TOKYO GX WEEK

ICEF
Innovation for Cool Earth Forum

Innovation for Cool Earth Forum

ICEF2025 Report

METI
Ministry of Economy, Trade and Industry

NEDO
New Energy and Industrial Technology Development Organization

Innovation for Cool Earth Forum

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ICEF2025 Report

Contents

*Job titles in the brochure are as of the time of the ICEF2025

What's ICEF?

Innovation for Cool Earth Forum (ICEF) is a platform of wisdom for discussing among industry-academia-government leaders around the world in order to promote "INNOVATION", the key to solving global warming.
Since 2014, the ICEF Annual Meeting has been held by the Government of Ministry of Economy, Trade and Industry (METI) and New Energy and Industrial Technology Development Organization (NEDO), and celebrated its 10th anniversary in 2023.

Distinguished experts from industry, academia and governments are gathered to engage in lively discussions and explore innovation-based solutions to address climate change, the most pressing challenge facing the 21st Century.

ICEF hopes to share the latest knowledge with the world, increase public awareness of the threat of climate change, and to facilitate a change in behaviour. ICEF is taking into consideration gender equality and youth engagement based on the awareness that diversity is the origin of innovation.

12th Annual Meeting (ICEF2025)

Main theme

Innovation for Green Transformation (GX) and Security

Date&Venue

Wednesday, October 8, 2025 - Thursday, October 9, 2025
The Westin Tokyo and Online (Hybrid Forum)

Hosts

METI Ministry of Economy, Trade and Industry
NEDO New Energy and Industrial Technology Development Organization

Co-Hosts

外務省 Ministry of Foreign Affairs of Japan
MEXT
MAFF Ministry of Agriculture, Forestry and Fisheries
Ministry of the Environment

Institutional Partners

iea
BloombergNEF
UNIDO
IRENA International Renewable Energy Agency

Speakers

A total of 57 experts from 19 countries and regions took the stage across 12 sessions.

Outcome of ICEF2025

- ICEF2025 Roadmap on "Sustainable Data Centers Roadmap"
- Statement from the ICEF Steering Committee

Official Website

www.icef.go.jp

Program

DAY 1 (Wednesday, October 8)

9:30-9:45 Opening

Opening Remarks by
MUTO Yoji
(Minister of Economy, Trade and Industry)

SAITO Tamotsu
(Chairman of New Energy and Industrial Technology Development Organization)

TANAKA Nobuo
(Chair of ICEF Steering Committee)

9:50-11:00 Keynote

Jean-Eric Paquet
(The Ambassador of the European Union to Japan, The Delegation of the European Union (EU) to Japan, EU)

KIHARA Shinichi
(Director General for Energy and Environmental Policy, Ministry of Economy, Trade and Industry, Japan)

Suman Kumar Bery
(Vice Chairman, National Institution for Transforming India (NITI Aayog), India)

Jooho Whang
(Former President & CEO, Korea Hydro & Nuclear Power Co., Ltd. (KHNP), Korea)

Xiangsheng Sun
(Chairman of ISETS; Former Secretary General of IEF, China)

11:05-12:05 Cooperation towards Carbon Neutrality and Security

12:10-13:10 Utilization of Nuclear Energy

14:20-15:20 Security through Climate Change Adaptation and Resilience

15:25-16:45 The Future of Renewable Energy

DAY 2 (Thursday, October 9)

9:30-10:30 CDR (Carbon Dioxide Removal) and Utilization

10:40-11:50 ICEF Roadmap Project : Sustainable Data Centers

13:05-13:35 Natural Hydrogen

13:40-14:40 Circular Economy x Startup

15:05-16:05 Advancing Clean Hydrogen Technologies

16:10-16:55 Closing Session

Quick Comments (Takeaways, Comment for ICEF 2026) from Dr. Hoesung Lee and other ICEF Steering Committee Members

Announcement of the Statement by YAMAJI Kenji
(Member of ICEF Steering Committee)

Final Thoughts on the Event by TANAKA Nobuo
(Chair of ICEF Steering Committee)

Closing Remarks by FUKUMOTO Takuya
(Deputy Director-General for GX Policy, Innovation and Environment Policy Bureau, Ministry of Economy, Trade and Industry, Japan)

Opening Remarks

MUTO Yoji

Minister of Economy,
Trade and Industry

Distinguished guests and esteemed participants from around the world, It is a great honor to address you today and to extend, on behalf of the Government of Japan, our sincere appreciation for your presence at the 12th Innovation for Cool Earth Forum . This forum was inaugurated in 2014, following a proposal by former Prime Minister Shinzo Abe, with the aim of tackling the global challenge of climate change through technological innovation and international cooperation, thereby paving the way toward a sustainable future. This year, under the theme of “Innovation for Green Transformation (GX) and Security,” we look forward to the convergence of global wisdom and to vibrant, forward-looking discussions among all participants.

In February of this year, Japan submitted a new greenhouse gas reduction target to the United Nations. In pursuit of carbon neutrality by 2050, we have set an ambitious interim goal of a 73% reduction by 2040 compared to 2013 levels. Achieving this target will require more than incremental efforts—it demands the development and deployment of transformative decarbonization technologies. To this end, the Government of Japan adopted the national strategy “GX2040 Vision” in February. This strategy outlines a direction to mobilize approximately 150 trillion yen in public and private investment over the next decade, accelerating the introduction and social implementation of next-generation technologies such as perovskite solar cells, advanced nuclear reactors, storage batteries, hydrogen and ammonia, and green steel. Furthermore, in implementing these technologies, we will remain attentive to economic security. We will support the development of domestic supply chains and enhance technological autonomy, thereby advancing GX in a manner that ensures both sustainability and resilience. Last month, I attended an international conference with economic ministers from ASEAN member states. Amid rising geopolitical tensions and increasing uncertainty in the international environment surrounding ASEAN, I keenly sensed the growing expectations toward Japan from our regional partners. In response to these expectations, and in recognition of the shared challenges in achieving decarbonization, Japan will contribute through the framework of the Asia Zero Emission Community (AZEC), providing technology and financing to support international cooperation.

Japan is undertaking bold initiatives in pursuit of GX. At the same time, we recognize that nations around the world are earnestly addressing the shared challenge of climate change, each in accordance with their unique circumstances. Cross-border collaboration and the sharing of scientific and technological expertise are essential to these efforts, and we are confident that ICEF will serve as a vital platform to meet the expectations of the international community. We sincerely hope that this year’s forum will further advance global cooperation and mark a meaningful step toward a sustainable future. In closing, I would like to express my appreciation to all those who have contributed to the successful organization of this forum. Thank you.

Opening Session

Scan here for the session video.

Opening Remarks by MUTO Yoji

(Minister of Economy, Trade and Industry)

Opening Remarks by SAITO Tamotsu

(Chairman of New Energy and Industrial Technology Development Organization)

Opening Remarks by TANAKA Nobuo

(Chair of ICEF Steering Committee)

Keynote

Scan here for the session video.

In this session, the participants discussed future directions and initiatives under consideration by various countries in the context of growing global interest in energy security policies.
Mr. Kihara referred to Japan's "Triple Breakthrough" approach of (1) decarbonization, (2) economic growth, and (3) energy security, and emphasized the importance of technological innovation, preparing for uncertainties, and discussions on adaptation in the energy sector.
Mr. Bery stated that India's policies aim to pursue domestic economic growth alongside climate change measures, and highlighted the necessity of collaboration with technologically advanced countries and financial support and technology sharing from other nations.
Dr. Sun pointed out China's achievements, such as a rapid increase in renewable energy generation and technological innovation, but also noted challenges such as barriers to market entry, and mentioned the importance of policy stabilization, cost reduction through technological innovation, and an open market and development environment.
H.E. Paquet referred to the damage caused by climate change, and stated that in the EU, it is necessary to prioritize the development of markets for innovative technologies and promotion of international cooperation.
Dr. Whang noted that Korea is constructing new nuclear power plants and developing innovative nuclear power technologies, and stated that improving the fuel supply chain, establishing regulations, and securing highly skilled human resources are essential for expanding nuclear power utilization.

Moderator

TANAKA Nobuo
Chair, ICEF Steering Committee, Japan

Speaker

Jean-Eric Paquet
The Ambassador of the European Union to Japan, The Delegation of the European Union (EU) to Japan, EU

KIHARA Shinichi
Director General for Energy and Environmental Policy, Ministry of Economy, Trade and Industry, Japan

Suman Kumar Bery
Vice Chairman, National Institution for Transforming India (NITI Aayog), India

Jooho Whang
Former President & CEO, Korea Hydro & Nuclear Power Co., Ltd. (KHNP), Korea

Xiangsheng Sun
Chairman of ISETS; Former Secretary General of IEF, China

Cooperation towards Carbon Neutrality and Security

Scan here for the session video.

The participants in this session discussed the importance of international collaboration in achieving carbon neutrality and ensuring energy security and the current and future approaches of various countries.
Mr. Kihara referred to the core principles of AZEC (Asia Zero Emission Community), including the "Triple Breakthrough," as well as various pathways and support for the decarbonization efforts of other countries.
Ms. Misna highlighted Indonesia's challenges and the need for financial and technological support, and emphasized the importance of government commitment consistent with methods of resource utilization.
Prof. Dr. Lim noted the diversification of energy supply chains and the complex challenges facing East Asia, and mentioned the importance of a balance between competition and cooperation.
Prof. Sikorsky emphasized that cooperation and collaboration within the region are extremely important, and as examples, cited securing supply chains and resilience.
During the panel discussion, the participants emphasized the importance of diverse initiatives tailored to national circumstances, financial support for decarbonization in developing countries, technological innovation for providing solutions, and the evaluation and comparison of risks and opportunities.

Moderator

Hoesung Lee
ICEF Steering Committee, Korea

TANAKA Nobuo
Chair, ICEF Steering Committee, Japan

Speaker

Eunjung Lim
Professor, Division of International Studies, Kongju National University, Korea

KIHARA Shinichi
Director General for Energy and Environmental Policy, Ministry of Economy, Trade and Industry, Japan

Andriah Feby Misna
Director of New and Renewable Energy, Directorate General of New, Renewable Energy, and Energy Conservation, Ministry of Energy and Mineral Resources, Indonesia

Erin Sikorsky
Director, Center for Climate and Security; Adjunct Professor, George Mason University, United States of America

Utilization of Nuclear Energy

Scan here for the session video.

This session focused on Small Modular Reactors (SMRs), with companies sharing their strengths and the current status of efforts, while also discussing the future outlook for broader deployment of SMRs.
Corporate speakers emphasized the advantages of SMRs prioritized by each company, which include low cost, high safety, and a short construction time, and shared the outlook for the future.
Mr. Borovas noted the hurdles for widespread adoption of SMRs, which include increasing social acceptance, waste management, and the construction of the first-of-a-kind unit, and the Moderator, Chairman Tanaka, followed up with questions for each speaker. Proposals included waste processing by fuel recycling for waste management, and the necessity of demonstrating safety with the initial plant and communicating with the public in easy-to-understand language in order to increase social acceptance.
The Moderator Benson pointed out that although numerous obstacles remain in the construction of SMRs, there is little time left to achieve net-zero, and concluded by stating that international cooperation and governmental support will be required for early adoption.

Moderator

TANAKA Nobuo
Chair, ICEF Steering Committee, Japan

Sally M. Benson
ICEF Steering Committee, United States of America

Speaker

KISHI Hisashi
Deputy Division CEO, Global Business Department, Chubu Electric Power Co., Inc., Japan

George Borovas
Head of Nuclear Practice, Hunton Andrews Kurth LLP; Managing Partner, Tokyo Office of Hunton Andrew Kurth LLP,Japan / United States of America

Matt Wilkinson
CEO, Thorcon International, United States of America

Caroline DeWitte
Co-Founder, Oklo Inc., United States of America

MORIWAKI Masanao
Senior Vice President and General Manager, Global Business Development & Management Division, Hitachi GE Vernova Nuclear Energy, Ltd., Japan

Lee Warren
Director, Engineering and Technology, Rolls-Royce, United Kingdom

Security through Climate Change Adaptation and Resilience

Scan here for the session video.

The topics in this session concerned the challenges and opportunities of climate change adaptation.
Dr. Lee cited the definition and history of adaptation, and noted the direction that developed countries should bear the costs of adaptation in developing countries. However, he also pointed out that financial support for adaptation remains at a very low level and stressed the need to accelerate investment in adaptation measures.
Mr. Kumahira highlighted the worsening agricultural and water issues in the Global South, and emphasized the importance of technologies for freshwater recycling, water distribution, transportation and storage, water-saving agricultural practices, and effective data utilization.
Dr. Bahar discussed the damage caused by climate change and the need for new technologies from the perspective of the African continent, and also emphasized the necessity of training scientists and engineers, improving access to technology for smallholder farmers, and establishing mechanisms for financing.
In the panel discussion, the participants discussed the necessary technologies and financing methods for the adaptation. Regarding financing, the need to develop financial schemes, devise risk mitigation measures, and provide project guarantees was discussed. It was concluded that future ICEF sessions should also discuss innovation in concrete and practical terms.

Moderator

ARIMA Jun
Senior Councilor, Japan Organization for Metals and Energy Security (JOGMEC);
Visiting Professor, Graduate School of Public Policy (GraSPP), The University of Tokyo;
Professor, Kaishi Professional University, Japan

Ismail Serageldin
ICEF Steering Committee, Egypt

Valli Moosa
ICEF Steering Committee, South Africa

Speaker

Hoesung Lee
ICEF Steering Committee, Korea

KUMAHIRA Tomonobu
Co-Founder and CEO, Mizu - Water One, United States of America / Japan

Faten Attig-Bahar
Deputy Director of the Future Earth Africa Hub, University of Pretoria;
Visiting Research Fellow, Rhodes University, Tunisia

The Future of Renewable Energy

Scan here for the session video.

This session examined the current status and future outlook for expansion of renewable energy.
Dr. Frankl of the International Energy Agency (IEA) delivered the Keynote address, outlining the latest market trends and challenges.
In the panel discussion that followed, four speakers made presentations.
Mr. Katase explained that closed-loop next-generation geothermal systems, adapted from oil and gas drilling technology, can cut costs while enabling continuous output.
Dr. Kaneko introduced perovskite building-integrated photovoltaic modules, which make it possible to secure an ample generating area even in urban settings.
Mr. Jha reported that India plans to raise $300 billion through innovative financing schemes and install 500 GW of renewable energy by 2030.
Prof. Dr. Wang urged parallel efforts to scale up existing technologies and invest in next-generation options such as storage technologies and nuclear fusion.
During the discussion, the participants agreed that grid integration, storage technologies, rising demand associated with digital technologies, and alignment of finance and policy are critical.
In closing, the Moderator stressed that renewables remain the best solution and that, with concurrent acceleration of technology, finance, and regulatory frameworks, the targets can be met.

Moderator

Nebojsa Nakicenovic
ICEF Steering Committee, Austria / Serbia

KURODA Reiko
ICEF Steering Committee, Japan

Speaker

Paolo Frankl
Head of Renewable Energy Division, International Energy Agency, France

Evelyn N. Wang
Vice President for Energy and Climate; Ford Professor of Engineering, Massachusetts Institute of Technology, United States of America

KATASE Hirofumi
Executive Vice Chairman and Director, I-Pulse Inc.;
President and CEO, G-Pulse Inc.;
Chairman, Geo Dreams Co., Ltd., Japan

Rajiv Ranjan Jha
Director (Projects), Power Finance Corporation Limited, India

KANEKO Yukihiro
Head of Perovskite Photovoltaics Business Promotion Office, Panasonic Holdings Corporation, Japan

CDR (Carbon Dioxide Removal) and Utilization

Scan here for the session video.

In this session, the importance and future challenges of Carbon Dioxide Removal (CDR) and Carbon Capture and Utilization (CCU) technologies were discussed.
Dr. Yogo emphasized that CDR is essential for achieving carbon neutrality, especially in hard-to-abate sectors. He also pointed out the need for cost reduction, scaling up of systems, application of existing technologies, and development of innovative adsorbent materials.
Mr. Dawe stressed that securing economic viability is key to technology deployment, and suggested that linkage with carbon credits and expansion from sectors where economic viability is more easily achieved are effective strategies.
Prof. Sugiyama highlighted the importance of CCU technologies for supplying chemical products in a carbon-neutral society, and emphasized the necessity of choosing optimal technologies and continuing basic research.
During the discussion, the key topics included scaling up from both technical and economic perspectives, cost reduction, introduction of optimal technologies for each industry, strengthening of the monitoring and verification systems, enhancement of market value through carbon credits, and creation of mechanisms to encourage corporate investment.
In conclusion, the participants affirmed that CDR and CCU are indispensable for realizing a circular society, and it is necessary to advance basic research, institutional design, and market formation, while continuing to select the optimal technologies for each sector.

Moderator

Sally M. Benson
ICEF Steering Committee, United States of America

Vikram Singh Mehta
ICEF Steering Committee, India

Speaker

Marcus Dawe
Founder & CEO, MCi Carbon, Australia

SUGIYAMA Masakazu
Director and Professor, Research Center for Advanced Science and Technology, The University of Tokyo, Japan

YOGO Katsunori
Group Leader and Principal Research Scientist, Chemical Research Group, Research Institute of Innovative Technology for the Earth (RITE), Japan

Roger Deane Aines
Dr. Roger Deane Aines from Livermore, United States.

ICEF Roadmap Project: Sustainable Data Centers

Scan here for the ICEF Roadmap.

In this session, Mr. Sandalow, the Lead Author of the ICEF Roadmap "Sustainable Data Centers" and a member of the ICEF Steering Committee, together with the roadmap co-authors Dr. Abramson and Dr. Aines, delivered a presentation and commentary on the roadmap.
The roadmap summarizes the environmental challenges posed by the rapid expansion of AI-driven data centers, such as electricity consumption, water use, and GHG emissions, together with their contributions to the deployment of clean energy.
Prof. Dr. Esaki of the University of Tokyo identified key future requirements, addressing issues concerning water, heat utilization, and GHGs, and argued that as the source of value shifts from physical goods to data (bits), large efficiency gains are achievable, and stressed the effectiveness of an information-processing society and the positive aspects of data center growth.
Dr. Haig of Microsoft, presented Microsoft's environmental policies and initiatives, including its commitment to become carbon negative, and suggested that the largest challenge in those efforts is reducing Scope 3 GHG emissions associated with semiconductors and other components.
The session concluded that this roadmap will help advance efforts to examine this issue so that the expansion of this sector can make a positive contribution to the environment and people's lives.

Moderator

David Sandalow
ICEF Steering Committee, United States of America

Speaker

ESAKI Hiroshi
Professor, Graduate School of Information Science and Technology, The University of Tokyo, Japan

Alexis Abramson
Dean; Professor, The Climate School at Columbia University, United States of America

Roger Deane Aines
Dr. Roger Deane Aines from Livermore, United States.

Ken Haig
Senior Director, Government Affairs, Microsoft, Japan / United States of America

Natural Hydrogen

This session reviewed the progress in research and development of natural hydrogen, future prospects, and the need for international cooperation from perspectives of the U.S. and Japan.
Dr. Hartman shared the view that natural hydrogen will not only provide an energy source for reaching net-zero, but is also important for security. He outlined advances in research and development in the United States and the challenges for deployment. Regarding international cooperation with Japan, he noted that swift progress is possible through cooperation between resource-rich America and Japan, with its high technological capabilities.
Dr. Niki highlighted natural hydrogen's low cost and clean profile, and noted that multiple exploration projects are also underway in Japan. He emphasized that many hurdles nevertheless remain, and further technology development and international partnerships are essential.
The Moderator Erdmann, asked about the long-term outlook for natural hydrogen. The speakers expressed the view that while reserves are still an unknown quantity, natural hydrogen will be an indispensable complement to conventional hydrogen on the road to net-zero.
All speakers agreed that the attractiveness of natural hydrogen as a resource, combined with U.S.–Japan collaboration, has the potential to accelerate its widespread adoption.

Moderator

Georg Erdmann
ICEF Steering Committee, Germany

Speaker

Richard Hartman
Chief Innovation Officer, Air Force Office of Energy Assurance, United States of America

NIKI Shigeru
Fellow; Program Director: Utilization of Unused Subsurface Resources/Geologic Hydrogen, New Energy and Industrial Technology Development Organization (NEDO), Japan

Advancing Clean Hydrogen Technologies

Scan here for the session video.

This session explored the current status and future outlook for hydrogen use in hard-to-abate industries.
Opening the discussion, the Moderator Erdmann, noted that the largest challenge is to ensure a stable supply of green hydrogen at an economically viable price.
Dr. Kofler reported that steel making employing hydrogen direct reduction and a fluidized-bed process can cut CO_2 emissions by approximately 80 %.
Ms. Schwager of the United Nations Industrial Development Organization (UNIDO) presented an international framework that satisfies both development of regional industry and food security through hydrogen and ammonia.
Mr. Singh stated that "The technology is almost ready, but shipowners will not commit to introducing hydrogen in ships as long as the fuel infrastructure and pricing are unclear."
Dr. Hara explained that Japan's "Hydrogen Society Promotion Act" will accelerate standardization and demonstration projects.
In the discussion, there was a view that an institutional design that links long-term hydrogen pricing and demand creation is indispensable. Also, a strategy to nurture initial markets through local production and local consumption of hydrogen in small-scale industrial clusters was introduced.
The panel also discussed risk-mitigation measures such as Japan's "overseas-investment credit attribution" scheme and linkage with the EU's European Union Emission Trading System (EU ETS), and speakers shared a view that early establishment of international standards and mutual recognition is urgent.
The Moderator Nakicenovic closed the session by stressing the importance of formation of sustainable hydrogen markets.

Moderator

Georg Erdmann
ICEF Steering Committee, Germany

Changhua Wu
ICEF Steering Committee, United States of America / China

Nebojsa Nakicenovic
ICEF Steering Committee, Austria / Serbia

Speaker

Irmela Kofler
Head of Research Area Decarbonisation, K1-MET GmbH, Austria

Ajay Singh
Senior Executive Advisor, Mitsui OSK Lines, Japan

Petra Schwager
Chief of the Climate and Technology Partnership (CTP) Division, UNIDO, Austria

HARA Daishu
Senior Director of the Hydrogen and Ammonia Department, New Energy and Industrial Technology Development Organization (NEDO), Japan

Circular Economy x Startup

Scan here for the session video.

This session focused on issues related to realizing a circular economy.
Mr. Verma of the Indian startup LOHUM, which aims to create a model of circulation of key minerals by battery recycling, discussed India's policies for establishing collection schemes, such as mandatory certification and regulations on who bears recycling-related costs, and introduced initiatives for producer-led joint collection points.
Ms. Cheah of Alterpacks, a Singaporean startup which is developing a biodegradable packaging technology using food waste as a raw material, emphasized the importance of building advantages over competing products, saying that eco-friendly materials need to surpass plastics in terms of functionality and cost.
Ms. Carrière of the Singapore-based startup OROBO, which provides Digital Product Passports (DPP) that enhance supply chain transparency, stressed the importance of ensuring transparency and suggested the desirability of utilizing technologies such as blockchain. She also noted the importance of partnering with companies that control the supply chain.
Finally, in concluding the session, each speaker expressed their hopes for collaboration with Japan.

Moderator

SAKANO Akira
ICEF Steering Committee, Japan

Speaker

Karen Cheah
Founder and CEO, Alterpacks Pte Ltd, Singapore

Sann Carrière
Founder - Director, Orobo, Singapore / The Netherlands

Rajat Verma
CEO & Founder, Lohum, India

Closing Session

Scan here for the session video.

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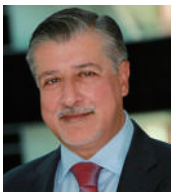
Closing Remarks by
FUKUMOTO Takuya
(Deputy Director-General for GX Policy, Innovation and Environment Policy Bureau, Ministry of Economy, Trade and Industry, Japan)

Steering Committee Members (2024-2025)

TANAKA Nobuo (Chair)
Chair, ICEF Steering Committee;
Former Executive Director,
International Energy Agency (IEA);
CEO, Tanaka Global, Inc.
(Japan)



Adnan Z. Amin
Senior Research Fellow, Belfer Center for Science and International Affairs,
Harvard University's Kennedy School of Government;
Director General Emeritus, IRENA;
Senior Adviser to COP 28 President
(Kenya)

Georg Erdmann
Retired Chair of Energy Systems, Faculty of Process Engineering, Berlin University of Technology;
President of the Board, KSB Energie AG, Berlin
(Germany)

KURODA Reiko
Designated Professor, Frontier Research Institute, Chubu University;
Professor Emeritus, The University of Tokyo;
Member, G7 GEAC (Gender Equality Advisory Council) 2023
(Japan)

Vikram Singh Mehta
Chairman, Center for Social and Economic Progress (CSEP) Research Foundation
(India)

Valli Moosa
Deputy Chairperson of the Presidential Climate Change Commission;
Former President, International Union for Conservation of Nature and Natural Resources (IUCN)
(South Africa)

SAKANO Akira
Representative Director, Zero Waste Japan;
Co-Founder, Green innovation;
Director & CSO, ECOMMIT Co., Ltd.
(Japan)

Ismail Serageldin
Co-Chair of the Board of Nizami Ganjavi International Center (NGIC);
Emeritus Librarian of Alexandria;
Former VP of the World Bank
(Egypt)

Changhua Wu
China / Asia Director, Office of Jeremy Rifkin;
Chair, Governing Council, Asia Pacific Water Forum
(United States of America / China)

Sally M. Benson
Professor, Energy Science and Engineering, Stanford University;
Deputy Director for Energy and Chief Strategist for the Energy Transition,
White House Office of Science and Technology Policy
(United States of America)

Eija-Riitta Korhola
Delegate of the Consultative Commission for Industrial Change European Economic and Social Committee
(Finland / Belgium)

Hoesung Lee
Former Chair of the Intergovernmental Panel on Climate Change (IPCC);
President, Carbon Free Alliance
(Korea)

Jon D. Moore
Chief Executive Officer, BloombergNEF
(United Kingdom)

Nebojsa Nakicenovic
Vice Chair of the Group of Chief Scientific Advisors (GCSA) to the European Commission;
Honorary and Emeritus Scholar, International Institute for Applied Systems Analysis (IIASA);
Emeritus Professor of Energy Economics, Vienna University of Technology (TU Wien)
(Austria / Serbia)

David Sandalow
Inaugural Fellow, Center on Global Energy Policy, Columbia University;
Co-Director, Energy and Environment Concentration, School of International and Public Affairs, Columbia University
(United States of America)

Vaclav Smil
Distinguished Professor Emeritus, University of Manitoba
(Canada)

YAMAJI Kenji
President,
Research Institute of Innovative Technology for the Earth (RITE);
Professor Emeritus, The University of Tokyo
(Japan)

Statement

ICEF2025 Steering Committee Statement

October 9, 2025 | Tokyo, Japan

Under the main theme of “Innovation for Green Transformation (GX) and Security”, the twelfth annual meeting of the Innovation for Cool Earth Forum (ICEF2025) was convened on October 8–9, 2025, in Tokyo and online. More than 3,000 persons from over 100 countries and regions registered this year’s discussions.
ICEF remains unique in its decade-long dedication to advancing innovation across technology, policy, institutions, finance, and society to accelerate the global transition toward a carbonneutral, resilient, just, secure, and affordable future. ICEF2025 was organized as part of Tokyo GX Week, a series of 20 international conferences addressing energy, climate, and environmental challenges.

1. Where We Stand

The urgency is undeniable.

The IPCC underscores the imperative that global emissions must peak by 2025, and bend down the emissions curve by nearly half within this decade to preserve a livable climate and reach net zero by 2050. With the world already surpassing 1.5°C of warming, escalating climate impacts – from record-breaking heatwaves and catastrophic floods to prolonged droughts – make clear that the window for effective action is closing rapidly. Decisions and investments made today will define whether we achieve this milestone or face irreversible setbacks.

Progress and challenges coexist.

For the first time, global wind and solar generation surpassed coal in 2025, signaling a historic turning point in the power sector. Global energy investment exceeded USD 3 trillion in 2024, with two-thirds directed toward clean energy technologies and infrastructure. Costs of solar, wind, and battery systems have been reduced by 60% to 90% / over the past decade. Yet, progress is uneven. Misalignment between policy, finance, governance and innovation, combined with geopolitical and geo-economic fragmentation, is slowing down the scaling of infrastructure and complicating international cooperation.

Climate ambition remains insufficient.

While nearly 120 countries and the EU have submitted their 2035 targets under the NDC 3.0 cycle, collective ambition remains off track from a Paris-aligned trajectory. The missed February 2025 NDC deadline by many countries highlights the persistent ambition–implementation gap. At COP30 in Brazil it is expected to focus on adaptation, the multilateral process risks fragmentation without renewed coordination.

Security and GX are inseparable.

Energy security, supply chain resilience, and access to critical minerals are now front-line concerns. These are amplified by geopolitical tensions and market nationalism. A new paradigm of innovation must therefore couple green transformation with security resilience, ensuring pathways to carbon neutrality also deliver reliability, affordability, and stability.

In addition to COP, new innovation ecosystems are needed.

Global decarbonization cannot rely solely on multilateral negotiations. Regional cooperation frameworks, city-level innovation ecosystems, and public–private coalitions are emerging as vital complements to the UNFCCC process – enabling faster experimentation, deployment, and scale.

2. Next Steps Needed

ICEF2025 recognized that triple breakthroughs – in emissions reduction, economic growth, and energy security – are essential to align innovation with global action. Discussions emphasized the following priorities:

1). Renewable Energy: From Decarbonization to Security

Renewables now underpin energy security, fuel independence and affordability. The dramatic fall in the levelized cost of electricity (LCOE) for solar and wind power has created a historic opportunity. However, this headline figure belies a critical barrier: significant system costs of integration, including grid modernization, storage and flexible load, which remain prohibitively high in many markets. Participants called for an integrated system approach that aligns policy, finance, digital innovation, and governance to accelerate scaled deployment while actively managing and valorizing the entire energy system. And effective and efficient policy becomes crucial to reshape the market architecture, unlock and scale demand, ensuring that cost-effective, clean electricity being generated is fully utilized to decarbonize our economies.

2). Hydrogen for Hard-to-Abate Sectors

Hydrogen remains central to decarbonizing steel, cement, chemicals, and shipping. ICEF highlighted growing cost competitiveness, industrial demand, and cross-border demonstration projects (e.g., Japan–Australia corridor, EU Hydrogen Bank). Standardization, certification schemes, and de-risking mechanisms such as offtake agreements and blended finance are essential to unlock large-scale investment. To achieve scale from pilots requires five integrated pillars – efficient policy sending clear signals; innovation delivering scaled solutions; financing reducing first-mover cost penalty; infrastructure enabling physical flow across sectors and borders; and cooperation connecting these into a trusted, global market.

3). Small Modular Reactors (SMRs) and Nuclear Innovation

SMRs offer flexibility, scalability, and regional resilience. ICEF emphasized the importance of cooperation and collaboration to accelerate the development and scaleup of the next generation of reactors with harmonized safety and cybersecurity regulation, transparent community engagement , and next-generation nuclear innovation as part of a balanced energy mix for countries pursuing net zero.

4). Carbon Dioxide Removal (CDR) Technologies

Carbon Dioxide Removal (CDR) is indispensable for achieving net zero emissions. ICEF2025 highlighted breakthroughs in Direct Air Capture (DAC) systems, CO_2-to-fuels pathways, and mineralization for reuse in building materials. To accelerate deployment, carbon markets and climate finance mechanisms must evolve to recognize and reward verified removals.

5). Circular Economy and Resource Security

The Asia–Pacific region is becoming a hub for circular innovation, driven by AI-enabled collection, recycling, and traceability systems. Circular economy models offer opportunities for local employment, regional resilience, and industrial upgrading. However, gaps persist in infrastructure, capital, and regulatory coherence. ICEF2025 underscored the need for blended finance, innovation ecosystems, and interoperable standards to globalize circular systems.

6). Sustainable Data Centers Roadmap

ICEF2025 released a Sustainable Data Centers Roadmap covering data centers' energy use, greenhouse gas emissions, water use and related topics, including data center cooling technologies, waste heat and policies around the world. The Roadmap equips governments, businesses and other stakeholders with actionable guidance to align the digital economy with climate goals – helping transform data infrastructure into a driver of decarbonization.

7). Adaptation and the Global South

ICEF reaffirmed that adaptation is no longer optional. Scaling resilient infrastructure, climatesmart agriculture, and early warning systems in vulnerable regions requires technology transfer, concessional finance, and long-term capacity building. Innovation partnerships must ensure that no region is left behind in the transition.

3. Conclusion

- **Inclusion and diversity fuel innovation.**

  ICEF reaffirms its belief in the vital role of women leaders, youth innovators, and Global South voices. Innovation flourishes when all perspectives are engaged.

- **Institutions and governance safeguard innovation integrity.**

  Strong governance systems are essential to de-risk investment, enforce fair competition, and ensure accountable, trustworthy innovation. Institutions anchor stability and confidence in the fast-evolving innovation ecosystem.

- **Security and GX define the next decade.**

  The convergence of green transformation and multifaceted security – encompassing energy, food, water, critical minerals, supply chains, and cybersecurity – will shape global trajectories. ICEF identifies three strategic imperatives for the decade ahead:

  I. Energy System Transition and Resilience – balancing decarbonization with reliability, affordability, and accessibility.

  II. Supply Chain and Resource Security – strengthening policy efficiency and resilience across minerals, technology, infrastructure, and food-water-energy systems.

  III. Technological Innovation and Global Standards – scaling breakthroughs while harmonizing global rules and norms.

- **AI as the Catalyst for the Next Frontier of Innovation.**

  Artificial Intelligence is emerging as a general purpose toolkit for green transformation. From optimizing renewable grids, industrial operations, and carbon removal systems, to enabling predictive climate analytics and new governance transparency tools, AI can unlock unprecedented efficiency, foresight, and accountability. ICEF calls for global collaboration to develop trustworthy, secure, and inclusive AI ecosystems that accelerate the GX-security nexus while upholding ethical and sustainability principles.

ICEF will continue to explore pathways in addition to COP, building coalitions that connect policy, finance, institutions, and innovation to realize the goals of the Paris Agreement – and to shape a future where innovation drives both transformation and security.

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Innovation for Cool Earth Forum

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October, 2026

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