology, Bengaluru, and her research topic was the utility of DNA barcoding in understanding the taxonomy of Mucinous species of India.

Winners of the TERI Press Photo Contest Award 2016, run by Terragreen, TERI's flagship monthly environmental magazine. It is a cracking read and this award was made possible by the sponsorship of Dalum Paper and the winning prize being sponsored by the State Bank of Hyderabad and TERI is very grateful indeed for that sponsorship. Now the jury was made up of Telegreens editorial team and it was led by the International award winning photographer, Ramjam Basin. There were three hundred

entries in total there were thirty shortlisted, they were all excellent and we are going to see a short presentation of the winning entries.

This was followed by a video address by Mr Prakash Javadekar, Hon'ble Minister of Human Resource Development, Government of India, who described how the WSDS in its original avatar as the Delhi Sustainable Development Summit, sparked off a sustainability debate throughout the world. He emphasized how man's exploitation of Mother Nature, right from the days of Industrial Revolution till today, has aided the onset of climate change. The world has decided to limit it up to 2°C and even tried to achieve 1.5°C and significantly, this is a manageable target.

Further, Mr Javadekar noted how the Paris Summit acquired support of all the countries of the world. He went on to describe how after effects of the Industrial Revolution and consistent emissions over the years have resulted in severity of the typhoons, hurricanes, floods, droughts, changes in monsoon cycle, rising sea levels, and rising temperatures and thus stand as testimony to climate change the world over. India, under the dynamic leadership of Prime Minister Shri Narendra Modi is committed to work on the path of the sustainable growth.

Mr Javedekar also restated how development and climate protection can be achieved

simultaneously. In India today, 140 million LED bulbs have been in use since the past 14 months, so, in the next two years, the usage will increase to nearly 700 million LED bulbs, achieving a saving of 20,000 MW. Besides, ensuring saving in financial terms, there will also be reduction in net emissions.

He went on to speak about how the nature of India's intended nationally determined contributions (INDCs) is robust, ambitious, and doable. Further, all ministries and departments are in mission mode insofar as the Government of India has launched eight missions to walk on the road to sustainable development. It is, in this respect that TERI is an important asset for the Government of India. TERI, as a think tank, under the leadership of Dr Ajay Mathur, Director General, TERI, who himself is an energy expert really can bring significant changes. He also spoke about how the developed world needs to commit more strongly so that a genuine reduction in emissions is achieved. Unlike the Kyoto Protocol, it will be ensured that all the countries remain united in their commitment to reducing emissions. He also spoke about creation of a new environmental consensus and consciousness amongst all the stakeholders and the public at large about environmental sustainability.

Next, Dr Ajay Mathur, Director General, TERI, began his concluding remarks by expressing

gratefulness to Mr Prakash Javadekar, Hon'ble Minister of Human Resource Development, Government of India, for the video message and his continued interest in the deliberations around WSDS. He went on to acknowledge the group of people, both within TERI and the International Steering Committee, who, in their respective capacity, have provided the overall guidance. The members of the Committee present at the Summit included Ambassador Arni Walter, Dr Suman Berry, Mr Upendra Tripathi, Mr Ashok Lavasa, and Mr H L Kite. He also expressed his gratitude to all the partners and the stellar group of people who provided the requisite support. These include, the Ministries of Environment, Forest and Climate Change, the Ministry of New and Renewable Energy, the Royal Norwegian Government Embassy, the Asian Development Bank, the World Bank, the Agency Françoise de Development, colleagues from the US and Swedish Governments and the European Union along with the Summit's our star corporate partner, Energy Efficiency Services Ltd. He also mentioned about the enormous media coverage garnered by the Summit during its four-day duration. In particular, he spoke about the effectiveness of social media, in terms of its reach.

Further, he expressed his gratitude to the journalists, from a number of neighbouring countries, including Cameroon, Sri Lanka,

Nepal, Bangladesh, Afghanistan, and India. He hoped that their reports on the challenges and success stories of environment and sustainable development will continue in times to come and will eventually be translated through publicity and wide dissemination of those efforts. Finally, he acknowledged TERI colleagues, including the WSDS Secretariat, the team which brought the plenaries and themes together, the various facilitators and reporters, the people who

arranged the thematic tracks and the plenaries, and the entire logistics and the administrative team. He also appreciated the presence and contribution of

Mr Martin Hiller, Director-General, REEEP, towards the success of the Summit. Dr Mathur also recognized the hard work and the amount of midnight oil burnt by the TERI Press team for publication of the bulletins on all the four days of WSDS.