TOKYO GX WEEK

# Innovation for Cool Earth Forum

## ICEF2024 Report


METI
Ministry of Economy, Trade and Industry

NEDO
New Energy and Industrial Technology Development Organization

Innovation for Cool Earth Forum

# Innovation for Cool Earth Forum

## ICEF2024 Report

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*Job titles in the brochure are as of the time of the ICEF2024

# 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 every year by the Government of Japan's Ministry of Economy, Trade and Industry (METI) and New Energy and Industrial Technology Development Organization (NEDO) of Japan.

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.

# 11th Annual Meeting (ICEF2024)

## Main theme

How to Live within the Planetary Boundaries through Green Innovation

## Date&Venue

Wednesday, October 9, 2024 – Thursday, October 10, 2024
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

## Participants

Around 1,700 participants from governments, international organizations, the business sector, and academia representing 93 countries and regions

## Outcome of ICEF2024

- Roadmap Project on “Artificial Intelligence for Climate Change Mitigation 2.0”
- Statement from the ICEF Steering Committee

## Official Website

www.icef.go.jp

# Program

## DAY 1 (Wednesday, October 9)

### 9:15-9:45 Opening / Keynote 1

Opening Remarks by
IWATA Kazuchika
(State Minister of Economy, Trade and Industry, Japan)
TANAKA Nobuo
(Chair of ICEF Steering Committee)

Keynote speech by
Johan Fredrik Rockström
(Director, Potsdam Institute for Climate Impact Research
Professor, Institute of Earth and Environmental Science at Potsdam University
Professor, Water Systems and Global Sustainability at the University of Stockholm)

### 9:50-11:20 Plenary Session 1

Planetary Boundaries and the Energy Transition

### 12:40-13:40 Keynote 2

Keynote speech by
Jean-Eric Paquet
(Delegation of the European Union to Japan, Ambassador of the European Union to Japan)
SADAMORI Keisuke
(Director, Energy Markets and Security, International Energy Agency)
Helle Kristoffersen
(Member of the Executive Committee, President Asia, TotalEnergies)

### 13:45-14:45 Special Session

Special Dialogue on Net-Zero

### 15:00-16:00 Technology Session 1

Climate Stabilization Technologies

### 16:15 - 17:15 Technology Session 2

Hydrogen Readiness

### 17:30 - 18:30 Technology Session 3

Food and Agriculture

## DAY 2 (Thursday, October 10)

### 9:00-10:30 Plenary Session 2

Innovative Finance

### 10:45-11:45 Special Sessions

ICEF Roadmap Project : Artificial Intelligence for Climate Change Mitigation 2.0

### 12:55-13:00 Keynote 3

Keynote speech by
Francesco La Camera
(Director-General, International Renewable Energy Agency (IRENA))

### 13:00-14:00 Technology Session 4

Future of Nuclear Energy

### 14:15-15:15 Technology Session 5

Sustainable Marine Transport

### 15:30-16:30 Special Sessions

Young Innovators

### 16:45-18:15 Closing Session

Quick Comments (Takeaways, Comment for ICEF 2025) from each SC Member

Announcement of the Roadmap by David Sandalow
(ICEF Steering Committee)

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

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

Closing Remarks by SAITO Tamotsu
(Chairman of New Energy and Industrial Technology Development Organization (NEDO))

# Opening Remarks

**IWATA Kazuchika**

State Minister of Economy,
Trade and Industry of Japan

It is our great pleasure to hold the ICEF 11th annual meeting, as one of the series of meetings during the Tokyo GX Week. I would like to extend my warmest welcome to all of you who are participating in person and online. I would also like to express my appreciation for the efforts of the ICEF steering committee members and all those who are involved.

In Japan, “Tokyo GX Week”, which is a series of international conferences on energy and the environment, is being held beginning on October 6th, with the aim of realizing green transformation. Climate change is an urgent issue that the entire world must tackle together. Acceleration of GX toward 2030 is the key to achieving the goal of carbon neutrality by 2050. In July of this year, METI established a new department, the GX Policy Group, to further accelerate Green Transformation. Along with the implementation and realization of the Pro-Growth Carbon Pricing Concept, we will comprehensively examine industrial structure, industrial location, and energy, and compile “GX2040 Vision” from a longer-term perspective aiming for the end of this year.

The ICEF is a platform of wisdom for leaders in industry, academia and government around the world to discuss how to promote “INNOVATION”, which is the key to solving global warming. This year, we will again have speakers from around the world with diverse backgrounds, including government, international organizations, industry, and academia. Under this year’s theme “How to Live within the Planetary Boundaries through Green Innovation”, we will discuss the green innovation, which is the essential key to solving the global warming problem. Discussions will also be organized based on technological areas, such as climate stabilization technologies, hydrogen, nuclear power energy, and so on. As diversification is a source of innovation, gender and generational diversity are also highlighted in the agenda. Many talented young experts, who will be expected to play an active role for achieving carbon neutrality by 2050, have been invited as speakers.

Since ICEF was established in 2014, the global situation has changed dramatically with climate change and the spread of infectious diseases and international conflicts. In the face of these challenges, creating innovation is the essential key.
I sincerely expect that energetic discussions will take place over the next two days, for further promoting decarbonization efforts to achieve carbon neutrality globally.


# Keynote Sessions

## Keynote 1


Prof. Dr. Rockström updated the current planetary boundaries with the planetary health checks.
There has been the stability and resilience of the Earth system as a whole and stressed that these had reached their limits. Global warming was also mentioned, highlighting in particular the risks to the Earth system posed by the accelerated warming since the 1970s. Specifically, he pointed out that extreme weather events are increasing with rising temperatures.
He also mentioned the loss of biodiversity and the increase in air pollutants, stressing that they had progressed exponentially since the 1950s. This has destabilized the entire Earth system, and a drastic change is needed, he said.
It concluded that sustainable development needed to be redefined and that innovation and transformation would be central.

## Keynote 2


Keynote 2 is highlighted issues of gas and coal prices, energy security, and geopolitical tensions.
Ms. Kristoffersen discussed their company's approach to energy security and transition, emphasizing geographical diversity and investment in renewable energy. Mr. Paquet outlined Europe's energy policy, emphasizing the balance between energy security and climate goals. Mr. Sadamori discussed the organization's role in energy security and the need for continued investment in oil and gas while transitioning to clean energy.
The discussion also covered innovation in energy technology, critical raw materials, and the importance of grid development. The session concluded with a discussion on climate change and the need for urgent action.

## Keynote 3


Video Message by Mr. Francesco La Camera, Director-General,
International Renewable Energy Agency(IRENA)

# Plenary Sessions

## Plenary Session 1 Planetary Boundaries and the Energy Transition

The session highlighted how to live within the planetary boundaries through Green Innovation following the ICEF2024 main theme.
Firstly, Dr. Kawamoto stated the nitrogen cycle about the increasing amount of nitrogen waste and the importance of sustainable nitrogen management. It could be revealed the pathway of contributing to carbon neutrality and a circular economy by recovering ammonia resources from power plants and ships regarding on his study.
Dr. Ishii claimed four systems that can be transformed by four action levers (decarbonization of energy, industry, and transportation; sustainable urban development; sustainable production and consumption; and sustainable food, land, water, and oceans), and emphasized the need for strong leaders for change.
From the view from the international institution, Ms. Groff emphasized the importance of governance and public innovation, and the need for effective measures especially in climate change policies. She has pointed out the importance of support from international organizations and climate change funds that concluded that better policy and governance approaches are needed.
In the discussion, it was stated that climate change measures are an urgent matter, and Japan is expected to contribute technological innovation and international cooperation.

**Sally M. Benson (Moderator)**
ICEF Steering Committee

**TANAKA Nobuo (Moderator)**
Chair, ICEF Steering Committee

**Hoesung Lee (Moderator)**
ICEF Steering Committee

**Johan Fredrik Rockström**
Director, Potsdam Institute for Climate Impact Research
Professor, Institute of Earth and Environmental Science at Potsdam University
Professor, Water Systems and Global Sustainability at the University of Stockholm

**KAWAMOTO Tohru**
Principal Researcher, AIST (National Institute of Advanced Industrial Science and Technology);
Director, Nanoblue Inc.

**ISHII Naoko**
Special Presidential Envoy, The University of Tokyo;
Director, Center for Global Commons;
Professor, Institute for Future Initiatives

**Maja Groff**
Convenor, Climate Governance Commission;
Chair, Planetary Governance Program, The New Institute;
Senior Treaty Advisor, Integrity Initiatives International

## Plenary Session 2 Innovative Finance

In this session, the theme of innovative finance in the field of climate change was discussed.
At the first, Ms. Chopra described using the case study of India's energy transition challenges, comparing it with developed economies such as Germany. India's electricity production has increased 2.5 times in the last 15 years and is expected to grow further. She claimed her role as the infrastructure finance side in supporting India's renewable energy sector, funding about one-third of India's installed renewable capacity.
As the perspective of financial bank, Dr. Ghanem proposed creating a new green bank to identify, develop, and supervise climate mitigation projects. He emphasized that this institution should be different from existing ones, suggesting a public-private partnership model with greater voice for developing countries in its governance structure.
From the view of international cooperation, Ms. Thrasher highlighted how international investment agreements can hinder climate finance efforts. She explained that these agreements often act as quasi-political risk insurance for fossil fuel firms, potentially slowing down the flow of finance toward climate-positive activities. Furthermore, Mr. Dossal emphasized the importance of building local capacity in developing countries to handle new financing mechanisms. He suggested creating country-based partnership facilities to help countries prepare viable projects that could attract private sector investment.
Prof.Dr. Konishi, as presented on engineering side of fusion energy technology and its potential role in climate mitigation. He discussed to work on developing fusion energy and biochar technology for carbon sequestration, highlighting the need for both public and private investment in innovative technologies.
In the discussion, the challenges of implementing carbon pricing and developing functional carbon markets. It could be revealed the current voluntary carbon market is insufficient and suggested taxing carbon emissions or setting emission ceilings for companies to create a stronger market.

**Ismail Serageldin (Moderator)**
ICEF Steering Committee

**Changhua Wu (Moderator)**
ICEF Steering Committee

**Hafez Ghanem**
Senior Fellow, Policy Center for the New South;
Nonresident Senior Fellow, The Brookings Institution

**Amir A. Dossal**
President and CEO, Global Partnerships Forum;
Founding Commissioner, Broadband Commission for Sustainable Development;
Former Distinguished Fellow, World Economic Forum Centre for Health and Healthcare

**Parminder Chopra**
Chairman and Managing Director, Power Finance Corporation Limited

**KONISHI Satoshi**
CEO, Kyoto Fusioneering Ltd.;
Professor, School of Energy Science, Kyoto University;
Chairman, Japan Fusion Energy Council

**Rachel Denae Thrasher**
Researcher, Boston University Global Development Policy Center


# Technology Sessions

## Technology Session 1 Climate Stabilization Technologies

In this session, discussions focused mainly on the future of innovative technologies related to carbon stabilization. The speakers discussed technologies related to climate stabilization, such as CDR and SRM. First, the speaker, Dr. Yamada, summarized other geoengineering technologies focusing on CDR and indicated the need for CDR and the need to reduce costs. Next, Dr. Tilmes presented the results of simulation studies on SRM, showing that there are still uncertainties in its effects and impacts on the natural environment, and pointed out that it is the most complex of all climate change technologies. Finally, Dr. Buck presented the challenges of geoengineering technologies from a social science perspective and discussed the need to evaluate technologies in terms of both their side effects and climate change impacts.

While acknowledging the need for such technologies, the discussion confirmed the need to prioritize mitigation and application. It summarized the need to pursue the benefits of climate change through research and technology development, taking into account governance and risks.

**Nebojsa Nakicenovic (Moderator)**
ICEF Steering Committee

**KURODA Reiko (Moderator)**
ICEF Steering Committee

**YAMADA Hidetaka**
Professor, Kanazawa University

**Holly Jean Buck**
Associate Professor, University at Buffalo

**Simone Tilmes**
Project Scientist III, National Center for Atmospheric Research


## Technology Session 2 Hydrogen Readiness

In this session, under the theme of Hydrogen Readiness, countries' responses to the future use of hydrogen energy and the prospects for future technological developments were discussed.
First, Mr. Roesch introduced IRENA's efforts to utilize hydrogen technology in the supply chain. He referred to the global increase in demand for hydrogen and technological developments, particularly converting electrical energy to hydrogen. He then discussed the challenges of the demand/supply gap for low-carbon hydrogen, and the challenges and need for international cooperation to expand the market.
The second speaker, Ms. Chen pointed out the necessity of a large amount of investment to realize further development of low-carbon hydrogen technologies, in addition to the international cooperation.
The third speaker, Mr. Yu, introduced the state of hydrogen technology utilization from the perspective of actual projects and referred to the potential of hydrogen utilization from the perspective of energy security. He also spoke of the importance of creating synergies and expanding the market through international cooperation between South Korea, Japan, and the U.S. to develop hydrogen technology.
The fourth speaker, Mr. Muraki, discussed the cooperation between Japan and South Korea to expand the hydrogen and ammonia market.
Finally, Ms. Dewi introduced the status of green hydrogen utilization in Indonesia and the status of policy formulation for hydrogen utilization and discussed the future expansion of hydrogen technology utilization worldwide and the market growth potential.

**David Sandalow (Moderator)**
ICEF Steering Committee

**Georg Erdmann (Moderator)**
ICEF Steering Committee

**JJ Yu**
Vice Chairman, SK Group;
CEO, SK Americas;
CEO, SK On

**Roland Roesch**
Director, IRENA Innovation and Technology Centre

**Shi Chen**
Postdoctoral Researcher, Carnegie Science

**MURAKI Shigeru**
President, Clean Fuel Ammonia Association

**Eniya Listiani Dewi**
Directorate General, New and Renewable Energy and Energy Conservation, Ministry of Energy and Mineral Resources of Indonesia (ESDM)


## Technology Session 3 Food and Agriculture

In this session, the discussion focused on food system transformation and GHG emissions in agriculture.
Firstly, Dr. Nguyen revealed a low GHG emission rice cultivation project in Vietnam and stressed the importance of support from the government and international organizations, and innovation.
From the view of young generation, Mr. Rubiyanto discussed about how the younger generation thinks about climate change measures and agriculture and emphasized the importance to call them up to the discussion of the food system for the future.
As the technological expert, Mr. Uki discussed food security and innovation regarding on the efforts of Japanese ministries and research agencies. There has been researching on carbon fixation in agriculture using biochar and emphasized the need to balance the development of agriculture, forestry, and fisheries with the reduction of GHG emissions.
Mr. Tezera stated food security based on basic data on hunger, and emphasized the need to consider regenerative agriculture that balances sustainability with increased productivity, and that innovation could be very important.
At the discussion, it has been described that in order to get the younger generation interested in agriculture, support from the government, utilization of data, and ensuring profitability are important, and that the younger generation is essential for creating innovation.

**Valli Moosa (Moderator)**
ICEF Steering Committee

**UKI Toshiharu**
Director General, Agriculture and Food Technology Unit, Technology and Innovation Strategy Center, New Energy and Industrial Technology Development Organization (NEDO)

**Thuy Thi Thanh Nguyen**
Director General, Department of Science, Technology and Environment, Ministry of Agriculture and Rural Development;
Editor-in-Chief, Vietnam Journal of Agriculture and Rural Development, Ministry of Agriculture and Rural Development

**Joko Tri Rubiyanto**
Youth Policy Board - Asia Pacific, World Food Forum (WFF);
Food Project Consultant, RISE Foundation Indonesia

**Dejene Tezera**
Director, Division of Agribusiness, UNIDO

## Technology Session 4 Future of Nuclear Energy

In this session, discussions focused mainly on the future of nuclear energy technologies. Ms. Cameron introduced the results of an overview of the spread of SMRs and global trends from the perspective of international organizations. Dr. Shin gave an introduction on the advantages and importance of SMRs and expressed his view that regulations specific to SMRs need to be developed. Dr. Waxman pointed out that the U.S. has not built new nuclear reactors for a long period of time, which has resulted in a loss of nuclear vendor know-how.
Ms. Sekiguchi discussed the possibility of applying the heat generated in high-temperature gas reactors and hydrogen production to the steel industry. Dr. Iwata described the development status of fusion using laser technology.
In the panel discussion, It was discussed that SMR is expected to be a source of supply for specific applications such as data centers and hydrogen generation.

**Eija-Riitta Korhola (Moderator)**
ICEF Steering Committee

**YAMAJI Kenji (Moderator)**
ICEF Steering Committee

**TANAKA Nobuo (Moderator)**
Chair, ICEF Steering Committee

**IWATA Natsumi**
Professor, Institute of Laser Engineering,
Osaka University

**Jeff Waksman**
Program Manager, US Department of Defense

**Ho cheol Shin**
President, Central Research Institute of Korea Hydro and Nuclear Power Co.

**Diane Melissa Jessica Cameron**
Head of Division of Nuclear Technology Development and Economics, NEA (OECD)

**SEKIGUCHI Mina**
Managing Partner, Resonancia LLC;
Non Executive Director, Penta Ocean Construction Company;
Auditor, Japan Atomic Energy Agency


## Technology Session 5 Sustainable Marine Transport

In this session, the latest sustainable marine technologies and policies were discussed. Dr. Kawakita gave an outline of the Japanese projects, the Green Innovation Fund (GI Fund), and Mr. Yokoyama introduced the ammonia fuel that NYK has developed. Dr. Brynolf presented the future possibilities and challenges of biofuels, blue fuels, and E-fuels. Finally, Dr. Chen raised the issue of alternative fuel safety and introduced port regulations and standards. The discussion focused on the criteria for how to determine alternative fuels in the future. It was also discussed that future fuels will be selected based on cost, supply scale, safety, and technological development.

**Georg Erdmann (Moderator)**
ICEF Steering Committee

**Vikram Singh Mehta (Moderator)**
ICEF Steering Committee

**KAWAKITA Chiharu**
Project Manager of Green Innovation Fund Project (Next-generation Ship Development), New Energy and Industrial Technology Development Organization (NEDO)

**YOKOYAMA Tsutomu**
Executive Officer, NYK LINE

**Shu-Ling Chen**
Director, Centre for Maritime and Logistics Management, Australian Maritime College, University of Tasmania;
Associate Professor, Australian Maritime College, University of Tasmania

**Selma Brynolf**
Researcher, Chalmers University of Technology


# Special Dialogue

## Special Sessions Special Dialogue on Net-Zero

In this session, the discussion focused on the reduction in carbon emissions achieved and the potential for achieving net zero by 2050. Dr. Smil focused on the current state of energy-related CO2 emissions in recent years and the challenges of decarbonization. Decarbonizing end-use applications that can easily be electrified and using newly produced green hydrogen in energy-intensive industrial processes were both stressed. Mr. Rystad outlined 24 technologies that can replace fossil fuels in the energy system, and argued that renewable energy is becoming more affordable, and that the combination of solar power generation and agriculture is promising. Dr. Lee shared the future vision of society based on the IPCC's 1.5°C and 4°C scenarios, and emphasized the importance of governments setting market rules and collaborating across borders beyond markets.
The panel discussion highlighted the potential of local communities, the expectations for international cooperation, the roles agriculture plays, the potential for reducing GHGs, and the use of small-scale local energy resources. It was also argued that the public understanding of this issue and the politicians' decisions are crucial.

**TANAKA Nobuo (Moderator)**
Chair, ICEF Steering Committee

**Ismail Serageldin (Moderator)**
ICEF Steering Committee

**Vaclav Smil**
ICEF Steering Committee

**SAKANO Akira**
ICEF Steering Committee

**Hoesung Lee**
ICEF Steering Committee

**Jarand Rystad**
CEO, Rystad Energy


# Roadmap Projects

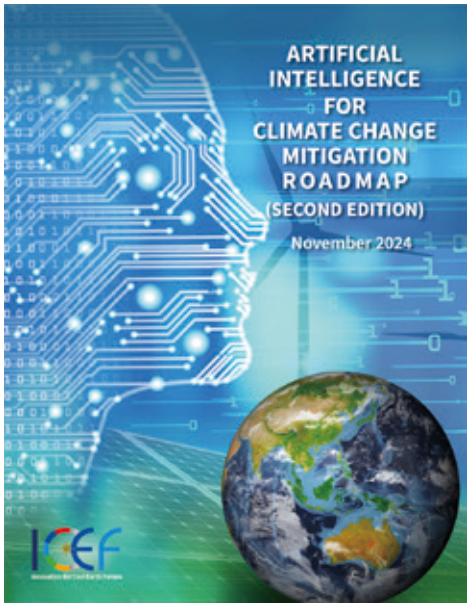
## Special Sessions ICEF Roadmap Project : Artificial Intelligence for Climate Change Mitigation 2.0

In this session, ICEF Steering Committee member Mr. Sandalow and the co-authors of the report, Dr. Kucukelbir and Ms. Carter, presented the draft “AI for Climate Change Mitigation Roadmap, Second Edition.” Ms. Kuwahata of the IEA then gave a presentation on “Electricity demand and Artificial Intelligence,” in which she introduced the research activities of the “Energy for AI, and AI for Energy” project launched by the IEA in 2024, and reported on research into sustainable ways to meet electricity demand using AI, etc.
There were also questions from the floor about the potential for further creative uses of generative AI, and the direction of the debate on the correct use of AI, including predictability, ethics, and reliability. The panelists noted that AI plays a role in accelerating innovation, and that these innovations have a synergistic effect; that many governments are considering regulations; and that the key is for AI and humans to work together appropriately to respond to rapid changes in society, including climate change and energy.

**David Sandalow (Moderator)**
ICEF Steering Committee

**Alp Kucukelbir**
Chief Scientist, Fero Labs;
Adjunct Professor, Columbia University

**Mariah Carter**
CEO, Lumora Technologies;
Former Senior Data Scientist, NRG Energy, Inc.




**KUWAHATA Rena**
Energy Analyst - Power System Transformation,
International Energy Agency (IEA)


# Young Innovators

## Special Sessions Young Innovators

In this session, three young innovators from different fields of expertise who spoke at each session of ICEF2024 were invited to discuss the challenges and prospects of future climate change policies. First, moderator Mr. Moosa raised the issue of how the current young generation, who will play a central role in the future world where climate change issues will become more serious, views climate change.

The discussion focused on the differences in the recognition of climate change issues among the young generation in each country, the need to expand educational opportunities to address climate change issues, and the need to strengthen bottom-up actions to change social behavior.

Ms. Carter argued that young people should actively promote a bottom-up approach to climate change as a starting point for the discussion. Following Ms. Carter's point, Mr. Rubiyanto identified the lack of educational opportunities in rural and indigenous communities in developing countries as a challenge, noting that access to education is essential for developing young innovators and creating awareness of the dangers of climate change.

Ms. Chen mentioned the need for stable international leadership in climate governance. She also discussed the need for a financial sector boost to promote investment and bridge the international low-carbon technology development gap.

Finally, co-moderator, Ms. Sakano summed up that there is great potential for innovation that the current young generation can bring about to change social behavior and reform awareness of climate change, and that it is crucial to continue positive initiatives and actions with the support of other generations, emphasizing the need for intergenerational collaboration.

**Valli Moosa (Moderator)**
ICEF Steering Committee

**SAKANO Akira (Moderator)**
ICEF Steering Committee

**Shi Chen**
Postdoctoral Researcher, Carnegie Science

**Mariah Carter**
CEO, Lumora Technologies;
Former Senior Data Scientist, NRG Energy, Inc.

**Joko Tri Rubiyanto**
Youth Policy Board - Asia Pacific, World Food Forum (WFF);
Food Project Consultant, RISE Foundation Indonesia


# Closing Session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**1 Quick Comments (Takeaways, Comment for ICEF 2025) from each SC Member**
ICEF Steering Commitee

**2 Announcement of the Roadmap**
David Sandalow
ICEF Steering Committee

**3 Announcement of the Statement from the Steering Committee**
YAMAJI Kenji
ICEF Steering Committee

**4 Final Thoughts on the Event**
TANAKA Nobuo
Chair of ICEF Steering Committee

**5 Closing Remarks**
SAITO Tamotsu
Chairman of New Energy and Industrial Technology Development Organization (NEDO)

# Steering Committee Members

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

### 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

### 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

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

### Eija-Riitta Korhola
Delegate of the Consultative Commission for Industrial Change European Economic and Social Committee

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

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

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

### Jon D. Moore
Chief Executive Officer, BloombergNEF

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

### 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)

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

### 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

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

### Vaclav Smil
Distinguished Professor Emeritus, University of Manitoba

### Changhua Wu
China /Asia Director, Office of Jeremy Rifkin;
Chair, Governing Council, Asia Pacific Water Forum

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

# Statement

## ICEF2024 Statement from the Steering Committee

October 10, 2024

After a decade on its journey of advocating innovation to fight climate change and advance clean, green, smart and just transition, the Innovation for Cool Earth Forum (ICEF) held its 11th annual meeting in a hybrid format on October 9th and 10th, 2024 as an initiative of “Tokyo GX Week” , convening leading global and Japanese innovation champions to tackle a wide range of energy and environmental issues. Themed on “How to Live within the Planetary Boundaries through Green Innovation” , ICEF 2024 examined hurdles to remove and opportunities to seize and create through innovation in the backdrop of geopolitical and social complexity. More than 1,700 people from governments, international organizations, industry, and academia participated in this event, representing 93 countries and regions. At the conclusion of ICEF2024, the Steering Committee is releasing the following statement based on a series of discussions.

### 1. Where our planet stands now

- The world faces deepening and complex planetary crises. The concept of planetary boundaries identifies nine critical boundaries for maintaining the stability and resilience of the Earth system as whole, and argues that out of the nine, the world has already overstepped six, including climate change.
- A UN report in May concludes that the world is not on track to achieve most of the SDGs by 2030. Multiple crises have caused significant setbacks to developing countries’ efforts to eradicate poverty and end hunger. According to the 2024 Global Report on Climate and SDG Synergy, 80% of the SDG targets are directly linked to climate. Synergies between climate action and sustainable development need to be maximized. The 2025 round of Nationally Determined Contributions or NDCs under the Paris Agreement offers a major opportunity for countries to do so. ICEF hopes that COP29 this November in Baku will make a step forward towards stronger NDCs.
- The Future Summit, concluded last September, put transforming global governance at top priority in order to deliver SDGs. Innovative forms of global governance need to be considered, in particular against the backdrop of increasing geopolitical and geoeconomic complications, exponentially impactful technologies and rivalry. To break deadlocks demands redesign of governance structures and processes to fit for purpose to enable green innovation.
- The major issue at COP29 this year is finance. New initiatives and mechanisms, such as a new collective quantified goal or NCQG, will be proposed for adoption. In addition, the COP29 presidency proposed in July a new climate action fund, seeking inter alia for voluntary contributions from fossil fuels producing countries and companies. Innovative finance is a prerequisite to mobilize ambitious climate action, particularly, of developing countries.
- Opportunities will lie ahead of us if we further advance technological and social innovation tethered to emergent political, economic and social reality. This has been exemplified by massive deployment and cost reduction of renewables.

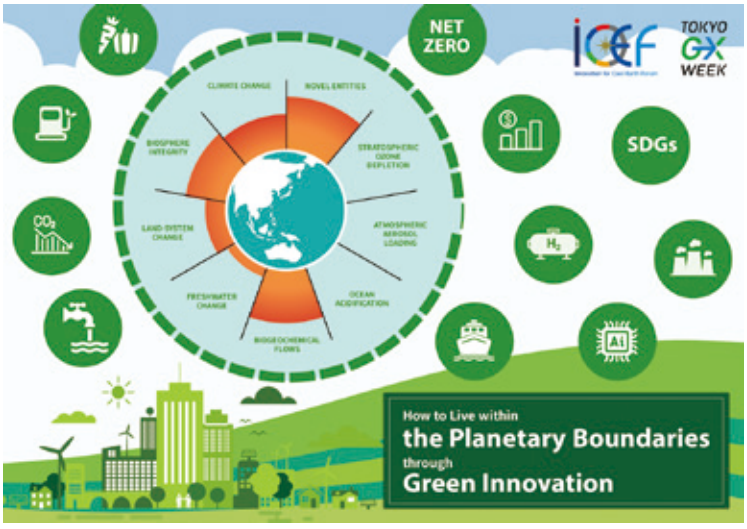
### 2. Next steps needed

- Against the above backdrop, ICEF2024 had in-depth discussions on stability and resilience of the Earth system and socially-just energy transition. We evaluated the current conditions for safe and just future on our planet, identified challenges, and deliberated on necessary policies and green innovations to construct our sustainable future for all, collectively.
- Recognizing the daunting debt stresses of developing countries, ICEF2024 also discussed innovative finance, which is to deploy financing solutions to stimulate private sector investment beyond public financing, and enhance public-private partnerships, while reforming international financial architecture, especially the multilateral development banks. To address the identified investment needs of $2 ～ 5.7 trillion per annum, we explored methods for mobilizing finance to emerging markets, green innovation, decarbonization and sound biodiversity security, which is assured by transparency and accountability in the process.

- Green innovation effort is essential. Leading experts dealt with the following five specific issues:
  - First, carbon dioxide removal (CDR) and other climate stabilization options, which are indispensable to achieve carbon neutrality, encompassing a wide range of technology-based and nature-based solutions. CDR technology perspectives, possible solutions for deployment, and international frameworks were debated.
  - Second, hydrogen readiness. Experts discussed the definition of "hydrogen ready" , which is increasingly being used as a condition for subsidizing infrastructure including new gas power plants. They also shed light on how to transition existing infrastructure to low-carbon hydrogen.
  - Third, food and agriculture system, which is adversely affected by climate change. Opportunities and challenges were discussed for food and agriculture system, and forestry and fishery sectors, which can be emission sources and/or removals in their supply chains. Further innovation is required to ensure food security. The food and agriculture system can, indeed, be totally transformed from being a major contributor to emissions to being a major contributor to Carbon Capture and Storage (CCS). Furthermore, by reducing the existing significant wastage, it can better contribute to reducing poverty and hunger in the world.
  - Fourth, future of nuclear energy. With focus on advanced reactors, experts examined the approaches taken by businesses toward their commercialization and various applications, as well as regulatory challenges.
  - And fifth, sustainable marine transport, which is one of the hard-to-abate sectors. Technologies and designs of vessels, sustainable fuels, and energy efficient operation for berthing were discussed. An adverse impact of banning heavy fuel oil was also debated.
- Building upon the previous year' s roadmap which attracted enormous attention globally, ICEF2024 released Artificial Intelligence for Climate Change Mitigation (Second Edition). The 2024 Roadmap comprehensively updates all chapters in the previous roadmap, adds six new chapters, and includes 5 – 10 specific, achievable recommendations in each chapter.

## 3. In closing

- Diversity and inclusiveness remain ICEF' s strong creed. We always embrace and celebrate the participation of speakers who represent and embody diversity, including leading youth and women innovators, especially from rural and indigenous communities. We at ICEF continue to be firmly committed to engaging diverse, cross-generational, cross-geographic stakeholders and thereby creating stronger momentum for technological and social innovation for our carbon neutral and sustainable future.
- Young innovators who are leading changes in the frontline of challenges, including in rural and indigenous communities, highlighted at ICEF2024 that "innovation comes from people" and we must continue to invest in next generations and drive positive changes. "We recognize the crucial role of innovation in shaping the future. And happy to contribute for this best and the worst time of human history, for passing on the cool earth to one and more next generations."
- Prof. Harari, the author of Sapiens, identifies nuclear war, ecological challenge, and tech-destruction by AI as the three major global challenges to human beings of the 21st century. ICEF should seriously address those issues in the next decade.
- The political and geopolitical landscapes are shifting in major economies this year. While challenges remain overwhelming, we foresee tremendous opportunities to be created and captured through joint innovation and partnership in the coming decade when foundation to deliver carbon neutrality by mid-century will be established. And planetary boundaries, while adding sense of crisis, offer a stronger argument for demanding strengthened innovation and cooperation. Opportunities are emerging. They include, as examples: 1) AI for enhanced climate resilience, 2)energy system reconfiguration, 3) industrial value chain transformation, 4) landscape-based food and agriculture system, 5) innovating global governance including financial architecture, and 6) the rise of younger generational aspiration and inspiration to lead innovative solutions, are among some of the most exciting levers for green innovation.



# Messages from Co-Hosts

Ministry of Foreign Affairs

## AKAHORI Takeshi

Senior Deputy Minister for Foreign Affairs, Japan

I hope that discussions of the ICEF can bring together expertise from leaders of different countries and fields and contribute to effective solutions toward climate change.

In order to achieve carbon neutrality by 2050, Japan has steadily implemented projects related to energy transition and decarbonization in both public and private sectors. Japan also has committed to mobilize up to approximately 70 billion USD in climate finance from both public and private sectors, and our cooperation is on track.

At COP29 later this year, Parties are to agree on the New Collective Quantified Goal on climate finance.

Japan believes that in order to achieve the 1.5°C target, it is fundamental to mobilize contributions from countries that have the capacity to do so as well as from private finance.

On top of this, it is also important to mobilize a broad range of finance, promote technological innovation, and utilize innovative technologies. Japan will contribute to effective and efficient climate action.

Ministry of Education, Culture, Sports, Science and Technology

## MASUKO Hiroshi

Senior Deputy Minister of Education, Culture, Sports, Science and Technology, Japan

On behalf of the Ministry of Education, Culture, Sports, Science and Technology, I would like to congratulate the leaders of industry, academia, and government at the ICEF 2024 meeting for coming together to discuss global warming countermeasures. To achieve carbon neutrality, it is essential that industry, academia, and government around the world work together to create innovation through research and development.

The Ministry of Education, Culture, Sports, Science and Technology supports basic research and development and human resource development at universities and other institutions in innovative green transformation technologies such as batteries, hydrogen, biomanufacturing, and semiconductors to achieve carbon neutrality by 2050.

Ministry of Agriculture, Forestry and Fisheries

## WATANABE Yoichi

Vice-Minister for International Affairs, Ministry of Agriculture, Forestry and Fisheries, Japan

I would like to express my appreciation to the leading figures representing the industries, governments and academia, who have gathered here to discuss innovations which play a pivotal role in tackling global warming.

In 2021, MAFF formulated the “MIDORI Strategy” to achieve both increased productivity and sustainability in the agriculture and food system through innovation, and has set 14 ambitious goals, including the realization of zero CO2 emissions in the sectors by 2050.

In May of this year, for the first time in the 25 years since its enactment, the Basic Act on Food, Agriculture and Rural Areas was revised, which sets the direction of Japan's agricultural policy. The act further promotes the reduction of environmental burdens by setting “establishment of environmentally friendly food systems” as one of its new pillars, and to promote reduction of environmental burden. We continue to promote counter measures against climate change and actively contribute to achieving a reduction of environmental burdens in the food, agriculture, forestry and fisheries sectors.

Ministry of the Environment

## MATSUZAWA Yutaka

Vice-Minister for Global Environment Affairs, Ministry of the Environment, Japan

The ICEF is a platform for world leaders to come together to discuss ‘climate change solutions through innovation’ , and this year marks its 11th anniversary.

The importance of innovation in combating climate change continues to be recognized. In the Global Stocktake conducted at COP28 last year, it was confirmed that acceleration of innovation is required to achieve the 1.5 degrees goal of the Paris Agreement.

At the G7 Ministers’ Meeting on Climate, Energy and Environment in April of this year, the importance of science-driven approaches in policymaking to tackle the global climate and environmental crisis was communicated.

I would like to express my hope that ICEF continues to make a significant contribution to the realization of net-zero by 2050.

# ICEF2024 Photo Gallery





Innovation for Cool Earth Forum

# ICEF2025

## 12th Annual Meeting

## Autumn, 2025

(Tentative)

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