



ACTION FOR A SUSTAINABLE AND CLEAN ENVIRONMENT



19 – 21 June 2024 Sands Expo & Convention Centre
Marina Bay Sands, Singapore

About CleanEnviro Summit Singapore

Organised by Singapore's National Environment Agency (NEA), the biennial CleanEnviro Summit Singapore (CESG) is a global platform for thought leaders, industry captains and policy makers to convene, connect as well as to consider solutions for enabling a sustainable and clean environment.

The sixth edition of CESG, held from 19 to 21 June 2024, was themed 'Action for a Sustainable and Clean Environment'.

Key focus areas were:



Climate Action

Clean Energy, Climate Defence, Decarbonisation, and Pollution Management



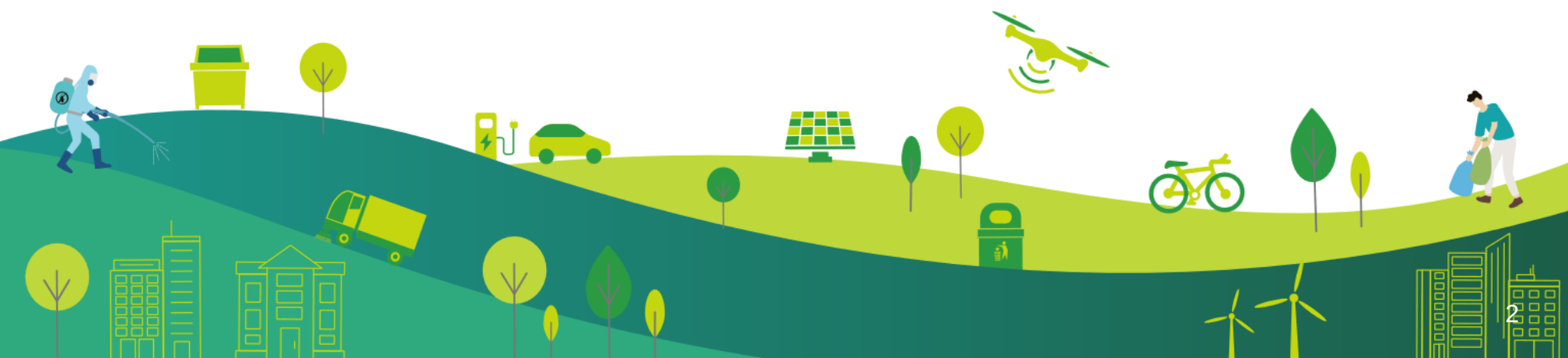
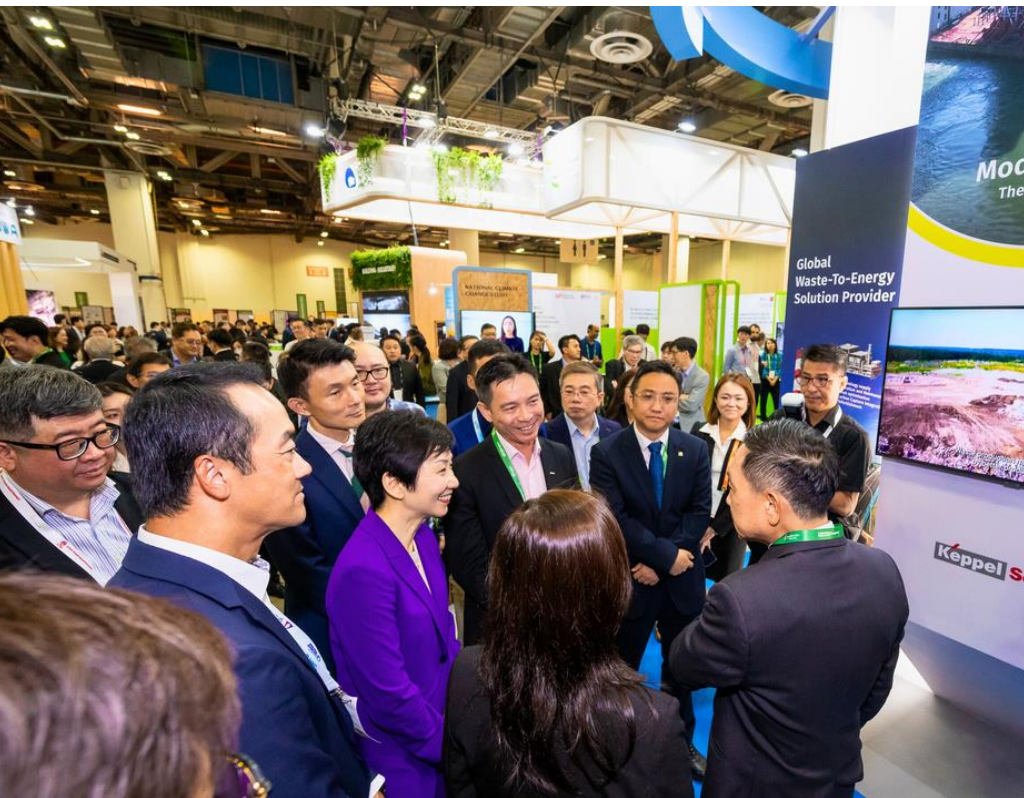
Resource Circularity

Management of Waste as Resource and Circular Economy Solution Management



Public Hygiene

Cleaning and Pest Management



Joint Opening Ministerial Plenary



H.E. Grace Fu

Minister for Sustainability
and the Environment and
Minister-in-Charge of Trade Relations
Singapore



**YB Tuan Haji Akmal
Nasrullah bin Mohd Nasir**

Deputy Minister
Ministry of Energy Transition
and Water Transformation (PETRA)
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Ms Guo Fang

Vice Minister
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Ministry of the Environment
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**Dato Seri Setia Awang
Haji Muhammad Juanda
bin Haji Abdul Rashid**

Minister
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Ms Anna Bjerde

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of Operations
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Undersecretary for Finance,
Information System and Climate
Change of the Department of
Environment and Natural Resources
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Joint Opening



Ms Grace Fu, Minister for Sustainability and the Environment and Minister-in-Charge of Trade Relations, delivered the opening address on 19 June 2024. Citing extreme weather patterns and rising sea levels, she emphasised the urgent need for climate action, and highlighted Singapore's efforts in building a more sustainable and climate-resilient future.

Events such as CESG and the Singapore International Water Week (SIWW) serve as a synergistic platform for stakeholders to exchange ideas, explore innovations, and foster collaborations, reinforcing the global call for decisive and collaborative action against climate impacts.



A Ministerial Plenary was held after the Joint Opening, during which they shared their perspectives on the challenges and successes in implementing decarbonisation and sustainability policies within their countries following COP28. The discussion provided valuable insights into the strategies and actions taken to address environmental and climate challenges, with a focus on achieving sustainable development goals.



Conference Highlights

Sustainability Summit

19 June 2024



Senior Minister of State for Sustainability and the Environment, Dr Amy Khor, delivered the welcome address for the Sustainability Summit. The theme, 'Towards a Net Zero City', reflects the urgent need to transform cities into sustainability hubs, particularly in resource-constrained Singapore. She highlighted Singapore's efforts to peak emissions before 2030 and achieve net zero by 2050, and hoped that the insights shared will catalyse action for sustainable change across our cities.



Keynote Address 1

Driving Resilience and Sustainability

Mr Yoon Young Kim, Cluster President, Singapore and Brunei of Schneider Electric, emphasised the need for business resilience amid growing uncertainties and the unsustainability of resource overspending. He highlighted the importance of adopting circular economy principles to reintegrate materials into supply chains for sustainability and long-term success.

Panel on Net Zero

The session focused on actionable steps to achieve net-zero emissions. Key discussions highlighted the crucial role of nature in climate action, the impact of advanced analytics on energy efficiency and cost savings, and the increasing demand for sustainable practices. Panellists shared that collaboration across businesses, government, and academia is essential to transforming challenges into opportunities and advancing towards a sustainable future.



Sustainability Summit

19 June 2024



Keynote Address 2

Paving the Way Towards Net Zero – Engaging Industries and SMEs for Sustainability

Dr Bicky Bhangu, President of Southeast Asia, Pacific & South Korea at Rolls-Royce & UN Global Compact Network Singapore, stated that the journey towards net zero, while complex, requires a collective effort from all industries. As industries and SMEs are central to this transition, engaging them effectively and providing the necessary support can pave the way for a sustainable future.

Panel on Low-Carbon Transition

Panellists discussed the growing urgency for businesses to adopt low-carbon strategies in response to the evolving environmental landscape. They highlighted how financial tools, along with carbon financing, are essential in driving industries toward sustainable practices. By leveraging these mechanisms, businesses can accelerate the adoption of low-carbon technologies, reduce their carbon footprint, contribute significantly to global efforts in combating climate change, and achieve long-term sustainability.



Sustainability and Clean Environment Convention

20 – 21 June 2024

The Sustainability and Clean Environment Convention served as a platform for industry professionals, academics, and technical experts to discuss both current and emerging environmental challenges. Focusing on the pillars of Climate Action, Resource Circularity, and Public Hygiene, the conference facilitated the exchange of ideas, technological innovations, and best practices related to the low-carbon transition.

The first track, 'Climate Leadership: Pathways to Action and Innovation', featured experts and business leaders who discussed strategies for reducing greenhouse gas emissions, transitioning to renewable energy, and adopting sustainable practices. Next, the 'Closing the Loop: Innovations for Better Resource Circularity', track focused on waste management, with experts and leaders examining trends, policies, and innovations related to plastic, e-waste, and food waste.

During the track, 'Advancing Public Hygiene Practices: Delivering Cleaning Services for the Future', speakers highlighted the shift to outcome-based cleaning contracts and advancements in robotic cleaning technology, emphasising energy efficiency and reduced manual labor. Lastly, the 'Winning the War: Sustainable Solutions for Smart Pest Management' track addressed the impact of climate change on pest biology and control, integrated pest management trends, and the latest sustainable innovations and best practices.



Environment Expo

Aligned with the CESG 2024 core pillars of Climate Action, Resource Circularity, and Public Hygiene, the Environment Expo featured three dynamic areas: the LaunchPad, Experiential Zone, and Landing Zone.



LaunchPad

A dynamic hub where visionaries and disruptors showcased their groundbreaking ideas and concepts in environmental sustainability, the LaunchPad was a platform for fostering collaborations and potential business growth. Startups and Institutes of Higher Learning showcased and pitched their environmental sustainability innovations at the LaunchPad, which featured booths, a dedicated pitching stage, and a 140-person open seating space.



Hosting their own events at the LaunchPad, Enterprise Singapore and the Urban Solutions & Sustainability Innovation & Enterprise Office showcased Singapore's innovative solutions. These events also fostered knowledge about our local waste treatment capabilities, catalysed partnership opportunities for a circular economy, and highlighted the relevance of triple-helix partnerships in our ecosystem through the discussion of successful use cases.



Experiential Zone

The Experiential Zone, built with elements inspired by outdoor and indoor settings, offered participants interactive and multi-sensory experiences on cutting-edge innovative environmental services solutions. Beyond conceptual thinking and theories, attendees were able to view demonstrations of these solutions in action, and their practical applications in real-world scenarios.



Landing Zone

Designed to foster collaborative learning, the Landing Zone provided a platform for hosting forums, seminars, workshops, and master classes. Investment NSW and Global Victoria celebrated the global connections between Australia and Singapore companies in the Cleantech sector, during their event, 'Australia: Solutions for a Sustainable Future'. The ISWA Beacon Conference, organised by the Waste Management & Recycling Association of Singapore, shared insights into the crucial role of waste management in combating climate change and advancing towards a net-zero future.

Also held at the Landing Zone was the France-Singapore Circular Economy Forum, organised by the French Chamber of Commerce in Singapore with the support of the French Embassy and the French Foreign Trade Advisors. The forum featured panel discussions by members of the industry and goods consumption sectors, who shared insights on driving circular and sustainable industry practices.



CESG Industry Night



Sponsors, exhibitors, conference delegates, and invited trade visitors celebrated the Environmental Services industry's contributions to Singapore's cleanliness and sustainability at the CESG Industry Night. The NEA-Industry Scholarship Awards and Workforce Transformation Awards were presented during the networking event. CESG sponsors and strategic partners also received tokens of appreciation.



National Environment Agency (NEA) Innovation Pavilion



Featuring research and development projects and innovations undertaken or supported by NEA, the NEA Innovation Pavilion was a platform for budding start-ups and research teams to engage with a diverse audience of capitalists, businesses, experts in the field, and regulatory authorities. Visitors to the booths could directly connect with researchers to find out more about the new concepts, prototypes, and products yet to be commercialised.

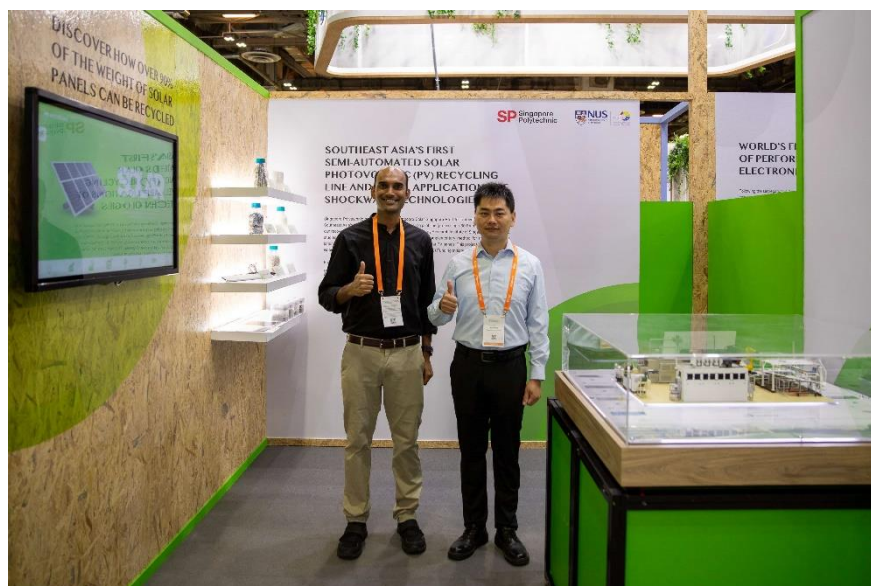
Autonomous Waterway Cleaning Robot

NEA cleans 27 waterways daily to ensure the cleanliness of Singapore's precious water resources. Traditionally, this task required manual labour, exposing workers to weather conditions and risks. In 2023, NEA worked with 800 Super Waste Management Pte Ltd, to trial the Autonomous Waterway Cleaning Robot which is charged by a solar-powered charging station. The robot is now deployed at Sungei Seletar, boosting its cleaning productivity by up to 80% and upskilling the existing workers to operate the robot.



Southeast Asia's First Semi-Automated Solar Photovoltaic (PV) Recycling Line and Novel Applications of Shockwave Technologies

Funded by NEA's Closing the Waste Loop Funding Initiative, Singapore Polytechnic collaborated with Sembcorp Solar to develop Southeast Asia's first semi-automated solar PV recycling pilot line, processing around 60 solar PV panels daily and recovering over 90% of their weight.



The Solar Energy Research Institute of Singapore has also explored shockwave fragmentation to separate laminated materials in both glass-backsheet and glass-glass solar PV panels.



High-resolution Climate Futures for a Climate-resilient Singapore and Southeast Asia

The Centre for Climate Research Singapore conducted the Third National Climate Change Study (V3), offering the highest resolution climate change projections for Singapore and Southeast Asia until the end of the century. Based on the Intergovernmental Panel on Climate Change's 6th Assessment Report, V3 provides projections under low, medium, and high global greenhouse gas emission scenarios.

The study provides a scientific foundation for government agencies, academia, and businesses to plan for climate resilience. V3's findings, found in the stakeholder and science reports, infographics, and the Climate Visualiser, are available on the Data Visualisation Portal (go.gov.sg/v3-dvp), allowing the public to explore future climate change projections.



World's First Geostationary Satellite Instrument Focusing on Air Quality Observations of Atmospheric Aerosols and Gaseous Pollutants

The Geostationary Environment Monitoring Spectrometer (GEMS) was launched in 2020 onboard the GEO-KOMPSAT-2B satellite by the Republic of Korea's National Institute of Environmental Research (NIER) to monitor atmospheric aerosols and pollutants.



GEMS provides hourly daytime air quality measurements over Asia, aiding in the study of atmospheric composition and air pollution causes. NEA, NIER, and the National University of Singapore are collaborating to apply GEMS data to environmental and air quality issues.



Automated Inspection and Detection of Irregularities in Niches

NEA leads the planning and management of after-death facilities, including burial, cremation, columbarium, and ash scattering services.

With over 200,000 occupied niches, manual inspection is unsustainable. NEA, through the Infocomm Media Development Authority's Open Innovation Platform Challenge, commissioned a project to develop an automated inspection prototype using robotics and vision analytics. In 2021, Senserbot Pte. Ltd. was awarded to advance this prototype, and NEA has since adopted the technology at one of its after-death facilities.



Strengthening Singapore's Public Health Resilience with Wastewater Surveillance

Wastewater surveillance is a key approach in strengthening Singapore's public health resilience. NEA's national programme screens wastewater for pathogens shed by infected individuals.

To scale rapidly, NEA developed automation and engineering solutions, covering around 500 sites and testing up to 5,000 samples weekly at the peak of the COVID-19 pandemic.

The programme's success has led to its expansion for testing other diseases, like the Zika virus, enhancing public health preparedness.



Project *Wolbachia* – Singapore: A Novel Control Tool to Fight Dengue

Project *Wolbachia* involves the large-scale production and release of male *Wolbachia-Aedes aegypti* mosquitoes to suppress the field *Aedes aegypti* mosquito population, through cytoplasmic incompatibility which causes wild-type females to produce non-viable eggs.

Covering approximately 480,000 households in Singapore, the project has reduced the *Aedes aegypti* mosquito population by 80% to 90% in study sites after 6 to 12 months of releases, and dengue risk by up to 77% in sites within one year of releases. The production and release capacity are being ramped up for further and more cost-effective roll-out in the next few years.



Transforming Printed Circuit Board Recycling: Recovery of User-Defined Precious Metals and Rare Earth Elements

Funded by NEA's Closing the Resource Loop Funding Initiative, the NTU Singapore-CEA Alliance for Research in Circular Economy is developing an AI-assisted system to automatically disassemble and sort Printed Circuit Board (PCB) components by their elemental content.



This enables selective metal recovery with higher purity and simpler processes. This is an improvement from the current process where whole waste PCBs are shredded, which results in mixed metal elements and prevents selective recovery of high value metals. Additionally, research is being conducted into specific hydrometallurgy processes that aims to improve the recovery of precious and critical metals from sorted materials, enhancing their recovery efficiency and sustainability.



Enhancing On-Site Contamination Detection: Innovative Portable Systems Deliver Results in under an hour

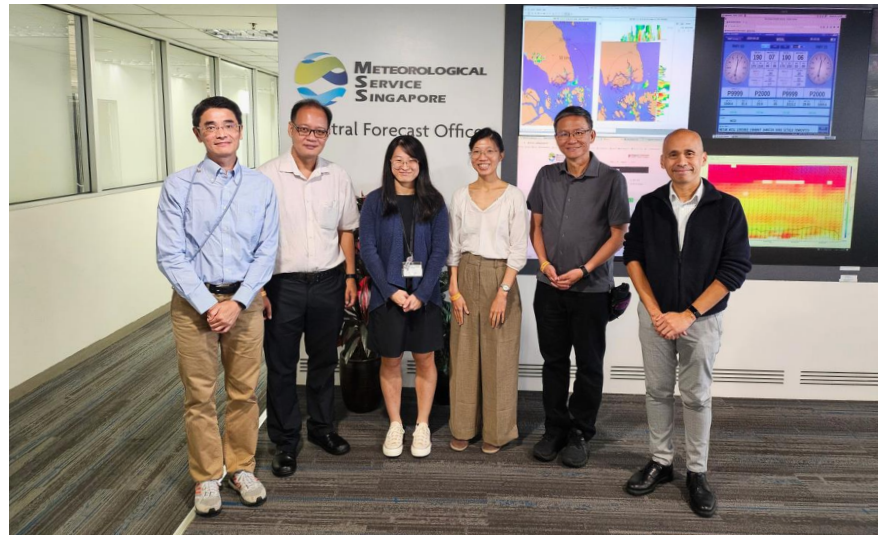
Funded by NEA's Closing the Waste Loop Funding Initiative, the project has pioneered a suite of innovative, portable systems. These systems significantly improve the efficiency and effectiveness of environmental monitoring and provide a comprehensive solution for on-site detection of heavy metals and phenolic compounds from solid waste materials. The developed technologies can perform the Toxicity Characteristic Leaching Procedure on-site and in less than one hour, compared to traditional lab testing which would take more than 24 hours.



Site Visits

Meteorological Service Singapore Central Forecast Office @ Changi Airport Terminal 2

Attendees gained insights into weather and climate services during their visit to the Central Forecast Office. They learnt how NEA meteorologists work around the clock to meet the needs of the public, government agencies, the aviation community, and other specialised users.



Project *Wolbachia* at Techplace II

NEA's Project *Wolbachia* combats dengue by releasing non-biting male *Wolbachia*-carrying *Aedes aegypti* mosquitoes, achieving 80% to 90% suppression of the mosquito population in study sites after 6 to 12 months of releases. During the site visit, attendees explored the mosquito production facility and observed the automated systems, including the larvae counter, rearing system, and pupae scanner.

TuasOne Waste-to-Energy Plant

Attendees toured the TuasOne Waste-to-Energy Plant, operational since December 2021, and saw how it incinerates 3,600 tonnes of waste daily, generating 136MWh of electricity. As Singapore's largest and most advanced incineration facility, TuasOne exemplifies efficient waste management and energy generation with its cutting-edge, eco-friendly practices.



Youth Environment Leaders Immersion Programme



Launched in September 2023, NEA's Youth Environment Leaders Immersion Programme aims to nurture passionate and proactive youth leaders in the environmental sphere. The programme recently celebrated the graduation and achievements of its inaugural cohort of 26 youth leaders, who demonstrated dedication and innovation in implementing environmental sustainability projects across schools and communities.



Facts at a Glance

Numbers are based on CESG 2024 and SIWW2024



30,000
Attendees



95
Countries/Regions



545
Exhibiting Companies

- AFGHANISTAN
 - ALGERIA
 - ANGOLA
 - AUSTRALIA
 - AUSTRIA
 - BAHAMAS
 - BAHRAIN
 - BANGLADESH
 - BELGIUM
 - BRUNEI
 - CAMBODIA
 - CANADA
 - CHINA
 - COLOMBIA
 - DENMARK
 - EGYPT
 - FINLAND
 - FRANCE
 - GEORGIA
 - GERMANY
 - GREECE
 - HONG KONG
- INDIA
 - INDONESIA
 - IRELAND
 - ISRAEL
 - ITALY
 - JAPAN
 - KENYA
 - LAOS
 - MALAYSIA
 - MALDIVES
 - MEXICO
 - MONGOLIA
 - MOZAMBIQUE
 - MYANMAR
 - NAURU
 - NEPAL
 - NETHERLANDS
 - NEW ZEALAND
 - NORWAY
 - PAKISTAN
 - PHILIPPINES
 - PORTUGAL
- QATAR
 - ROMANIA
 - RWANDA
 - SÃO TOMÉ AND PRÍNCIPE
 - SAUDI ARABIA
 - SINGAPORE
 - SLOVAK REPUBLIC
 - SOUTH AFRICA
 - SOUTH KOREA
 - SPAIN
 - SRI LANKA
 - SWEDEN
 - SWITZERLAND
 - TAIWAN
 - THAILAND
 - TIMOR-LESTE
 - TURKEY
 - UNITED ARAB EMIRATES
 - UNITED KINGDOM
 - UNITED STATES OF AMERICA
 - VIETNAM



Acknowledgements

We would like to express our heartfelt thanks to our sponsors, strategic partners, exhibitors, delegates, and trade visitors for making CESG 2024 a resounding success.

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