

NMCG-TERI Centre of Excellence on Water Reuse

PROCEEDINGS

1st Annual Meet and International Conference on Advancing Circular Economy and Water Reuse

27th July 2023 | Silver Oak Hall, India Habitat Centre, Lodhi Road, New Delhi

Event Sponsored and Supported by



Foreword



जी अशोक कुमार, भा.प्र.से.
विशेष सचिव एवं महानिदेशक
राष्ट्रीय स्वच्छ गंगा मिशन
G Asok Kumar, IAS
SPECIAL SECRETARY & DIRECTOR GENERAL
NATIONAL MISSION FOR CLEAN GANGA



भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन,
नदी विकास और गंगा संरक्षण विभाग
GOVERNMENT OF INDIA
MINISTRY OF JAL SHAKTI
DEPARTMENT OF WATER RESOURCES,
RIVER DEVELOPMENT & GANGA REJUVENATION



FOREWORD

I am glad at the successful completion of the 1st Annual Meet and International Conference on Advancing Circular Economy and Water Reuse jointly organized by NMCG MoJS, TERI, and FICCI. This conference has served as a remarkable platform for the exchange of ideas and knowledge among various stakeholders.

The discussions and presentations during the conference have shed light on the critical role of water reuse in tackling India's water scarcity challenges. They have also highlighted the immense potential for economic growth through the adoption of circular practices in the water sector.

I would also like to acknowledge the efforts of the government's water missions and the initiatives undertaken by the National River Conservation Directorate (NRCD) in training and capacity building for Urban Local Bodies (ULBs) and State Pollution Control Boards (SPCBs). These endeavors have played a crucial role in empowering stakeholders with the necessary knowledge and skills to promote sustainable water management practices.

I am confident that the outcomes of this conference will contribute significantly to advancing circular economy principles and water reuse practices in our nation. It is through such collaborative efforts that we can collectively address the challenges of water scarcity and pave the way for a sustainable and prosperous future.

Dated : 19th Oct 2023

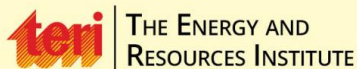

(G Asok Kumar)



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Foreword



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Dr. Vibha Dhawan
Director General, TERI

FOREWORD

I would like to extend my heartfelt congratulations to National Mission for Clean Ganga (NMCG), NMCG-TERI Centre of Excellence on Water Reuse (NTCoE), Federation of Indian Chambers of Commerce & Industry (FICCI), and all our partners on the successful conclusion of the 1st Annual Meet and International Conference on Advancing Circular Economy and Water Reuse.

At TERI, we have consistently demonstrated our dedication in providing support to government bodies in their water-related initiatives. This conference, organized under the aegis of NTCoE, marks a significant milestone as the first of its kind. The outcomes that have emerged from this event will undoubtedly prove beneficial to various stakeholders. The conference provided a platform for knowledge sharing, networking, and collaboration among stakeholders from diverse water-related sectors. It has truly acted as a catalyst for driving change and fostering a more sustainable approach to water management in India.

TERI remains steadfast in its commitment to achieving both national and international environmental sustainability goals. We firmly believe that these proceedings will offer valuable insights into the policy landscape of the country, perspectives of the industries and utility leaders, international collaborators, and knowledge that can be translated into practice. Furthermore, we hope that these proceedings will contribute to the creation of new market opportunities. Together, we can strive for a more sustainable future for water management, within our nation and across the globe.

Dr. Vibha Dhawan

Executive Summary



Shri D. P. Mathuria, Executive Director (Technical), NMCG

NMCG-TERI Centre of Excellence on Water Reuse (NTCoE) has been established jointly by the National Mission for Clean Ganga (NMCG), Department of Water Resources, River Development & Ganga Rejuvenation, Ministry of Jal Shakti, Govt. of India in collaboration and TERI. This CoE is the first of its kind in the country that matches the activities envisaged under the Ganga Knowledge Centre (GKC) of the 'Namami Gange Program'.

It is primarily a technology forum, which aims to bring various stakeholders to a common platform to design and foster research and innovation, including the identification of knowledge gaps for research and the need for new ideas, supporting targeted research, and spurring and nurturing needed innovation for low-cost, effective and integrated wastewater treatment technologies, which could bridge the current treatment gaps, boost treatment efficiency, augment capacities and provide safe treated water for reuse. Also, it aims to raise training standards, address skill gaps, and align training & research with industry needs.

The 1st Annual Meet and International Conference on Advancing Circular Economy and Water Reuse of NTCoE was a resounding success, with over 200 participants in attendance (online & offline). The event aimed to explore sustainable solutions for water management and promote the concept of circular economy. The discussions and presentations highlighted the importance of water reuse in addressing India's water scarcity challenges and the potential for economic growth through circular practices. Key sessions included inaugural and plenary session, sessions on policy framework, voice of industry, utility leader's forum, international collaborations, knowledge leading to practice and market creation.

The event provided a platform for knowledge sharing, networking, and collaboration among stakeholders from various sectors. Overall, the event served as a catalyst for driving change and fostering a more sustainable approach to water management in India.

Acknowledgement



Dr. Nupur Bahadur, Associate Director, TERI

I on behalf of TERI-NMCG Centre of Excellence (NTCOE) would like extend my heartfelt gratitude for making the 1st Annual Meet and “International Conference on Advancing Circular Economy and Water Reuse” of NTCE a resounding success. The discussions and deliberations held during various sessions were highly engaging and led to many meaningful outcomes. We are grateful to National Mission for Clean Ganga (NMCG) and Federation of Indian Chambers of Commerce & Industry (FICCI) for co-organizing the event successfully in such a short time.

We would like to thank our distinguished delegates for their active participation, insightful presentations, and engaging discussions, which made our conference intellectually stimulating and truly global. Their diverse perspectives and expertise created an environment that fostered knowledge sharing and learning at its best, setting a benchmark for future events.

We owe a special thanks to our Knowledge Partners, Cambi, India and International Water Association (IWA), India and Sponsors and Industry partners, Perfact Group, New Delhi, and Re-Sustainability Limited, Hyderabad, NJS Engineers Pvt. LTD., New Delhi, Dew Projects and Chemicals Pvt Ltd, Gr. Noida and Ion Exchange Projects and Engineering Ltd., New Delhi, Xylem Inc., India, WOG Technologies Private Limited, Gurugram, and Vision Earthcare, Mumbai whose support and collaboration were pivotal to the success of this conference. Your commitment to the event and your shared vision played a vital role in the event. We look forward to continuing our partnership and achieving even greater milestones together in the future.

We are immensely grateful to all the participants who attended the conference. Your enthusiasm and interest in our event were truly inspiring. Your questions, interactions, and feedback helped us understand how we can further move towards sustainable wastewater management. Your presence added a vital dimension to the event, and we hope you found it beneficial and informative.

Lastly, heartfelt thanks goes to the TERI-Administration, TERI-Event Team and NTCE internal team that worked tirelessly behind the scenes to plan, organize, and manage the conference seamlessly. Once again, thank you all for being part of this remarkable event. Your presence, contributions, and unwavering support were instrumental in making this event a memorable and enriching experience for all.

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NMCG-TERI Centre of Excellence on Water Reuse

Organizes

1st Annual Meet and International Conference on Advance Circular Economy and Water Reuse

27th July 2023 | Silver Oak Hall, India
Habitat Centre, Lodhi Road, New Delhi

NMCG-TERI Centre of Excellence on Water Reuse (NTCoE) <<http://nmcgtericoe-wr.in>> has been jointly established by the National Mission for Clean Ganga (NMCG) <<https://nmcg.nic.in>> Department of Water Resources, River Development & Ganga Rejuvenation, Ministry of Jal Shakti, Govt. of India and The Energy and Resources Institute (TERI), New Delhi <<http://teriin.org>>. This Centre aims to bring various stakeholders to a common platform to design and foster research and innovation, including the identification of knowledge gaps and the need for new ideas, supporting targeted research, and spurring and nurturing needed innovation for low-cost, effective and integrated wastewater treatment and water reuse technologies, which could bridge the current treatment gaps, boost treatment efficiency, augment capacities and provide safe treated water for reuse. Also, it aims to create knowledge, raise training standards, address skill gaps and align training & research with industry standards and requirements.

Coinciding with TERI's 50th Year anniversary celebrations, Environment & Waste Management Division of TERI is organizing this Conference under the aegis of the NTCOE together in collaboration of NMCG and FICCI. Through this Conference we look forward to deliberations on the current status, future need and ways to advance Circular Economy and Water Reuse and how this Centre could fulfill its Vision of contributing towards various National Missions centred around 'Water' and achieving UN SDGs, particularly SDG 6.

Event Sponsors and supporters



For participation register at:



<https://lnkd.in/dJZ9UFJg>

Agenda & Program Schedule

Thursday, 27th July 2023 at Silver Oak, India Habitat Centre, Lodhi Road, New Delhi.

Time	Description
9:00-9:30 AM	Registration & Networking Over Tea
9:30-10:15 AM	<p>Inaugural Session</p> <p>Welcome Address & 50 Years of TERI's Legacy: Dr Vibha Dhawan, Director General TERI & Vice-Chairman, Steering Committee of NTCoE</p> <hr/> <p>Lighting of Lamp & Namami Gange Anthem</p> <p>Introducing NTCoE</p> <hr/> <p>Dr Nupur Bahadur, Associate Director, NTCoE, Environment & Waste Management Division, TERI and Vice-Chairman, IWA-India</p> <hr/> <p>Keynote Address</p> <p>Mr G Asok Kumar, IAS, Director General, National Mission for Clean Ganga (NMCG), Department of Water Resources, River Development & Ganga Rejuvenation, Ministry of Jal Shakti, Govt. of India and Chairman, Steering Committee of NTCoE</p> <hr/> <p>Inaugural Address</p> <p>HE Mr Hans Jacob Frydenlund, The Ambassador of Norway to India and Bhutan, The Royal Norwegian Embassy, New Delhi</p>
10:15-10:45 AM	<p>Plenary Session</p> <p>Special Address</p> <p>Ms Debashree Mukherjee, IAS, Special Secretary & Secretary-Designate, Department of Water Resources, River Development & Ganga Rejuvenation, Ministry of Jal Shakti, Govt. of India</p> <hr/> <p>Plenary Address</p> <p>Ms D Thara, IAS, Additional Secretary & Mission Director, Atal Mission for Rejuvenation and Urban Transformation (AMRUT), Ministry of Housing & Urban Affairs, Govt. of India</p> <hr/> <p>Mr Rajeev Saxena, Joint Secretary, Ministry of Textiles, Govt. of India</p> <hr/> <p>Dr Sangita Ladha, Member FICCI Water Mission & Agri Committee and Business Director, Rivulis Irrigation India Pvt. Ltd</p> <hr/> <p>Vote of Thanks</p> <p>Dr Suneel Pandey, Director, Environment & Waste Management Division, TERI</p>
10:45-11:00 AM	Tea Break

11:00-12:00 PM	Session 1: Policy Framework
Time	Description
	<p>This Session will deliberate on National Framework on Safe Reuse of Treated Water, State Policies in place and need for future action.</p> <p>Chair</p> <p>Mr Nitin Bassi, Senior Programme Lead, Sustainable Water, Council on Energy, Environment and Water (CEEW), New Delhi</p> <p>Panelist</p> <p>Mr Rajeev Saxena, Joint Secretary, Ministry of Textiles, Govt. of India</p> <p>Mr Avinash Mishra, Advisor, Water, Environment & Land Resources, NITI Aayog</p> <p>Dr M Dhinadhayalan, Adviser (PHEE), Ministry of Housing & Urban Affairs, Govt. of India</p> <p>Ms Shipra Misra, CEO, CKIC-DRIV, O/o Principal Scientific Advisor to Govt. of India</p>
12:00-1:00 PM	Session 2: Voice Of Industry
	<p>This session brings together Industry Leaders and Industrial Associations to discuss on how the Industry & Academia could come together and how this CoE could bridge this gap and work towards raising training standards, address skill gaps and align innovation & research with industry standards and requirements.</p> <p>Chair</p> <p>Dr Nupur Bahadur, Associate Director, NTCoE, Environment & Waste Management Division, TERI and Vice-Chairman, IWA-India</p> <p>Panelists</p> <p>Mr Ajay Popat, President, Ion Exchange (India) Ltd., Mumbai and Past Chairman, ASSOCHAM Water & Sustainability Council</p> <p>Dr Ranjeet Mehta, Deputy Secretary General, PHD Chamber of Commerce and Industry</p> <p>Dr Sangita Ladha, Member FICCI Water Mission & Agri Committee and Business Director, Rivulis Irrigation India Pvt. Ltd.</p> <p>Mr Narendra Kumar Shantilal Jain, Vice President, Environment (Corporate), Jubilant Ingrevia Ltd., Noida</p>
1:00-2:00 PM	Networking Lunch

2:00-3:00 PM	Session 3: Utility Leaders Forum
	This Session brings together Utility Leaders to deliberate and discuss on the best practices adopted by them in the areas of Circular Economy and Water Reuse and contributions made towards the Arth Ganga Mission. Outcomes of this session may come out as the 'Compendium of Best Case Studies'.
	Chair
	Mr Rajiv Ranjan Mishra , I.A.S. (Retd.), Chief Technical Advisor & Chairman of Strategy & Policy Unit, NIUA
	Panelists
	Mr Rajiv K N , Chief Engineer (Projects), Bangalore Water Supply and Sewerage Board (BWSSB)
	Mr N Mahesan , Chief Engineer, Greater Chennai Corporation (Online)
	Mr Vikram Singh , Chief Engineer (Drainage) Proect-1, DJB
	Mr Faisal Ibrahim , Superintending Engineer, GMDA, Gurugram
Time	Description
3:00-4:00 PM	Session 4: International Collaborations
	This forum will discuss on the ways on how international collaborations and multi-lateral funding support could foster research & innovation and what are expectations from this CoE, in terms of knowledge creation, sharing knowledge across borders and various stakeholders.
	Chair
	Mr Sumouleendra Ghosh , Partner & Global Infrastructure Water Sector Lead at KPMG India
	Panelists
	Ms Upneet Singh , co-TTL and Senior Water and Sanitation Specialist, The World Bank Group
	Ms Beate Langset , Counsellor - Climate and Environment, The Royal Norwegian Embassy, New Delhi
	Mr Neeraj Gahlawat , Water Resources Specialist, The Israel Embassy, New Delhi
	Mr Jeyannathann Karunanithi , India Regional Operations Manager at International Water Association (IWA), Chennai
4:00-4:15 PM	Tea Break

4:15-5:00 PM **Session 5: Knowledge Leading To Practice**

This session aims to deliberate upon how research & innovation could be taken from lab to field, pilots to commercialization and what strategies should be adopted by technology-based COEs like this for faster adoption of newer technologies. Also, it will discuss on the training & capacity building needs across Industry, R&D and Utilities.

Chair

Prof. A K Gosain, Professor Emeritus, Department of Civil Engineering, IIT Delhi

Panelists

Prof. Srinivas Chary Vedala, CEO, WASH Innovation Hub & Professor, Administrative Staff College of India (ASCI), Hyderabad (Online)

Mr Praveen Bhargava, Chairman, Perfact Group, New Delhi

Mr S K Thakur, Director (Technical), Dew Projects and Chemicals Pvt Ltd, India

Dr Chandra Shekar Shankar, CEO, Vision Earth Care, Mumbai

Dr Indra N Mitra, Director, Cambi (Europe) India

5:00-6.00 PM **Session 6: Market Creation**

This Session aims to bring in Industry Leaders to share their best practices and deliberate upon the improvements required towards creating a Circular Economy and Water Reuse market in India.

Chair

Dr Uday Kelkar, Managing Director and CEO, NJS Engineers India Private Limited, Mumbai

Panelists

Mr Sunil Rajan, Managing Director, WOG Technologies (P) Ltd. (WOG Group of Companies), Gurugram

Mr Bobby E Kurian, Business Unit Head, Re Sustainability (Formerly Ramky Enviro Engineers Ltd.)

Mr Lalit Bhardwaj, Assistant Vice-President, MEP (Projects), DLF Limited, Gurugram

Mr Avinash Patro, South Asia Head – Strategy & Marketing, Xylem India, Bengaluru

Vote of Thanks & End of the Conference

Inaugural Session



i. Welcome Address:



Dr Vibha Dhawan, Director General, TERI & Vice-Chairman, Steering Committee of NTCoE welcomed the gathering and spoke about 50 years of TERI's legacy along with the milestones achieved during the entire journey. She commenced by quoting "*Water is a precious resource that cannot be created*". She also complimented various missions and initiatives taken by ministries. She spoke about TERI's vision of creating sustainable infrastructure and mentioned that research done in labs is of no use if it does not reach stakeholders. TERI plays an important role as an implementing and consulting agency in bridging that gap. She also mentioned that about two-thirds of the country's infrastructure is yet to be built and should focus on energy efficiency and sustainability for a better future. She further mentioned about country's plan in achieving Net Zero Goals and how TERI can help and foster those plans. She then talked about NTCoE's TADOX technology which merely takes 5-6 hours to treat wastewater and can be the future of the wastewater treatment industry. Lastly, she thanked NMCG for establishing the CoE in collaboration with TERI and making it available for industries as well.

ii. Lamp Lighting and Namami Gange Anthem

The event began with a traditional lamp-lighting ceremony, symbolizing the eradication of darkness through knowledge and awareness. The lamp was lit by esteemed dignitaries. Following the lamp-lighting ceremony, the melodious “Namami Gange” anthem was played. The anthem, with its soul-stirring lyrics and captivating music, encapsulated the essence of the Namami Gange National Mission – to clean and restore the sacred River Ganga and its tributaries.



(iii) Introduction of NTCoE



Dr Nupur Bahadur, Associate Director, NTCoE, Environment & Waste Management Division, TERI and Vice-Chairman, IWA-India introduced NTCoE to the audience and invited various stakeholders to participate in various activities of the CoE and urged to make this first-of-its-kind CoE in the country, a great success. She discussed the development of TADOX technology and its effective use in wastewater treatment, water reuse applications in various National Missions including the circular economy approach. She also thanked NMCG, MoJS, GoI for providing CoE Grant and helping at each stage in its successful working and deliverables achieved so far! She thanked FICCI for coming along as a co-organizer for this event.

iii. Keynote Address



Mr G Asok Kumar, IAS, Director General, National Mission for Clean Ganga (NMCG), Department of Water Resources, River Development & Ganga Rejuvenation, Ministry of Jal Shakti, Govt. of India and Chairman, Steering Committee of NTCoE congratulated on TERI's 50-year completion journey and mentioned how TERI was much ahead of its time when it started with the vision of achieving sustainability. He mentioned that the main focus in relation to water today is sustainability and climate change. He further added that the subject of climate change always pertains to carbon emissions and energy, and the water component is often neglected and requires more focus. He

also said that the manifestation of carbon emission lies in the water sector and that water is a major limiting factor in India's growing economy. The focus today should be on the circular approach as the linear approach will not work. He also acknowledged academicians and researchers working on improving the water quality and also talked about the "Arth Ganga" program under Namami Gange on River Ganga sustainability and monitoring. He also expressed concern over excessive water extraction and freshwater use. He also suggested that the circular economy concept of 3 'R's (Reduce, Reuse, and Restore) can be expanded to include the additional 'R's of remonetizing water and reuse of sludge. He talked about the National framework for the safe reuse of treated water developed in collaboration with the European Union and banning the use of potable water for non-potable purposes. In continuation, he mentioned TERI's TADOX technology and that it is an excellent example of academia-industry linkage and can be applied for treating wastewater effectively. He invited various stakeholders to participate in NTCoE and make it a success.

iv. Inaugural Address



HE Mr Hans Jacob Frydenlund, The Ambassador of Norway to India and Bhutan, The Royal Norwegian Embassy, New Delhi stated that as the population grows, the need for water will increase, so we must concentrate on long-term objectives for proper water use and wastewater treatment & management. He stated that to keep enjoying the benefits of clean water we need to fundamentally change the ways we treat water and that water is a local resource. He also mentioned the Yamuna River as an example of degraded water quality that will take a long time to improve. He also mentioned that plastic waste is a major environmental challenge in today's world. He also mentioned examples from Norway that were successful in restoring river water quality and managing non-recyclable waste and how the country's safeguarding policies for water management have been helpful. In the end, he acknowledged TERI and NMCG's effort in tackling water problems.

Key Highlights of the Session

1. Use of sustainable building materials aids a lot in managing zero waste generation which in turn compliments numerous Ministry Missions and activities.
2. Development of technologies like TADOX technology and its proven effective use in the industrial and municipal sector is a big step towards achieving a circular economy.
3. Government organizations, academic institutions, industrial associations, regulators, policy makers, researchers and all relevant stakeholders should come together on one platform for achieving sustainability. NTCoE is one such platform.
4. “Arth Ganga” project which focuses on sustainability and monitoring of the River Ganga, monetization of treated water and reuse of the sludge was also highlighted.
5. Overall session concluded with an opinion that the management of water resources should be viewed as a global issue. The demand for water will increase as the population grows, so we must concentrate on long-term objectives for proper water reuse and treatment. Finally, it was said that *“water has the same value whether it is in India or Norway or flowing in any country.”*

Plenary Session

i. Special Address



Ms Debashree Mukherjee, IAS, Special Secretary & Secretary-Designate, Department of Water Resources, River Development & Ganga Rejuvenation, Ministry of Jal Shakti, Govt. of India (through video message) pointed out that the water cycle is being impacted by climate change resulting in droughts and flooding across the country. She also emphasized that water security can only be accomplished using cost-effective technologies and engaging every pertinent group, including academia, think tanks, businesses, trade groups, governmental organizations, and the general public. Reusing treated water is a major issue that requires attention, and this necessitates cross-sector cooperation in water management.

ii. Plenary Address



Ms D Thara, IAS, Additional Secretary & Mission Director, Atal Mission for Rejuvenation and Urban Transformation (AMRUT), Ministry of Housing & Urban Affairs, MoHUA, Govt. of India highlighted

major concerns over water collection, conveyance, and treatment, which pose huge challenge in the country. Only a small number of the nation's sewage treatment facilities meet the CPCB's (Central Pollution Control Board) requirements for water treatment. It is crucial to concentrate on capacity building and skill development throughout the value chain to enable the reuse of the treated water. According to the AMRUT Mission, metropolitan areas must reuse 20% of their treated water, with 40% of the water being designated for industrial usage. Some states have been successful in monetizing treated water, but this achievement depends on meticulous planning and collaboration between all stakeholders. Despite having a lot of rainfall, India struggles with water stress and scarcity because of administrative and governance issues.



Mr Rajeev Saxena, IAS, Joint Secretary, Ministry of Textiles, Govt. of India mentioned that the textile sector uses a lot of water and is a highly polluting industry. Water reuse is the need of the hour. He also talked about TADOX technology as a great intervention for this sector and promoting water reuse. He emphasized using alternative sustainable technologies and focusing on investments that can put less pressure on water resources. He also mentioned about technical textiles and the National Technical Textiles Mission (NTTM), which is a research-oriented mission and focuses mainly on technical performance and functional properties of materials.



Dr Sangeeta Ladha, Member FICCI Water Mission & Agri Committee and Business Director, Rivulis Irrigation India Pvt. Ltd. addressed the vital sector of agriculture that has the potential to significantly impact the nation's general prosperity while adding to sustainable water management. She

mentioned that the sector heavily depends on water resources and uses 70–80% of the water that is available. Reusing treated water may be able to meet the demand and supply gap in agriculture for water. She also mentioned FICCI's Water Mission and the Agriculture and Water group that is working actively in promoting best practices in the water sector and technology dissemination. She concluded by mentioning that water is a precious resource for all life and consuming water wisely and effectively can help the world's population reach the Sustainable Development Goals.

Vote of Thanks



The session was concluded with a vote of thanks by **Dr Suneel Pandey** (Director, Environment & Waste Management Division, TERI). He appreciated participation from ministries, embassy industries, and all organizations. He emphasized the importance of water reuse and its significance under various missions and how NTCoE is an excellent step in achieving the targets of various water missions.

Key Highlights of the Session

- The delegates in the session briefly discussed how climate change affects the water cycle, causing more frequent and intense precipitation that causes floods.
- Emphasis on utilizing cost-effective technology and involving all relevant parties, including academia, think tanks, industries, industrial associations, government agencies, and the general public to ensure water security.
- STPs should necessarily meet the CPCB standards for treated water. The performance of STPs right now is not satisfactory in many states.
- Action-oriented agenda should be adopted, focus on training and capacity building should be increased, collaborating and reaching out to industries and researchers for achieving circular economy and economical wastewater treatment goals.

Networking Sessions



Session 1: Policy Framework



Session Theme: National Framework for Safe Reuse of Treated Water and State Policies: Deliberations and Actionable Insights

Chair



Mr Nitin Bassi, Senior Programme Lead, Sustainable Water, Council on Energy, Environment and Water (CEEW), New Delhi presented the assessment on the market potential for the reuse of treated wastewater in India that was conducted in 2021. Mr Bassi went on to say that the revenue from the agricultural output would have been roughly INR 966 billion if available treated wastewater had been utilized in agriculture based on the volume of wastewater generated in the nation. Also, the

area that can be irrigated using treated water would have been around 1.3 million hectares. He further said that India has enormous potential to manage its wastewater and meet the nation's expanding water needs in various sectors. He also emphasized that there is a need to focus on the progression of policies in India and how we can mainstream use of treated wastewater.

Panelists



- (i) **Mr Rajeev Saxena**, Joint Secretary, Ministry of Textiles, Govt. of India talked about circularity in the textile industry and that the industry is working actively towards achieving sustainability by focusing on developing sustainable textile materials. He also spoke about traditional fibres like cotton and jute which depend extensively on water and bamboo technology which requires less water. He also mentioned that the ministry has announced 7 Mega textile parks that can have common CETPs and the National Technical Textile Mission (NTTM) is funding various projects for technology upgradation to minimize pollution. The Indian government is aggressively promoting initiatives and water-efficient technologies to encourage sustainable water use in the textile sector.



- (ii) **Mr Avinash Mishra**, Advisor, Water, Environment & Land Resources, NITI Aayog recommended a thorough framework with clear standards for upholding water quality is necessary to encourage the widespread reuse of treated water and to assure water security. The clear leadership of numerous national missions, like Jal Jeevan Shakti Mission, AMRUT,

and Swachh Bharat Mission, is also essential for the success of this program. Developing in-situ water treatment and promoting sustainable practices that encourage the wise use of water resources are essential for addressing the issues presented by rapid urbanization and population growth. Additionally, the characteristics and need for wastewater treatment may vary depending on the location. The multifaceted approach has the potential to be extremely effective in encouraging environmentally friendly water management. This objective can be greatly advanced by creating sustainable innovation islands.



- (iii) **Dr M Dhinadhayan**, Adviser (PHEE), Ministry of Housing & Urban Affairs, Govt. of India highlighted that wastewater management and recycling should go together. He compared the status of water sanitation in 2014 and after the launch of missions like SBM and AMRUT. The percentage of households connected to sewerage systems increased and the usage of septic tanks increased significantly. The operational capacities of wastewater treatment in states also increased after the implementation of government-initiated missions. The status of recycling earlier was limited to fewer cities like Chennai and Chandigarh but now the number has increased exponentially. He also mentioned about the requirement of norms for non-potable purposes and that the Ministry is launching a National task force to handhold states for knowledge dissemination and a National manual on recycling and reuse of treated wastewater.



- (iv) **Ms Shipra Mishra**, CEO, CKIC-DRIIV, O/o Principal Scientific Advisor to Govt. of India talked about low-cost innovative water treatment technologies and their potential of scaling up. She mentioned DRIIV's mission of Lab to Market technology implementation and scaling across

the country and highlighted the active participation of DRIIV in North India. She appreciated TERI's TADOX technology and its successful implementation in various sectors (industrial as well as municipal). She also advised that different technologies must be deployed in a coordinated manner in order to properly address the problem of wastewater treatment management.

Key Highlights of the Session

- The need for future action and various national and state regulations, such as the National Framework on Safe Reuse of Treated Water, State regulations in Place, were discussed.
- It was emphasized that upgrading technology and quality standards are necessary for wastewater treatment.
- Swachh Bharat Mission and Jal Jeevan Mission initiatives should be implemented according to standards and guiding principles. AMRUT-1 has been successfully applied.
- The CPCB report suggests using a combination of treatment techniques, such as advanced oxidation (TADOX technology), phytoremediation, sanitation, sewage management, and sewage recycling.
- The textile industry's reliance on treated wastewater necessitates the implementation of cutting-edge treatment techniques. The market potential of treated wastewater use in India should be explored as much as possible.
- Government agencies or central bodies should have flexibility in investing in technology that needs more experimentation and trials.

Session 2: Voice of Industry

Session Theme: Bridging the Gap between Industry and Academia: Collaborative Efforts of Industry Leaders, Industrial Associations, and the Centre of Excellence (CoE) in Raising Training Standards, Addressing Skill Gaps, and Aligning Innovation & Research with Industry Requirements



Chair



Dr. Nupur Bahadur, Associate Director, NTCoE, Environment & Waste Management Division, TERI and Vice-Chairman, IWA-India highlighted that the end user of any research is industry and therefore this session is of tremendous importance as it has representatives from members of four key industry bodies in the country like FICCI, CII, ASSOCHAM, and PHDCCI and also industry experts with whom R&D is taking shape, so therefore industry voice coming from this session is very crucial in shaping the agenda for the NTCoE. She also expressed gratitude to both the government and industry for their support in expanding the research of the center. Dr. Bahadur encouraged the collaboration between industry and academia to promote a thriving research and innovation environment. She invited input and suggestions from industry experts and panelists to further enhance the NTCoE's progress and opened the session for the discussion.

Panelists



- (i) **Mr Ajay Popat**, President, Ion Exchange (India) Ltd., Mumbai and Past Chairman, ASSOCHAM Water & Sustainability Council, Chairman CII's council on New Technologies talked about the importance of collaboration between industry and academia and how it is crucial for accelerating the research and innovation. He mentioned that by pooling joint resources, we can develop and commercialize technologies at a quicker pace. This also provides opportunities for researchers to work on practical problems facing society and industry. He emphasized the importance of these collaborative efforts to influence policy development by providing evidence-based insights and recommendations. He urged stakeholders in the water industry to work together to drive progress and make a meaningful impact. He addressed the challenges in wastewater treatment and the circular economy in relation to fostering innovation, societal acceptance, industry-academia collaboration, and the need for pragmatic higher skills that can be highly impactful in achieving sustainable and effective solutions. By bringing together researchers, engineers, scientists, and industry professionals, valuable insights and practical experience can be combined with theoretical knowledge, leading to the development and implementation of more effective wastewater treatment processes and circular economy practices. A qualified workforce that can adjust to new technology and shifting environmental rules is necessary for the fields of wastewater treatment and circular economy. In order to be practical about higher skills, education, and training programs must be matched to the unique requirements of these industries.



- (ii) **Dr Ranjeet Mehta**, Deputy Secretary General, PHD Chamber of Commerce and Industry mentioned that PHDCCI has a widespread presence, working in 65 verticals of the Indian

economy through various expert committees. This extensive reach indicates its significance and influence in various economic sectors. The PHDCCI's encouragement and appreciation of Micro, Small, and Medium Enterprises (MSMEs) are commendable. MSMEs play a crucial role in the Indian economy, contributing significantly to employment generation, innovation, and overall economic growth. He mentioned that awareness programs are required for MSMEs for technologies to reach to the market and in the industrial clusters. He also cited the example of Europe already having carbon tanks and India's vision of becoming net zero by 2070. To enhance the contribution of MSMEs towards the Indian economy in the context of the environment, circular economy, and wastewater treatment, the PHDCCI can take several initiatives with NTCoE in capacity building, policy advocacy, networking, technology adoption and knowledge dissemination



- (iii) **Dr Sangita Ladha**, Member FICCI Water Mission & Agri Committee and Business Director, Rivulis Irrigation India Pvt. Ltd started by pointing out the role and contribution of the FICCI water mission and its committees on water reuse, water agriculture, and corporate water stewardship. She pointed out that treated water reuse in agriculture may have different requirements and different designs for STPs are required. There is need for modular STPs and the need to promote micro-irrigation. Cost economics also needs to be taken care of for this area of application of treated water. By integrating wastewater treatment with circular economy principles and micro-irrigation technologies, this framework aims to promote sustainable water use, minimize environmental impact, and foster community acceptance for using treated wastewater in non-edible segments like water planting. The success of such initiatives will depend on strong collaboration among various stakeholders, sound financial planning, and ongoing monitoring and evaluation of the project's environmental and economic impacts.



- (iv) **Mr Narendra Kumar Shantilal Jain**, Vice President, Environment (Corporate), Jubilant Ingrevia Ltd, Noida talked about the efforts required by regulators, bureaucrats, and policymakers at the Centre that are crucial for fostering a conducive environment for innovation and development in industries focusing on wastewater treatment and circular economy. By raising queries and highlighting the need for responsibility in fallback arrangements for newer technologies, the concerns and considerations of various stakeholders can be addressed more effectively. He further added that stringent and inflexible regulations may impede the adoption of new technologies, as they may not account for innovative solutions that deviate from traditional approaches. When a new technology is being developed by academia then regulators should be involved from the beginning and be part of academic-industry association from early stage to technology adoption so that it could be part of contingency plans and fallback arrangements in case of any adverse outcomes or unexpected challenges. He also suggested that the CPCB may have a separate cell for solution providers for wastewater treatment technologies for validation and test.

Key Highlights of the Session

- There is the necessity of being appreciative of MSME's presence, their efforts in the adoption of various strategies and standards, and their impact on the Indian economy.
- In order to promote environmentally friendly technologies, certain environmental benefits may be set as deliverables for eligibility of this benefit and may only be available to early adopters, such as 10 Nos. of industries per sector.
- On-site commercial-scale installations and operations of new technologies must have reasonable relaxation in discharge norms for justifiable timescales when operating in industry clusters with adequate dilution and should be installed for CETPs to mitigate any adverse impact on the environment.
- Such development work should be encouraged by funding from industry and should be co-partnered by SPCB/CPCB and certified on successful completion.
- Setting up of a central agency is required for proper technology validation and certification.

Session 3: Utility Leaders Forum



Session Theme: Utility Leaders Sharing Best Practices in Circular Economy and Water Reuse and Contributions to the Arth Ganga Mission



Chair

Mr Rajiv Ranjan Mishra, I.A.S. (Retd.), Ex-DG, NMCG, MoJS and currently Chief Technical Advisor & Chairman of Strategy & Policy Unit, NIUA talked about water security, water management and treating different sources of water (storm water, treated water). He discussed the significance of SDG 6, in particular SDG 6.3 & 6.4, which focuses on scaling up of water quality and water reuse in sustainable development and is focused on water quality. He mentioned about National Urban

Sanitation plan and National Water Policy. He further mentioned Namami Gange Mission's efforts to create a R&D ecosystem across Namami Gange's different verticals. He reiterated the Prime Minister's statement to seek ways to reuse water and to find ways to monetize STP outputs like sludge by developing business models. Several cities across India are coming up with this model. He also addressed the vision of Arth Ganga, which combines the economy and ecology and heavily relies on technology. This is where the Centre of Excellence of TERI steps in.

Panelists



- (i) **Mr Rajiv K N**, Chief Engineer (Projects), Bangalore Water Supply and Sewerage Board (BWSSB) gave a concise summary of Bangalore's cityscape as well as the tasks undertaken by BWSSB which was the first to develop a master plan for a city. Radial development is taking place in the city. With an expanded capacity of 2200 MLD, the city's 36 existing STPs will be increased to 56. Water is recycled from decentralized STPs in Bangalore (890 MLD). In the areas around Bangalore, 380 MLD of treated sewage is being used to rehabilitate lakes. The industrial region and Lalbagh neighbourhood of the city receive 40 MLD of tertiary treated water. Additionally, treated water is provided for various reuse applications in the Railways, ITC, International Airport, Raj Bhavan, etc., and thus BWSSB could generate revenue.



- (ii) **Mr Mahesan**, Chief Engineer, Greater Chennai Corporation, (Online mode) talked about Chennai's waste generating profile, which includes 6500 TPD of total solid waste and 1100 TPD of waste processing. MCD stands for Micro Composting Centre; it has a 500 TPD capacity

and processes moist waste. Manufacturing facility for garden trash: Tender coconuts and garden garbage are regularly collected, processed, and turned into briquettes and pit blocks. It is now running in PPP mode. A Bio-CNG plant in PPP mode, with no investment from the GCC—at the 1000 TPD plants in Chetpet and Madhavaram. GCC simply gives the concessionaire the land and the trash.



- (iii) **Mr Vikram Singh**, Pr. Chief Engineer, Delhi Jal Board (DJB) began by talking about the current linear economy and how circular economy could pave the way for future water security after usage. He emphasized that water should be brought back for reuse instead of disposal, and the byproduct sludge could be used for power generation and fertilizer production. Further, he discussed about the 3500 MLD of sewage generated in Delhi, the 720 MLD shortfall between the capacity for generation and treatment, and DLB's intentions to build new STPs to close the gap. Moreover, when there is land available, DJB intends to fill the lakes and make artificial lakes there with treated water which is being used for groundwater rejuvenation, city horticulture, and gardening.



- (iv) **Mr Faisal Ibrahim**, Superintending Engineer, Gurugram Metropolitan Development Authority (GMDA) stated that Gurugram's water supply was 640 MLD, but the actual demand was for 585 MLD, and that their main obstacle was their inability to distribute drinking water

fairly. In Gurugram, there are 388 MLD capacity STP plants. A total of 126 MLD of treated water was being given to the city, with 30 MLD going to horticulture, 5 MLD to textiles, 9 MLD to construction, and the remaining MLD going to filling up water bodies and forest areas.

Key Highlights of the Session

- Focus on solid waste management that separates wet and dry waste, wet waste management, and uses micro-composting to produce biogas is essential.
- The significance of SDG 6 and SDG 6.3 & 6.4, in particular, which concentrates on water quality and water reuse in sustainable development was discussed.
- The importance of Namami Gange project in enhancing the water ecosystem's flow, ecology, and R&D was also discussed.
- National framework created by Arth Ganga looks at combining the economics and ecology, where technology plays a significant role. It is at this point where TERI Centre of Excellence could make a significant contribution.

Session 4: International Collaborations



Session Theme: Fostering Research and Innovation through International Collaborations and Multi-lateral Funding: Expectations and Contributions of this Centre of Excellence (CoE) in Knowledge Creation and Sharing among Cross-border Stakeholders

Chair



Mr Sumouleendra Ghosh, Partner & Global Infrastructure Water Sector Lead at KPMG India started by saying that water reuse as an initiative can be implemented only when there is an economic incentive involved, e.g., water tariffs, water regulations, water balancing, or water budgeting. To scale it up effectively across the nation, proper policies are required to be in

place. He also mentioned that there is a lot of scope for market-based initiatives and cited World Bank's 'Wastewater Reuse Trading Certification System'. He emphasized the significance of giving policymakers and the administration time to adjust when a new idea is introduced in a nation. At this point, the piloting and early excellent practices are brought in from established nations that have already dealt with this issue.

Panelists



- (i) **Ms Upneet Singh**, co-TTL and Senior Water and Sanitation Specialist, The World Bank Group highlighted that the World Bank is the leading global provider of multilateral funding. The Bank is helping the Indian government's efforts to improve water security by funding investment projects for infrastructure as well as providing technical support and funding for research. She also cited Banks's framework on the Water in Circular Economy and Reuse (WICER) by Water Global Practice, which focuses on 3 outcomes, viz., to foster resilient and inclusive services focusing on diversifying sources of water and maximizing the use of existing infrastructure, resource recovery and preserving and regenerating natural systems. Globally, The World Bank is supporting various research-to-practice initiatives. In India, she mentioned Chennai as an example, one of the first cities to source 10% of its water from recycled, treated wastewater. They built two 45 MLD Tertiary Treatment and Reverse Osmosis (TTRO) facilities, with one of the plants receiving support from the World Bank's Tamil Nadu Sustainable Urban Development Project.



- (ii) **Ms Beate Langset**, Counsellor- Climate and Environment, The Royal Norwegian Embassy, New Delhi emphasized the value of sharing knowledge internationally and that Norway

is doing excellent work in promoting water reuse and circular economy. She mentioned Fredrikstad, Norway as an example, explaining how recycling facilities allowed it to transform into a green port. She continued by mentioning Indore city in India as a clean city and city with the best water reuse practices and that it can be incorporated by other cities in India as well. She also cited an occasion when NMCG and River Cities Alliances brought together specialists from other nations, including Norway, where the Norwegian experts spoke about the significance of river management. She also spoke about knowledge exchange, mentioning a UNEP-rated highly successful online webinar attended by 400 civil servants.



- (iii) **Mr Neeraj Gahlawat**, Water Resources Specialist, The Israel Embassy, New Delhi began by outlining Israel's general characteristics, which include being an arid country with little rainfall and having a large chunk that is a desert. Water scarcity was a problem in Israel for a very long period, and the first water reuse project was initiated in 1986 and later desalination projects started in the year 2005. 95% of the wastewater in Israel is treated and around 50% requirements of the agriculture sector are met by treated wastewater. All water-related decisions in Israel are made by the Israeli Water Authority. This authority includes all other organizations and decides on all water-related matters. A project in the state of Haryana involves transporting 200 MLD of water from Gurugram to water-scarce areas. Another comparable project with the State of Gujarat and AMRUT Mission as partners involves the establishment of a 200 MLD STP that will be providing year-round agriculture. Also, the Gol and the Israeli Embassy are working to establish two different water technology centres at IIT Madras and IIT Roorkee.



- (iv) **Mr J Karunanithi**, India Regional Operations Manager at International Water Association (IWA), Chennai conveyed that in order to learn from the West from places where various

technologies have been tried for a long time, there needs to be a convening body that is lacking. He stated several effective examples from Singapore and Western European nations working on water reuse and resource recovery. He mentioned that the International Water Association as a body can achieve that for India and South Asia by drawing on existing, context-specific learning from prior studies and large-scale initiatives and facilitating discussion on a platform appropriate to that country. IWA believes in the power of communication and believes that it can be applied for water reuse, non-revenue water, and material recovery and reuse in the circular economy.

Key Highlights of the Session

- World Bank's role in promoting research with respect to international practice, delivering durable infrastructural services, conserving and restoring the environment was highlighted.
- For a meaningful transformation, industries and researchers should unite on one platform. Notable circular economy initiatives and policies from Norway and Israel have been discussed and their positive impact in promoting circularity in water sector.
- For attaining water security and sanitation, technically viable and economical solutions are the way to go.
- The importance of other factors like water tariffs, control, allocation, budgeting, and balancing was highlighted. Market-based initiatives are very important.
- Various sustainable water technology-based initiatives initiated by different bodies were highlighted in the session.

Session 5: Knowledge Leading to Practice



Session Theme: From Lab to Field: Strategies for Accelerating Research and Innovation adoption in Technology-based Centres of Excellence (CoE) and Addressing Training and Capacity-building Needs in Industry, R&D, and Utilities

Chair



Prof. A K Gosain, Professor Emeritus, Department of Civil Engineering, IIT Delhi set the context of the panel discussion by putting a focus on the importance of reusing water. He emphasized on the growing need for water and the significance of looking into sustainable management techniques

for these priceless resources. Instead of concentrating only on the intended water quality after treatment, he reasoned for a thorough examination of the complete water contamination pathways, beginning at its source.

Panelists



- (i) **Prof. Srinivas Chary Vedala**, CEO, Wash Innovation Hub & Professor, Administrative Staff College of India (ASCI), Hyderabad (online mode) spoke on the problem of capacity gaps in achieving a circular economy. He said that “the ability to effectively translate the national vision into practical implementation holds a significant capacity gap.” Additionally, he remarked on a number of distinct gaps, like State Government policies aimed at achieving national objectives and a lack of understanding of how to apply these regulations within their individual jurisdiction. He also emphasized the need for building capacity for policies and regulations. Progress is being also hampered by inadequate market analysis. He also mentioned PPP model can be a key to this gap and will be market responsive as well.



- (ii) **Mr Praveen Bhargava**, Chairman, Perfect Group, New Delhi emphasized that the reuse of industrial wastewater and zero liquid discharge (ZLD) with proper conversion of reusable products is the characteristic demand of the time. He further added the alarming prevalence of multiple sizable companies that harvest and degrade groundwater and river sources

in rural areas. He suggested a list of tasks for NTCoE to carry out in order to successfully address these issues, including adequacy studies of these industries' treatment facilities, component-by-component analyses of effluent plants, treatability studies, lab studies, and the commissioning of pilot plants across geographies.



- (iii) **Mr S K Thakur, Director (Technical)**, Dew projects & Chemicals Pvt Ltd, Greater Noida, India talked about the need for new innovative treatment technologies for industrial wastewater treatment. He concentrated particularly on Zero-liquid discharge (ZLD), a well-known water treatment method. He underlined three key requirements throughout his discussion that any technology must meet in order to be embraced by industries which include economic viability, feasibility, and practical implementability. He also urged that businesses be given incentives to promote the use of such newer technologies like TADOX®



- (iv) **Dr C S Shankar**, CEO, Vision Earth Care, Mumbai initiated the discussion by talking about Vision Earth Care's journey in providing nature-based wastewater treatment solutions and that the company holds 400 MLD of treatment portfolio across the country. He continued by highlighting the lack of a certification organization/regulator for these techniques as a major barrier to the widespread adoption of such technologies throughout India. He emphasized the significance of setting up a reliable organization in India that can validate, certify, and thus support these technologies in order to promote their scaling and national implementation.



- (v) **Dr Indra Mitra**, Director, Cambi (Europe), India presented a talk on Sustainable Biosolids Management. The Cambi THP (Cambi-Thermal Hydrolysis Processes) technology, which enables improved treatment for sewage sludge and biodegradable waste, was one of many Cambi technologies he discussed during his session. Dr Mitra spoke on the many advantages of Cambi THP, such as the creation of pathogen-free, Class A fertilizers of the highest quality, a low carbon footprint, and cost savings in terms of capital expenditure (CAPEX) and operating expenditure (OPEX), sludge to energy, sludge to fertilizer or soil conditioner and thermal hydrolysis: high pressure boiling of sludge followed by rapid decomposition (steam explosion).

Key Highlights of the Session

- Knowledge panelists discussed the “Missing Link” between implementing technological breakthroughs.
- Technology should be incorporated and more relatable, practical, and economical solutions should be developed.
- In order for a technology to be embraced by an industry, it must first meet three key requirements: economically viable, feasible, and practically implementable. Then, companies should be given incentives for the adoption of such technologies.
- The panelists emphasized the necessity of creating a centralized test bed facility in India that could verify, certify, and support these technologies in order to promote their scalability, statewide adoption, and implementation.

Session 6: Market Creation



Session Theme: Promoting a Circular Economy and Water Reuse Market in India: Insights from Industry Leaders and Strategies for Improvement

Chair



Dr Uday Kelkar, Managing Director and CEO, NJS Engineers India Private Limited, Mumbai emphasized the importance of understanding the existing situation of circular economy activities and water reuse in India. He further suggested investigating the significant environmental sustainability concerns and highlighted the significance of designing products with circularity in

mind. He cited the example where only treated water is used for industrial production in India and emphasized on increasing interaction between industries to support water reuse. He also discussed strategies for extending product life cycles, reducing waste, and promoting responsible consumption.

Panelists



- (i) **Mr Avinash Patro**, South Asia Head- Strategy & Marketing, Xylem India, Bengaluru presented three important Xylem initiatives that promote the circular economy in India. These initiatives include reusing wastewater in Mumbai, implementing smart meters in Pune with the assistance of Pune Municipal Corporation (Xylem installed 3, 25,000 meters as part of the project), and reducing water loss and non-revenue water (NRW) with Smart Ball Technology using acoustic sensors to detect leaks and gas pockets.



- (ii) **Mr Sunil Rajan**, Managing Director, WOG Technologies (P) Ltd. (World Group of Companies), Gurugram emphasized on the business own solutions developed for both municipalities and industries, as well as mentioned about their broad expertise helping 16 nations with a range of wastewater-related problems. WOG is now working on projects to further reduce

carbon emissions by up to 250,000 tonnes. WOG has achieved a significant annual decrease in carbon footprint of roughly 500,000 tonnes. Additionally, they have been successful in preserving 400 million litres of fresh water and 1,600 MegaWatts of power each day.



- (iii) **Mr Bobby Kurian**, Business Unit Head, Re Sustainability Ltd. (Formerly Ramky), Hyderabad discussed Ramky's impressive achievements in their field of business. He highlighted the firm's commitment in carrying out several programs, including legacy leachate treatment, marine litter control, and landfill gas management. The main objective is to turn garbage into useful resources and keep it from ending up in landfills. The largest Construction and demolition, Refused Derived Fuel, and Compost factories in India are all run by Ramky, according to Mr Kurian. The first metal recovery plants, end-of-life car recycling plants, and a marine-based recycling facility were all established by them as well.



- (iv) **Mr Lalit Bhardwaj**, Assistant Vice President, MEP (Projects), DLF Limited, Gurugram emphasized that there is a problem with residential neighbourhoods. The norms for water treatment have not been reached after a few years of construction and transfer to the condominium. This is mostly caused by the expensive maintenance fees, which condominiums find it impossible to pay. He recommended that the local government deal with this matter and offer assistance in making sure that sufficient water treatment is provided in these residential establishments.

Key Highlights of the Session

- Issues like inline leak detection and pipe conditional assessment technology were discussed. WOG as a solution provider discussed about WWT, ZLD, carbon footprint reduction, biogas generation, and several other needs.
- Waste management sector should involve reuse, reform and recycling, circular economy, conversion of biogas, and applicability in the automobile sector.
- Discussion on the strategies to add all of the estimated environmental costs associated with a product throughout the product life cycle cost assessment to the market price of that product, contemporarily mainly applied in waste management.
- The session also highlighted the importance of regulatory bodies and the need for policy upgradation with the central government bodies. Panelists acknowledged some key challenges faced during project execution, including concerns related to waste quality, efficient handling of sludge, and the absence of a well-defined economic model.

Vote of Thanks

Felicitations and a vote of thanks were given by **Dr Nupur Bahadur**. The event was successful in providing a forum for all the experts and stakeholders to share their views towards advancing circular economy and water reuse. Through this platform, she invited all the stakeholders: industries and government bodies to come along in making this centre a great success. She expressed thanks to the National Mission for Clean Ganga (NMCG), Department of Water Resources, River Development & Ganga Rejuvenation, Ministry of Jal Shakti for establishing this centre and throughout being a guiding light and providing the funds in a timely manner. She also thanked FICCI for coming along as an event partner, TERI event management team and administration and all the sponsors and partners for organizing this event.

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