ACT TOGETHER, SUPPORT INNOVATION

PM MODI CALLS UPON EVERY COUNTRY TO THINK OF GREATER GOOD IN FIGHT AGAINST CLIMATE CHANGE

Virtual Hall: Pavagada

INAUGURAL CEREMONY

Welcome Address: Mr Nitin Desai, , Chairman, TERI

Inaugural Address: Hon'ble Prime Minister of India, Shri Narendra Modi

Addresses: Shri Prakash Javadekar, Minister of Environment Forest & Climate Change, Government of India; Hon. James Marape, MP, Prime Minister of Papua New Guinea; Ms Amina J Mohammed, Deputy Secretary-General, United Nations; Mr Mohamed Nasheed, Speaker of the People's Majlis, Republic of Maldives; H.E. Dr Mohamed Irfaan Ali, President of the Cooperative Republic of Guyana

Vote of Thanks: Dr Ajay Mathur, Director General, TERI

Inaugurating virtually the 20th edition of the World Sustainable Development Summit 2021, TERI's flagship event, the Hon'ble Prime Minister of India, Shri Narendra Modi said that the poor are most impacted by climate change. He added that climate justice is inspired by a vision of trusteeship where growth comes with greater compassion to the poorest. He said, it also means giving developing countries enough space to grow. He explained that when each of us understands our individual and collective duties, climate justice will be achieved. Prime Minister Modi added that India's intent is supported by concrete action and spirited public efforts. He said India is on track to exceed its commitments and targets on Paris.

SHRI NARENDRA MODI
Hon'ble Prime Minister of India

> The road to fighting climate change is through climate justice and this requires us to be large-hearted by thinking of the bigger and the long-term picture

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SHRI PRAKASH JAVADEKAR

Hon'ble Minister, Environment Forest and Climate Change

> With dedication and commitment to the cause of promoting sustainable development, WSDS has grown into an internationally recognised forum that promotes thoughtful discussions that create an actionable agenda for future sustainable conferences

H.E. DR MOHAMED IRFAAN ALI

President of the Cooperative Republic of Guyana

> Over the years, we have followed the Paris Agreement commitment in our efforts towards protecting the environment by moving the country towards a sustainable development path though our low carbon development strategy

H.E. MR MOHAMED NASHEED

Speaker of the People's Majlis, Republic of Maldives (Former President of The Republic of Maldives)

> To survive climate change, we need to work with nature and not against it by adopting smart biological adaptation strategies

MS AMINA J MOHAMMED

Deputy Secretary-General, UN

> Science tells us that we must cut GHGs by 45% by 2030 and reach net zero by 2050

The other dignitaries present in the event included H.E. Dr Mohamed Irfaan Ali, President of the Cooperative Republic of Guyana; Mr Mohamed Nasheed, Speaker of the People's Majlis, Republic of Maldives (Former President of Maldives); Ms Amina J Mohammed, Deputy Secretary-General, United Nations; and Shri Prakash Javadekar, Hon'ble Union Minister of Environment, Forest, and Climate Change. Addressing the gathering, Shri P Javadekar said, "I am very happy to be part of WSDS 2021. With dedication and commitment to the cause of promoting sustainable development, WSDS has grown into an internationally recognized forum that promotes thoughtful discussions that create an actionable agenda for future sustainable conferences. Our Honourable PM launched the ISA, Coalition of National Disaster Infrastructure and Mission Innovation which has been picked up by the world very well."

Delivering the welcome address, Shri Nitin Desai, Chairman, TERI, said, "The summit, over the course of 20 years has, brought together people, leaders, activists, and experts around the world to exchange ideas for a sustainable future. In many ways, our PM has taken a lead in this initiative and has been a strong leader in the renewable energy sector."

Ms Amina J Mohammed, Deputy Secretary-General, United Nations said , "Over the years, this event has addressed the most pressing global challenges of our time. Science tells us that we must cut GHGs by 45% by 2030 and reach net zero by 2050. India is currently the only G20 country that has overachieved its NDCs. The target of 450 GW of renewable energy by 2030 will bring more jobs, cleaner air, and a more secure power grid. We count on India on its contribution to multilateralism on COVID vaccines, climate change, and on peacekeeping."

Commending India's climate goal commitments, H.E. Mr Mohamed Nasheed, Speaker of the People's Majlis, Republic of Maldives (Former President of The Republic of Maldives), said, "The climate crisis is a great national security threat to the world. Climate change is already upon us but that does not mean we are going to give up. To survive climate change, we need to work with nature and not against it by adopting smart biological adaptation strategies. Time is running out and we must cut emissions, quickly. In December, India announced an eye-catching target of 450 GW of renewable energy target by 2030, which shows incredible leadership by the Prime Minister of India. I thank PM Modi for taking the leadership in providing strategies that will deliver a safer and prosperous future for all." Addressing the gathering, H.E. Dr Mohamed Irfaan Ali, President of the Cooperative Republic of Guyana, said, "I am pleased to join the 20th inauguration ceremony of the WSDS 2021. I commend TERI for sustaining this initiative where the Government of Guyana is participating since 2011. The time has come for society to adopt technologies and innovations. Over the years, we have followed the Paris Agreement commitment in our efforts towards protecting the environment by moving the country towards a sustainable development path through our low carbon development strategy. The requirement is of a greater political will to upscale the use of these technologies. It is a critical role, not only for the government but also the private sector and organizations like TERI that help facilitate the technological transformation and uptake."

Dr Ajay Mathur, Director General, TERI, gave the vote of thanks. He said that it was an honour to have the Hon'ble Prime Minister of India inaugurating this summit. He highlighted the need to develop new and innovative partnerships which will help us combat climate change together.

FIRESIDE CHAT

Virtual Hall: Pavagada

TRANSITIONING TO ZERO EMISSIONS: A CONVERSATION ON INDUSTRY, FINANCE AND POLICY

Chair: Mr Manjeev Puri, Former Indian Diplomat
Speakers: Mr Manish Chaurasia, Managing Director and CEO, Tata Cleantech Capital; Mr Erik Solheim, Former Minister of International Development and Minister of the Environment, Norway; Prof. Dr Björn Stigson, Chairman, Stigson & Partner

The fireside chat on 'Transitioning to Zero Emissions: A Conversation on Industry, Finance, and Policy' discussed how we can support green growth and accelerate a sustainable transition. Mr Manjeev Puri highlighted the need for immediate actions on a sustainable transition. Giving an example of the recent natural calamity in Uttarakhand, he said, "It is evident that there is a major problem going on with the nature." He talked about India's commitments to the Paris Agreement. Prof. Dr Björn Stigson discussed the challenges in transforming the energy system worldwide. He highlighted the role of businesses and talked about the scope available to the developing countries in the field of renewable energy unlike old economies that have a baggage to deal with trying to go ahead. He suggested that for successful businesses, we need able energy systems.

Discussing the role of carbon finance, Mr Manish Chaurasia asserted that finance for this transition is not a macroeconomics problem. He compared the global savings with the money required for global carbon finance. He said, "Looking at the estimates, the required amount for carbon finance is just a portion of the savings. Thus, it is a microeconomics problem." He stated that we need an ecosystem where policies are predictable and stable leading to investors' confidence. He mentioned that multinational institutions such as World Bank, Green Bank, and so on need to see that the wealth of technology is disseminated in the areas that cannot afford them. Talking about the importance of public policy and the role of politics in this area, Mr Erik Solheim said, "Politics is about will." He mentioned that in recent times, much has been done in order to move towards a carbonless future. Furthermore, he said, "Today's time is different as now, we can integrate economy and ecology from the beginning as price of renewable energy is really low. There is no choice to be made between mother earth, jobs, and prosperity." He praised India for having policies that work for nature as well as eliminating poverty. He asserted that political will, businesses and technology are needed to attain the transition. He also talked about the theory of change, for which he said, "Change happens when three factors come together, which are public opinion, brave visionaries, that is, politicians, and businesses."

MR MANJEEV PURI
Former Indian Diplomat

"We need 'GREEN'– Growth with Renewable Energy, Enterprise, and Wedded to Nature"

PROF. DR BJÖRN STIGSON
Chairman, Stigson & Partner

"There are losers as well as winners in the sustainable transition. Thus, we need policies to deal with this situation"

MR MANISH CHAURASIA
Managing Director and CEO, Tata Cleantech Capital

"An ecosystem is required where policies are predictable and stable which leads to investors' confidence"

MR ERIK SOLHEIM
Former Minister of International Development and Minister of the Environment, Norway

"Bring ecology and economy together to find win–win solution"

Virtual Hall: Kamuthi

YOUTH UNITE FOR A SAFE AND SECURE ENVIRONMENT FOR ALL

Inaugural Address: Mr Ajai Malhotra, Distinguished Fellow and Senior Advisor (Climate Change), TERI
Setting the Context: Mr Darsh Vatsa, Delhi Pubic School, Sonepat
Special Address: Mr Christophe Manet, Chargé d'Affaires a.i., Delegation of the European Union to India; HE Mr Vincenzo de Luca, Ambassador of Italy to India; HE Ms Jan Thompson, Acting High Commissioner, UK
Speakers : Dr Ajay Mathur, Director General, TERI; Dr Arunabha Ghosh, CEO, Council on Energy, Environment and Water; Ms Indra Basu, Board Member, Indian Youth Climate Network; Ms Tosca Barucco, Special Envoy for COP 26 of the Italian Ministry of Foreign Affairs; Ms Taru Mehta, Area Convenor, EEA,TERI; Ms Jasmine Kaur Narang, Panjab University, Chandigarh

In the session, it was emphasized that global recovery must lead to a more resilient and safer future with focus on rebuilding and reshaping economies. Panelists urged for bold moves to be made on COP26 to ensure we are not late for actions. Green partnership between Italy, UK, and India for use of renewable energy, transition in technology, and increasing efficiency to achieve CO_2 reductions and be a pillar of the recovery plan prior to G20 and COP26 was highlighted. Youth Climate Conclave was acknowledged to be a competitive and education-based approach for youth to showcase stories of change. Capacity building of youth and indigenous communities was stressed for reducing their vulnerability towards climate. It was noted that though installation cost is higher in the renewal sector, the long-term efficiency and overall carbon emissions are far less. It was suggested that the interest of the elite and the vulnerable should converge. The need for collaboration of all generations for a stronger and more inclusive framework to combat climate change was highlighted. The need to prioritize the 3 Ps (people, planet, and prosperity) for increasing our green footprints was also emphasized.

HE MS JAN THOMPSON
Acting High Commissioner, UK

"Young people can act now and build now to create jobs and prosperity without compromising the environment"

Virtual Hall: Rewa

HARNESSING THE SOCIO-ECONOMIC CO-BENEFITS OF RENEWABLE ENERGY: MAKING THE PARIS AGREEMENT A SUCCESS

Opening Presentation: Ms Neha Pahuja, Fellow, TERI; Dr Sebastian Helgenberger, COBENEFITS Project Director, Institute for Advanced Sustainability Studies (IASS)
Special Remarks: Dr Ajay Mathur, Director General, TERI
Speakers: Dr Anju Goel, TERI; Ms Rashmi Murali, TERI; Mr Neeraj Kuldeep, The Council on Energy, Environment and Water (CEEW)
Session Chair: Mr R R Rashmi, Distinguished Fellow and Programme Director, TERI
Panellists: Dr Sekhar Bonu, Director General, Development Monitoring and Evaluation Office, NITI Aayog; Mr Dinesh D. Jagdale, Joint Secretary, Ministry of New and Renewable Energy; Dr Praveen Saxena, CEO, Skill Council for Green Jobs (SCGJ); Dr Nisha Mendiratta, Advisor/Scientist G and Associate Head, Climate Change Programme, Department of Science and Technology; Mr Abhishek Acharya, Joint Director, Department of Economic Affairs, Ministry of Finance

Ms Neha Pahuja, opening the session, stated that India is in the midst of an energy transition with important social and economic implications. India's energy pathway will define the basis for its future development. Dr Sebastian Helgenberger stated that recommendations of COBENEFITS policy report should be included as a part of India's climate action and in India's NDCs. It would be important to make co-benefits an agenda for government. Dr Ajay Mathur, in his special remarks, highlighted that renewable energy is a low-hanging fruit in achieving climate actions and provides us with tools to bring down the emissions and understanding the co-benefits of such actions would drive the climate action at the state and community levels. Dr Anju Goel presented her results on improving health and reducing cost with renewable energy. Ms Rashmi Murali focused on secure and reliable electricity access with renewable energy mini-grids in rural India and Mr Neeraj Kuldeep shared his findings on future skills and job creation with renewable energy. Dr Sekhar Bonu focused on outputs and outcomes and the need to quantify them for better comprehending the 'co-benefits' of renewable energy. Mr Dinesh Jagdale said that with improved technology and declining costs renewable energy penetration has become easier. Dr Praveen Saxena stated that the workforce in the sector is expected to reach 18.5 lakhs by 2030. Mr Abhishek Acharya emphasized the need to include the private sector through financial instruments that would help in the energy transition for India while also emphasizing on the global community's response and support. Dr Nisha Mendiratta spoke about increasing emphasis on mitigation and adaptation-oriented missions in India.

Virtual Hall: Charanka

FROM COASTS TO HIGH SEAS: EXPLORING SOLUTIONS FOR A CLEANER OCEAN AND A SUSTAINABLE BLUE ECONOMY

Moderator: Ms Twinkle Dev, Research Associate, TERI
Opening Remarks: H.E. Hans Jacob Frydenlund, Ambassador of Norway to India

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Session I: Countering Ocean Litter: Sustainable Waste Management in India
Session Chair: Dr Shailesh Nayak, Director, National Institute of Advanced Studies (NIAS)
Session Speakers: Dr M.V. Ramana Murthy, Scientist-G & Director, National Center for Coastal Research (NCCR); Dr Amardeep Wander, International Waste and Marine Litter Consultant, UNEP – Team Leader; Dr Vijay Habbu, Adjunct Professor (ICT), (Ex- Sr. Vice President, Reliance)
Closing Remarks: Dr Suneel Pandey, Senior Fellow & Director, Environment and Waste Management Division, TERI

Session II: Blue Economy: India's Road to a Greener Future
Session Chair: Dr M.A. Atmanand, Visiting Faculty, Indian Institute of Technology, Chennai, Director (Retd.), National Institute of Ocean Technology, MoES, Chair-IOCINDIO, UNESCO
Session Speakers: Prof. V.N. Attri, Chair in Indian Ocean Studies (CIOS), IORA; Mr C.N. Ravishankar, Central Institute of Fisheries Technology (CIFT); Capt. Sarabjeet S. Parmar, Executive Director, National Maritime Foundation; Ms Joanna Cymbalista, Quality & Sustainability Compliance Manager, IKEA South Asia
Closing Remarks: Mr Souvik Bhattacharya, Fellow and Director, Resource Efficiency and Governance, TERI

In the inaugural address, Hans Jacob Frydenlund, Ambassador of Norway to India focused on the tangible and intangible importance of the ocean to human civilization and its deep connection with all life forms on earth. Blue economy, he asserted, could lead the way in a post-COVID world, through sustainable management and vigilant policymaking. The ambassador also stressed on the Norwegian model of sustainable ocean management and how by partnering with India, the two nations can be the front runners in controlling oceanic pollution across the world.

Session I

Dr Shailesh Nayak pointed out that plastics are a major source of marine litter as they take several decades to decay and further form microplastics, which pose a more serious threat to the environment. He informed that in India, the primary concern is waste management and without a proper waste disposal infrastructure and legislation, tackling plastic pollution is not possible. In his concluding remarks, he emphasized that research and education are pivotal in curbing marine pollution. Dr M. V. Ramana Murthy discussed the different types of plastics found in oceans and foregrounded how microplastics and nanoplastics are most harmful as they infect the food chain. He further talked about sampling and analysis of microplastics and informed that plastic is not only found in water, but also in sediments on the shores.

Dr Amardeep Wander took the session forward and enlightened the attendees about the four key takeaways for improving waste management, which include stronger data, improved designs, innovation, and research.

The final speaker was Dr Vijay Habbu, who mentioned that the industry should focus on designing, especially that enables circularity, recyclability, and promotes collection of littered waste. He said that in India, PET recycling is the most successful since the bottles are being upcycled into various forms including textiles.

H.E. HANS JACOB FRYDENLUND
Ambassador of Norway to India

> Ocean influences all the life forms, it feeds us, connects us with various life forms and inspires us collectively. Our survival depends on it and we should do everything in our power to safeguard it

Dr Suneel Pandey thanked all the presenters and highlighted the crucial role of proper waste management on land along with the necessity for a robust monitoring system to control plastic pollution and save the oceans.

Session II

Dr M.A. Atmanand began the session by highlighting the importance of cohesion between science and policymaking and how the two must be synchronized in order to create a pathway towards positive sustainable oceanic development. He informed the panel about the dangers that the oceans worldwide are currently facing, particularly focusing on their impact on the fishing and tourism industries, which are major contributors to the economic development of the country.

Following suit, Mr C.N. Ravishankar pointed out how a decline in fish species can endanger the livelihood and consumption patterns of over 1.3 billion people, globally. Thus, the need of the hour is to focus on deep sea areas to gain access to untapped fish resources. Mr Ravishankar further discussed the merits of technological innovation that can help build fuel-efficient designs and reduce the impact of bottom trolling, thus bringing a new level of sustainability into the fishing industry.

Prof. V.N Attri steered the conversation to India's ability to achieve its blue economy targets, based on technological innovation and scientific research. Prof. Attri expressed immense confidence that the country is on its way to become a $10 trillion economy by 2030.

Capt. Sarabjeet S. Parmar focused on the governance aspect and highlighted the importance of strong institutional structures and advantageous multilateral collaborations, and how they can help in developing a sustainable blue economy. He stated that we, as a country, must set clear and measurable targets and allow for a seamless intra-institutional collaboration to effectively improve the state of our oceans and the various industries that rely on them.

Ms Joanna Cymbalista shed light on the exceptional work IKEA has been doing in the area of recycling fishing nets and how the team has assumed control over the entire supply chain to make sure that these nets do not end up in the seas, but are reused for the production of other materials.

In his concluding remarks, Mr Souvik Bhattacharya expressed gratitude to all the presenters and acknowledged how the amalgamation of science and technology with policymaking can be instrumental in enhancing the development of a sustainable blue economy.

Virtual Hall: Muppandal

ELECTRICITY TRANSITION IN INDIA: NATIONAL AS WELL AS STATE-LEVEL INTERVENTIONS

Welcome Address: Mr A.K. Saxena, Senior Director, Electricity and Fuels Division, TERI
Inaugural Address: Dr Ajay Mathur, Director General, TERI
Special Address: Mr S. Suresh Kumar, Additional Chief Secretary, Power Department, West Bengal; Mr Gavin McGillivray, Development Director, British High Commission
Panel Discussion Chair: Mr Ajay Shankar, Distinguished Fellow, TERI
Panellists: Mr S.K. Soonee, Advisor, POSOCO; Jane Dennett-Thorpe, Deputy Director, Decarbonisation & Energy Transition, Ofgem; Mr A.S. Bakshi, Former CERC Member; Mr Praveen Gupta, Chief Engineer, Integrated Resource Planning, CEA; Mr B.B. Mehta, Director (SLDC), Odisha Power Transmission Corporation Limited; Mr Abhishek Ranjan, Head Renewable, Smart Grid & DSM, BSES Rajdhani Power Limited

The variability in scale presented by renewable energy sources, such as wind and solar, poses serious challenges to India's rapid energy transition. This session aimed to address the challenges on the way to achieve the ambitious targets of renewable energy (RE) addition through power system flexibility interventions at both national and state levels. In his welcome address, Mr A.K. Saxena emphasized the need for electricity transitions with the help of diverse stakeholders.

Dr Ajay Mathur opened the discussion on a confident note and said, "This decade is the decade of electricity transition". He highlighted the subject of intermittent renewables and asserted that "renewable energy is the cheapest source only when the sun is shining and the wind is blowing". Therefore, India must address the flexibility needs by managing the daily variability through technological and policy interventions at the state level together with capacity building. In his concluding remarks, Dr Mathur advocated for modelling practices to address the need for flexibility in meeting energy demands.

Mr Gavin McGillivray acknowledged the collaboration between TERI and the British High Commission and ensured support towards the energy transition goals. He discussed why, in India, the net zero energy targets must be recognized by the mid-century. Further, he highlighted that affordable and clean electricity is at the forefront of sustainable development and to realize this, India must exhibit great leadership at all fronts. Following his address, Mr McGillivray launched the coffee table book titled, ***Power Sector Reforms Programme*** along with Mr Anish De, KPMG (India).

Mr Thomas Spencer, Fellow, TERI presented key insights to India's power system transition by 2030. He highlighted that the share of variable RE being 35–40% in the total power generation is economically cost-effective by 2030. He further mentioned, since the daily variation in the share of wind and solar is 10–60% in a month, the power system would require fast ramping needs from the existing coal fleet and hydro plants. Interstate transmission network enhancement is indispensable for a strong RE integration, he concluded.

In his special address, Mr S. Suresh Kumar focused on energy transition from West Bengal's perspective by citing that the pandemic was a wake-up call for all to understand the role of flexibility of the power system with a sudden drop in demand. He further added that with the decrease in costs, there has been renewed confidence to add more renewables to the state portfolio in managing the flexibility swiftly through the existing pumped storage plants and battery

MR AJAY SHANKAR
Distinguished Fellow, TERI

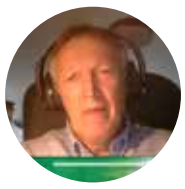
> Distribution utilities need to acquire a central role in driving the energy transition. Time has come to shift their role in leadership

storage. The discussion revolved around the importance of attaining flexibility across the whole value chain from the supply side to the demand side. Flexibility in the supply side mostly needs to cater by lowering the technical minimum of coal fleet, retrofitting to improve ramp rates, ensuring national-level dispatch integration, and enhancing through the existing gas and hydro plants. The panellists suggested for better power system modelling tools and benchmarking of technology assumptions to instil confidence among central planners. Apart from the supply-side interventions, the demand-side flexibility is a necessity too, which could be achieved by segregating the role of the distribution system operator (DSO), and enhancing the distributed energy resources (DER) portfolio in the utility area, thereby easing the energy transition. Concluding the discussion, the panellists unanimously proposed for a strong support system, stemming from state policies and regulations, along with a push for technological interventions to increase the renewable penetration and improve the interstate grid flexibility.

Virtual Hall: Brahmanvel

ACCELERATING AND INSTITUTIONALIZING RESOURCE EFFICIENCY AND CIRCULAR ECONOMY IN INDIA

Welcome Address: Mr RR Rashmi, Distinguished Fellow and Programme Director, Earth Science and Climate Change, TERI
Speakers: Mrs Astrid Schomaker, Director, Global Sustainable Development, Directorate General for Environment, European Commission; Dr Bhawana Singh Scientist 'E', MoEFCC (Resource Efficiency Cell)
Moderator: Mr Michael Bucki, EUD Counsellor
Panellists: Dr Janez Potocnik, Co-Chair of UN International Resources Panel, Former European Commissioner for Environment; Ms Seema Arora, Deputy Director-General, CII; Dr Rachna Arora, Team Leader, EU-REI II; Ms Ekta Narain, Director - Business Development, Recykal; Mr Joseph Arullappan, CEO, FOV Biogas India Pvt Ltd; Dr Asad Warsi, Project Management Consultant, Indore Municipal Corporation
EU-REI Phase II Launch: Mrs Astrid Schomaker, Director, Global Sustainable Development, Directorate General for Environment, European Commission; Dr Bhawana Singh, Scientist 'E', MoEFCC (Resource Efficiency Cell); Dr Ajay Mathur Director General, TERI



DR JANEZ POTOCNIK
Co-Chair of UN International Resources Panel, Former European Commissioner for Environment

> The concept of circular economy has emerged from waste management policy, mixed with the concept of sustainability

The key element driving resource efficiency and circular economy is the regulatory framework and to move ahead there is a need to look at the resource consumption patterns. Delivering the welcome address, Mr R R Rashmi laid emphasis on how resource efficiency and circular economy could be anchored to the actions of environmental management in different streams such as climate change biodiversity, and taking it forward in an overarching framework will play a key role.

Next, Mrs Astrid Schomaker mentioned that the EU – India Cooperation on Resource Efficiency and Circular Economy is a crucial element for integral sustainability. She highlighted that with India having the largest middle class population and it being the fourth largest country in terms of greenhouse gas emissions, the focus on resource efficiency and circular economy could help mitigate the negative externalities and create benefits for the environment by reducing its emissions.

Dr Bhawna Singh stated that the government's priority is to promote resource efficiency which is also reflected in various government policies such as Swachh Bharat Mission, E-vehicles adoption, Waste Management Rules, etc. She further added that resource efficiency and circular economy can deal with resource constraints and provide benefits to the industries and other stakeholders.

The panel discussion, moderated by Mr Michael Bucki, EUD Counselor, threw some thought provoking insights on the important aspects of the India–EU partnership and collaboration on resource efficiency and circular economy, and the role RE&CE approaches can play in reinforcing crisis resilience. The panellists discussed about the need to improve governance, create sustainable production and consumption patterns, and develop comprehensive and working models which can be scaled up and replicated to contribute to circular economy and optimize resource efficiency.

In the presence of EU–REI consortium members and the thematic track panellists and delegates, the EU-Resource Efficiency Initiative Phase II was launched. The key highlights of EU–REI Phase II includes identification of key sectors, efficient use of raw materials, taking forward draft national resource efficiency policy and its implementation, bringing together entrepreneurs, enhancing business-to-business connections and increasing collaboration among industries through EU–India partnerships. The idea is to move beyond models and studies and focus on the implementers where the action is taking place such as the inception of EU innovation lab. Acknowledging the strengthened partnership between EU and India, Dr Ajay Mathur highlighted the success of EU–REI Phase I and how the Phase II can build upon the existing cooperation, foster policy dialogues, knowledge exchange, research, and innovation. At the conclusion of the session, Dr Shilpi Kapur, Senior Fellow, TERI gave the vote of thanks.

Virtual Hall: Kamuthi

PRIVATE SECTOR'S ROLE IN ACHIEVING CLIMATE RESILIENCE: LEADING EXAMPLES FROM COASTAL CITIES

Introductory Remarks: Mr Edwin Koekkoek, Counsellor, Energy and Climate Action, Delegation of the European Union to India
Speakers: Mr Narinder Nayar, Chairman, Mumbai First; Mr Saurabh Bhardwaj, Fellow, Earth Science and Climate Change Division, TERI; Ms Sanne van der Mijl, Project Leader, Climate Adaptation Summit, Ministry of Infrastructure and Water Management, The Netherlands Panel Discussion
Moderator: Mr Anirban Ghosh, Chief Sustainability Officer (CSO), Mahindra and Mahindra
Panellists: Mr Ram Vaidyanathan, Head - Environmental Sustainability, Godrej Group; Ms Shloka Nath, Executive Director, India Climate Collaborative and Leader, Sustainability Portfolio, Tata Trusts; Mr Lennart Silvis, Global Director, Water for Industry, Royal Haskoning DHV; Mr Frédéric Woringer, Director, Climate and Infrastructures Department, AETS; Mr Hans-Peter Egler, Director, Public Affairs, South Pole

MR EDWIN KOEKKOEK
Counsellor, Energy and Climate Action, Delegation of the European Union to India

> Resilience building requires a balance of both adaptation and mitigation strategies

The session provided a platform for the private sector entities leasing climate action efforts in coastal cities to showcase their ongoing initiatives and achievements and highlighted the challenges they face. The session discussed how climate hazards have increased in the last decade. The speakers emphasized on the crucial role that the private sector can play in finding a scalable resilience solution based on a shared vision. It was asserted that business leaders in collaboration with planners, policymakers, and elected officials can play a significant role in conservation, adaptation, and mitigation of climate change. Mr Saurabh Bhardwaj said "building climate resilience is an option which offers holistic mechanisms to address climate variability and change without compromising on present development changes." In the panel discussion, the panellists highlighted that even though Mumbai faces ecological and social challenges through climate change, yet, much of the analysis has concentrated on isolated events rather than on building a systematic lens to view the city's risk profile. The discussion then moved on about how business leaders often have incomplete information about climate change and the impact it will have in the future, which makes it difficult for them to decide where to invest for future infrastructure development. The speakers highlighted that innovation in all fields can bring a holistic change in the development process. Ms Shloka Nath discussed about Climate Risk Atlas, an innovative project of TATA Trusts. She informed that the project aims at critical vulnerability areas such as coasts, urban heat stress, water stress, etc.

Mr Frédéric Woringer mentioned about using flora and fauna to rejuvenate habitats that will act as a good carbon sink and as a consequence boost green tourism. Areas such as insurance and digital sector can play an important role in creating innovative financial incentives and digital solutions in minimizing damages and preparing cities for future disaster risks. Mr Anirban Ghosh emphasized on the importance of learning from the past and the need of big data repository on climate change and its impacts on coastal cities as well as other settlements. Concluding the session, the panellists agreed that the public–private partnership can play a significant role in building, operating, and managing resilient infrastructure and scale up sustainable solutions for future development.

Virtual Hall: Rewa

ARE WE REALLY AWARE ABOUT AIR POLLUTION AND ITS IMPACTS?

Welcome Address: Dr Sumit Sharma, Director, Earth Science and Climate Change, TERI
Inaugural Address: Dr Jonathan Demenge, Head of Co-operation, Swiss Agency for Development and Co-operation
Panellists: Prof. R. Guleria, Director, AIIMS; Prof. Arun Sharma, Director-Professor, University College of Medical Sciences; Prof. Archna Kumar, Behavioral Change Expert, Associate Professor, Lady Irwin College; Mr Vikrant Gupta, Senior Executive Editor (Sports), TV Today Network; Ms Archana Khanna Chhabra, Teacher, Puranchndra Vidyaniketan, Kanpur; Mr Naman Sawhney, Student, City Montessori School, Aliganj, Lucknow; Ms Anshika Maurya, Student, City Montessori School, Aliganj, Lucknow

PROF. R. GULERIA
Director, AIIMS

"Not only health effects, air pollution causes labour loss and agricultural productivity"

The session addressed some of the key issues regarding the existing levels of public awareness on the severity of air pollution and provided comprehensive insights on the importance of behavioural change for the abatement of its impacts. Giving the welcome remarks, Dr Sumit Sharma briefly elaborated on the current state of air pollution across the country, and its impact on human health, climate, agriculture, and overall environment. In his inaugural remarks, Dr Jonathan Demenge highlighted the loss of health and life caused by air pollution and asserted it as a global emergency. He explained about the CAP India project which aims to support India's efforts to improve air quality, while contributing to public health, environment, and climate change mitigation.

Mr Naman Sawhney and Ms Anshika Maurya, winners of the interschool poster and resource mapping competition organized by CAP India project, spoke briefly about their understanding of air pollution along with its sources and impacts. Esteemed medical expert, Dr R. Guleria explained the health impacts of air pollution and shared the insights from the research conducted by him and his team studying the health impacts of air pollution. He added that as per the findings of his research work, there was a visible spike in the number of cases reporting acute respiratory problems as the air quality of the city worsened. Ms Archana Khanna Chhabra stressed the need of updating the education system, and making it more interactive and practical to inculcate responsible behaviour amongst the children. Mr Vikrant Gupta highlighted the need of encouraging conversations around air pollution throughout the year, unlike the current situation where the public discourse on air pollution spikes around four months of winter when the air quality is worse. Dr Arun Sharma stressed that it is our collective responsibility to act upon air pollution as it is an urgent public health issue. Dr Archna Kumar delivered the final address on the event. She drew attention towards what induces behavioral change amongst individuals. She said information does not always communicate to action and people do not act on the basis of information available to them. Factors such as context, motivation, capacity, and even emotion play important roles in deciding the behaviours of individuals. Concluding the discussion, she added that by using behavioural outcome matrix for different levels of interventions using the socio-ecological model as a tool one can determine what needs to be done at each level and create a synergy that should be effectively communicated with all the stakeholders.

Virtual Hall: Charanka

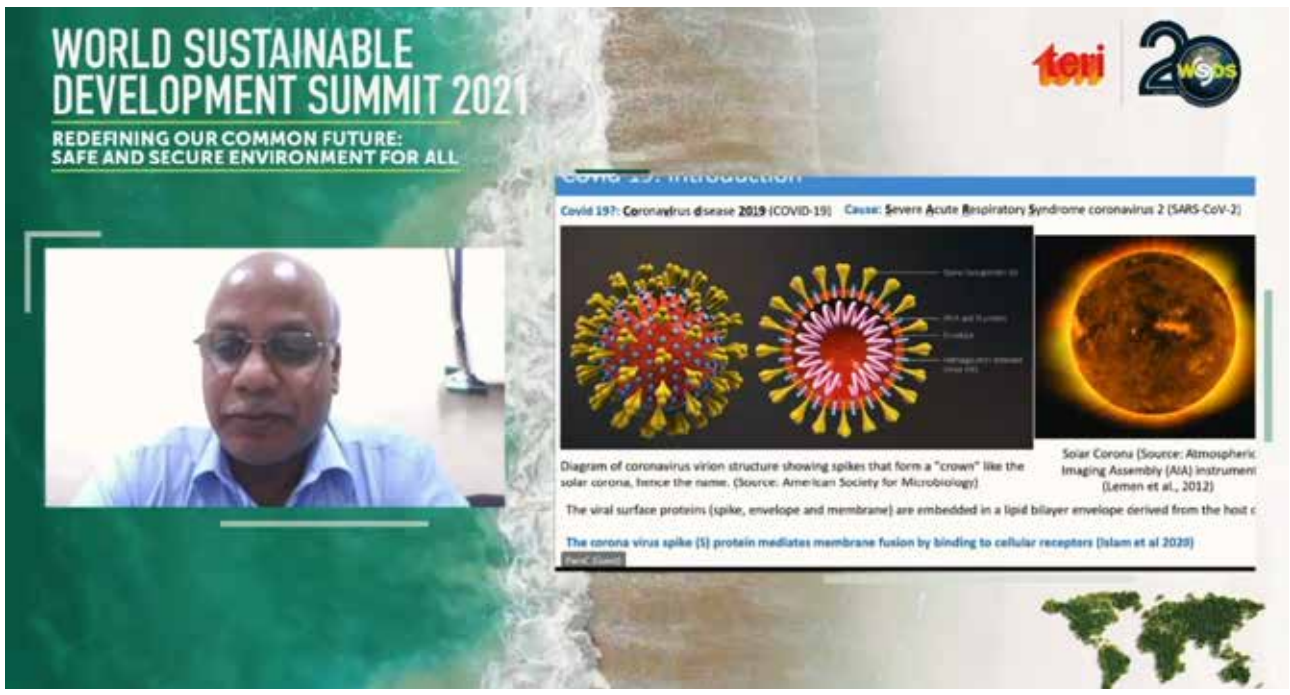
MONITORING OF COMMUNITY WASTEWATER FOR EARLY SIGNALLING THE SPREAD OF COVID-19

Speakers: Dr S K Sarkar, Senior Director and Distinguished Fellow, TERI; Ms Debashree Mukherjee, IAS Additional Secretary, Ministry of Jalshakti, Govt of India; Dr Paromita Chakraborty, Associare Professor, Dept of Civil Engineering, SRM Institute of Science and Technology, Chennai; Dr N Godhantaraman, Head Centre for Environmental Sciences, University of Madras, Chennai; Mr Joep Verhagen, Global Lead Water, Global Centre on Adaptation, Rotterdam, The Netherlands; Dr Magdalena Urbaniak , UNESCO Chair and Associate Professor, Department of Applied Ecology, University of Lodz, Poland

Opening the thematic session, Dr Girija Bharat said that the 'Monitoring of Community Wastewater for Early Signaling the Spread of COVID-19' in Chennai was supported by the Swiss Development and Corporation (SDC) and conducted by the consortium. Welcoming all, Dr S K Sarkar said that as a consortium, TERI, SRM, and Mu Gamma consultants have developed the thematic study. He added that the major goal of the study is to develop an

early signaling system to detect the spread of COVID-19 in communities in Chennai. The findings of the study have the potential to be replicated in other parts of India and could be useful for policymakers and the public for providing real-time assessment of the COVID-19 situation. Ms Debashree Mukherjee highlighted that in the area of monitoring sewage water system to detect the spread of COVID-19, there are no appropriate or timely interventions in the type of scholarships and policies. She said that change in science and technology, knowledge and tools in detecting this disease are welcome. Presenting the technical part of the policy brief, Dr Paromita Chakraborty explained the analysis and results, and suggested new set of outcomes to 'Detecting SARS-COV-2 in Wastewater: An Early Warning System for COVID -19'. She added that around 1500 samples were collected and analysed and the adopted four methods (WHO approved) worked very well. She further stated that the striking feature of the project is that it is cost-effective.

Dr N. Godhantaraman gave a brief explanation on the ways COVID-19 spreads and the viability in the world. He highlighted that temperatures in various regions and



MR JOEPH VERHAGEN
Global Lead Water, Global Centre on Adaptation, Rotterdam, The Netherlands

> "Substantial inequalities in COVID-19 are likely with disproportionate burdens falling on those who are of racial/ethnic minorities are poor, have less education and are veterans"

pH, humidity, sun light exposure play vital roles in the sustainability of the virus. Mr Joeph Verhagen informed that Netherlands is 99.9% open defecation free with sewer network covering almost the entire country. But at the same time, almost 4.5 billion people in the rest of the world do not have access to safely managed sanitation. He said that of the 3 billion people who are better off are connected to sewage network, but only a part of waste water is being treated. He highlighted that it is the poor who live in overcrowded and unsanitary conditions, are likelier to be infected by COVID-19 and thus improving existing health, water and sanitation facilities is vital for bolstering the resistance to future climate impacts and pandemics.

Dr Magdalena Urbaniak spoke about Wastewater-Based Epidemiology (WBE) technique that determines the consumption of, or exposure to, chemicals or pathogens in a population. She added that WBE gives an opportunity to reliably survey the presence of the virus in the population in a better and more harmonized way without direct testing of individual persons. It can also serve as a trending tool as continual monitoring of waste water, and can form a part of an early warning community public health surveillance system.

Dr Jonathan Demenge gave the keynote address, where he highlighted that on a practical and policy point of view, he was impressed by the numerous applications that have come out of the research. He also pointed that the COVID-19 pandemic has put humanity in a deep crisis. It has been a threat in many ways but at the same time it has brought some opportunities such as expediting the digitization process by 10 years.

Virtual Hall: Muppandal

URBAN RESILIENCE: PARTICIPATIVE GOVERNANCE, DESIGN AND DEVELOPMENT

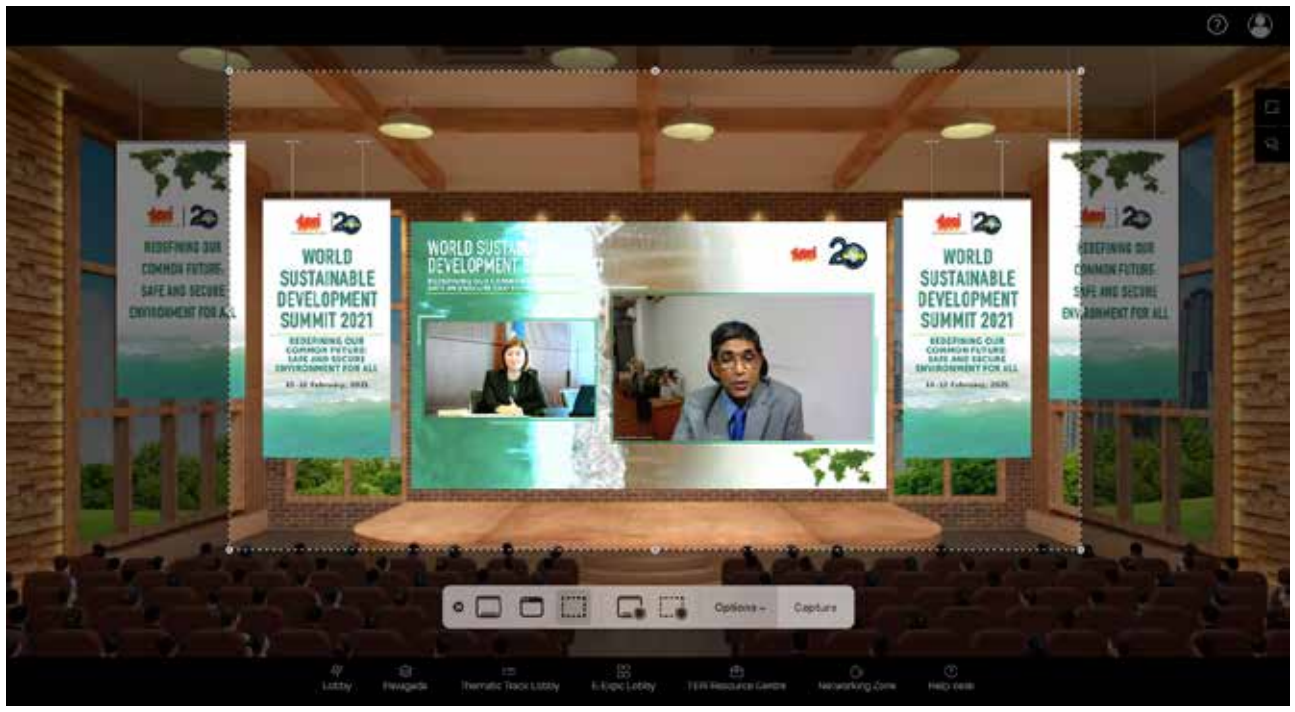
Moderator: Mr Jagan Shah, Senior Infrastructure Advisor, Foreign, Commonwealth and Development Office, British High Commission
Speakers: Mr Ken O'Flaherty, Regional COP26 Ambassador for Asia-Pacific and South Asia, Government of UK; Mr Mahesh Rajasekar, Chair, Urban Resilience, National Institute of Urban Affairs (NIUA); Dr Surendra Babu, Deputy General Manager, National Bank for Agriculture & Rural Development (NABARD); Mr Debendra Dalai, Director Environment, Department of Environment, Chandigarh; Ms Preety Bhandari, Director, Climate Change & Disaster Risk Management Division, Asian Development Bank; Ms Aditi Garg, CEO, Indore Smart City; Dr Manish Shrivastava, Assistant Professor, Department of Energy and Environment, TERI School of Advanced Studies
Closing Remarks: Ms Swati Pillai, Associate Fellow, TERI

Cities, particularly in global south represent socially, politically, and environmentally complex spaces steeped in systemic inequalities. These are the spaces that witness most growth, but in an informal and unmanaged way. Rapid urban developments create socio-economic vulnerabilities, which are further exacerbated due to the effects of stress stemming from climate change. In this scenario, building resilience to climate change in cities is challenging. However, since urban systems and centres are critical to investment, development, and governance, their resilience to climate change is paramount. This thematic track discussed the roles that subnational and non-state actors play in building urban resilience to climate change, and explored innovative means for cities to build resilience, including the challenges they have faced and the way forward. Under the presidency of the UK, COP26 aims to mobilize international action on adaptation and resilience. With the launch of the Race-to-Resilience campaign, the UK highlighted the importance of subnational and non-state actors in fighting climate change on the urban, rural, and coastal fronts. It aims to send a resounding signal that business, cities, regions, and investors are united in meeting the Paris goals and create a more inclusive and resilient economy. Challenged with reconciling its economic growth with the pressing need to address the impacts of climate change, India focuses on sustainable development with an emphasis on building climate change adaptation and resilience. While the impetus for climate policy in India initially came from the centre in a top–down approach, in recent years, state and local governments have begun formulating and implementing their own climate policies more proactively under various initiatives. States are now responding to national plans, guidelines, and policies in a manner that reflects their own economic and political circumstances. Moreover, decentralization reforms have not only increased the powers of state governments, but also of municipal governments. The role of systems and networks is crucial to bring about transformative urban resilience. A systems approach needs to be considered to build resilience in urban areas, ensuring integration of multiple actors across various scales. While it is challenging, it is also critical to replicate and scale climate action to meet the ambitious national and global targets, starting from cities with a bottom–up approach. Initiatives such as 'Climate Smart Cities Assessment Framework' being implemented by the NIUA help cities to be more responsive and less vulnerable to climate change. NABARD's various initiatives and green growth projects focus on building resilience and low emission development. Cities such as Chandigarh and Indore are the success stories, from which best practices and advisories can be replicated in other cities. Such initiatives are being supported by international institutions such as ADB, which has its 2030 strategy founded to focus on liveable cities and building climate resilience.

Virtual Hall: Brahmanvel

IEA'S INDIA ENERGY OUTLOOK: EXPLORING ENERGY AND EMISSION PATHWAYS TO 2040

Welcome Address: Dr Ajay Mathur, Director General, TERI
Inaugural Address: Dr Fatih Birol, Executive Director, IEA
Keynote Address: Mr Anil Jain, Secretary, Ministry of Coal
Panel Discussion Chair: Ms Nicole Thomas, India Program Manager, IEA
Panellists: Mr Rajiv Yaduvanshi, Principal Secretary, Government of Delhi; Mr BN Reddy, Joint Secretary, Ministry of Petroleum and Natural Gas; Ms Reena Suri, Executive Director, India Smart Grid Forum; Dr Ritu Mathur, Director, Integrated Assessments & Modelling, TERI; Dr Rahul Tongia, Senior Fellow, Centre for Social and Economic Progress (CSEP)



A new special report from the International Energy Agency's World Energy Outlook series has been launched. Introducing the session, Dr Ajay Mathur emphasized the changing nature of demand and supply profiles, and the increasing challenge to align them.

Dr Fatih Birol, in the inaugural address, complimented India on its tremendous progress in the last decade that was demonstrated through India's rapid electrification of households, rise in LPG connections through Ujjwala Programme, and the success of LED programme. However, he cautioned India against its rising energy demand, growing oil import dependency, and urgent need for developments in battery storage technology to enable a smooth and sustainable energy transition. Additionally, he recommended the Indian clean energy transition to take place in an inclusive manner.

Tim Gould, in his presentation, posed two questions in the framing of the IEA report. First, about the duration and severity of the pandemic and its impacts, and secondly, the responses of governments and companies, both in India and globally, as they seek a recovery while also tackling the urgent threat of climate change. Presenting some outcomes from the report, he drew attention to the critical role of flexibility in ensuring a secure transformation of the electricity sector. He suggested options, such as investment in smart and expanded network infrastructure, ability of coal fired fleet to vary its output, gas and hydro power capacity, and demand side options to improve flexibility. He also pointed out the importance of industry and transport sectors in governing energy and emission trends.

Mr Anil Jain emphasized the uncertainties associated with the timing of India's energy transition, role of coal, electricity demand, and doubling of hydropower, and renewable energy. He advised emphasis on demand side actions, industrial heat requirements, and import dependency. He suggested different ways to address these issues, including electrification of mobility, coal gasification for liquid fuels, high share of public transport, and transnational gas pipelines.

DR FATIH BIROL
Executive Director, IEA

> India, as of today, has arrived to the centre stage of global energy affairs

In the panel discussion, Mr BN Reddy highlighted the key challenges and opportunities for India to move towards a gas-based economy. He stated that the key challenge to a gas-based economy is how to supply the customers at all levels at an affordable price with least possible disruptions in prices. He also mentioned challenges related to import dependencies and geopolitical risks.

Ms Reena Suri addressed the flexibility requirements in India due to high RE capacity and peak AC demand. She emphasized the role of digital technologies to facilitate demand flexibility amongst other options to bring flexibility.

Dr Ritu Mathur mentioned that the relation of GDP growth rate and energy requirements is not and need not be linear and that the ability to decouple energy use from GDP growth is also influenced by the ability of certain sections of society or certain sub-sectors of industry to transition to the more efficient technologies and processes. She further pointed to the growing recognition of the fact that the science-policy connect can and should play a role in doing things differently so that we need not move along the trajectories of the past.

Dr Rahul Tongia advised that India's net zero emissions targets could be a distraction being too far away in time. He, in fact, recommended that the real focus for India should be to plateau its emissions.

Virtual Hall: Pavagada

HIGH-LEVEL ROUND TABLE ON REBOOTING GREEN GROWTH

Chair: Dr Ajay Mathur, Director General, TERI
Chairman's Address: Dr S Jaishankar, Hon'ble Minister of External Affairs, Government of India
Panellists: Mr Mohammed Nasheed, Speaker of the People's Majlis, Republic of Maldives; Mr John F Kerry, US Special Presidential Envoy for Climate, US Government; Rt Hon. Lord Zac Goldsmith, Minister of State (Minister for Pacific and the Environment), UK Government; Ms Amina J Mohammed, Deputy Secretary General, United Nations

Leading up to the COP26, the 'High-Level Round Table on Rebooting Green Growth' aimed to steer discussions towards strengthening our commitment to maximizing renewable energy use, enhancing our capacity to deal with the changing climate, and creating financial flows to help enable these actions. The panellists observed that even as the world recovers from the devastating impact of the pandemic, there is a need to retain sight of broader commitments to a cleaner and more sustainable path. Countries and communities need to urgently develop solutions and actions to respond to the current impacts of climate change and also prepare for the future.

In his recorded address, Dr S Jaishankar said that after a year of the pandemic, we can now see optimism around us in the form of vaccination drives in India, and there are lessons from the COVID-19 that we must concentrate on. He asserted that India is a leader in the climate action sphere, as respect for nature is an integral part of its culture. India's renewable energy capacity has grown 162% in the last 5 years and the country has been taking the lead in bringing about global initiatives, such as International Solar Alliance (ISA), Coalition for Disaster Resilient Infrastructure (CDRI), India-UN Development Partnership Fund, and Leadership Group for Industry Transition (LeadIT). He reiterated that it is important for all the countries to complete their commitments leading up to COP26.

Mr Mohammed Nasheed discussed the institutional challenges in the path of low-carbon economy and focused

on developing low-carbon development strategy for climate-vulnerable countries that would bring economic development. He suggested that the idea of climate action should be lodged into the manifestos of the political parties. He said, "It is not just hard science that we require, but we also need management systems, economics, administrative frameworks, and legal frameworks that fit into low-carbon development strategies."

RT HON. LORD ZAC GOLDSMITH

Minister of State (Minister for Pacific and the Environment), UK Government

> Choices we make today will decide if we go for resilient growth

MS AMINA J MOHAMMED

Deputy Secretary General, United Nations

> We can't return to old normal and we must address the inequalities

Mr John F Kerry appreciated India's leadership in energy transition as the Prime Minister declared a target of installing 450 GW of renewable energy capacity by 2030. He thanked India's rapid scale-up for building solar capacity in India at the lowest cost. He said that we also need to raise the ambition to mitigate the effects of climate change and USA's rejoining of the Paris Agreement shows President Joe Biden's commitment towards green growth and zero-emission future. He also talked about hydrogen as the fuel of future and India could play a pivotal role in this energy transition towards becoming a hydrogen economy. He discussed the need to move towards electric mobility and stated that we could completely transition to electric vehicles in the coming 15 years. Rt Hon. Lord Zac Goldsmith stressed on the fact that choices we make today will decide whether we go for a resilient growth. He also highlighted that the UK wants to strengthen adaptation by urging governments to work towards their Nationally Determined Contributions (NDCs). He said that the UK is working on finance, adaptation, climate energy, climate transportation, and nature as it looks forward to a cleaner, greener, and resilient world.

MR JOHN F KERRY

US Special Presidential Envoy for Climate, US Government

> The solution to climate crisis is energy policy

DR S JAISHANKAR

Hon'ble Minister of External Affairs, Government of India

> India is clearly a leader in climate action

MR MOHAMMED NASHEED

Speaker of the People's Majlis, Republic of Maldives

> For developing low-carbon economy, we need not just money, not just readiness, but also economics, policy, and framework

While commending India's achievements, Ms Amina J Mohammed felt that India is a global leader in the sphere of climate action and is on the path of achieving its commitments/targets. She also said that the UN wants to work with India for a safer and equitable world. She talked about dislocation caused due to the loss of jobs during the pandemic as 2021 will be pivotal for the entire humanity.