TOKYO GX WEEK

ICEF Innovation for Cool Earth Forum | 10th Anniversary

Innovation for Cool Earth Forum

ICEF2023 Report

METI Ministry of Economy, Trade and Industry

NEDO New Energy and Industrial Technology Development Organization

Contents

Innovation for Cool Earth Forum

Innovation for Cool Earth Forum

ICEF2023 Report

(*Job titles in the brochure are as of the time of the ICEF2023)

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.

10th Annual Meeting

Overall theme

Innovation for Just, Secure and Sustainable Global Green Transformation (GX)

Hybrid Forum (Hotel New Otani Tokyo and On-line)

Wednesday, October 4, 2023 – Thursday, October 5, 2023

Hosts

METI Ministry of Economy, Trade and Industry

NEDO

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

Participants

Around 1,700 participants from governments, international organizations, the business sector, and academia representing 79 countries and regions

Outcome of ICEF2023

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

Program

DAY 1 (Wednesday, October 4)

9:30-9:45 Opening Session

Opening Remarks by Mr. NISHIMURA Yasutoshi
(Minister of Economy, Trade and Industry, Japan)

Opening Remarks by Mr. TANAKA Nobuo
(Chair of ICEF Steering Committee)

9:45-10:00 Keynote 1

Keynote speech by
Dr. NOGUCHI Soichi
(Astronaut, Entrepreneur; CEO Miraispace Co., Ltd;
Professor, University of Tokyo; Executive Chief Fellow, IISE)
Prof. Steven Chu
(Professor of Physics, Professor of Molecular and Cellular Physiology and Professor of Energy Science and Engineering, Department of Physics, Stanford University)

10:00-11:40 Plenary Session 1

Speech by H. E. Mr. Jean-Eric Paquet, Ambassador,
The European Union (EU) to Japan

Innovative Policy Making

13:00-14:45 Other Event

NEDO Green Innovation Fund Projects Symposium
"Carbon Neutral City achieved by Next-generation Photovoltaics"

13:05-13:10 Keynote 2

Video Message by the Director General of UNIDO, Mr. Gerd Müller

13:15-14:15 Keynote 3

Panel Discussion

14:30-16:00 Plenary Session 2

GX Together

15:00-16:00 Other Event

Carbon Dioxide Removal (CDR)
"Initial demand creation towards the expansion of the CDR market"

16:15-17:15 Concurrent Session 1

Global Stocktake

16:15-17:15 Concurrent Session 2

Food, Water and Climate Change

DAY 2 (Thursday, October 5)

9:30 - 9:50 Keynote 4

Dialogue between Dr. Fatih Birol
(Executive Director of International Energy Agency (IEA))
and Mr. TANAKA Nobuo
(Chair of ICEF Steering Committee)（Pre-recorded dialogue）

9:30 - 10:30 ICEF Roadmap Project

"Artificial Intelligence for Climate Change Mitigation"

10:00 - 11:00 Concurrent Session 3

Innovative Use of Renewables

10:45 - 12:15 Other Event

The Co-hosted Event by BloombergNEF
"Global and Japanese Climate Transition Scenarios:
Business Opportunities and Risks"

11:15 - 12:15 Special Session

Special Dialogue on the Energy Transition

13:15 - 14:15 Concurrent Session 4

Sustainable Aviation

13:15 - 14:15 Concurrent Session 5

Nuclear Fusion Technology

14:30 - 15:30 Other Event

Conversation with Young-generation Innovators

14:30 - 16:00 Other Event

The Co-hosted Event by UNIDO
"Making just transitional changes towards deep decarbonisation in steel and cement industries - how to stimulate supply and demand for low to zero carbon products"

15:45 - 17:15 Summarizing Plenary Session

Overlooking the Outcome of All sessions at ICEF2023

17:15 - 17:45 Closing Session

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

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

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

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

Opening Remarks

NISHIMURA Yasutoshi

Minister of Economy,
Trade and Industry, Japan

It is our great pleasure to hold the 10th Annual Meeting of the Innovation for Cool Earth Forum (ICEF) as one of the meetings in 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 Steering Committee members and all those who are involved.

Climate change is an issue that the whole world must urgently confront together, and we must achieve worldwide carbon neutrality as soon as possible. However, the circumstances surrounding the energy situation vary from country to country. As agreed at the G7 Meetings hosted by Japan this year, it is important to aim for our common goal of net-zero greenhouse gas emissions, while acknowledging various pathways according to each country's situation.

This year, the ICEF celebrates its 10th anniversary. In order to promote innovation, which is the key to solving global warming, the ICEF has disseminated cutting-edge knowledge and measures to the world, raised awareness of climate change, and aimed to promote behavioral changes. The global situation has changed dramatically in the last 10 years, including climate change, the pandemic, and regional conflicts. In the face of these various challenges, innovation is the most important key to solving these problems.

Japan will make a public-private investment of over 150 trillion yen (1 trillion U.S. dollars) to create the innovation that will be the key to achieving GX over the next 10 years through upfront investment support measures using GX Economy Transition Bonds, the world's first transition bond issued by a government. We will also continue to leverage the strength of Japan's technological capabilities to lead the world in achieving carbon neutrality.

This year's ICEF will discuss ways to build secure supply chains of the clean energy that is essential to achieving carbon neutrality, and the importance of innovation in accelerating efforts toward carbon neutrality, as they relate to the global stocktake at the COP, from a scientific perspective. We will also discuss a variety of topics, including the impact of climate change-induced droughts and floods on food and water resources. Furthermore, with expectations for realizing nuclear fusion now increasing rapidly, this technology will be featured.

There are several promising nuclear fusion technologies emerging and many startups all over the world, including in Japan. Last December, the Lawrence Livermore Laboratory in the United States announced that the energy generated by its reactor exceeded the input necessary to create the fusion reaction. However, due to the limitations of the laser equipment and other factors, the reaction can only occur once a day. In contrast, "Hamamatsu Photonics" and the Osaka University venture "EX-Fusion" are developing a high-speed repetitive irradiation technology for high-power lasers. Since nuclear fusion technology is a dream technology that, if realized, will revolutionize the world, I would like to see a lively discussion on the current state of research and development and the challenges facing practical application.

In addition, many young innovators who will play a leading role in society in 2050, the year carbon neutrality is to be achieved, will also be on stage this time. As young innovators will play important roles in the future, I hope that they will engage in active discussions on a completely new "white canvas," with ideas that are not bound by the past.

While we are still facing various global crises, I hope that the attendees will discuss how we can make powerful progress toward achieving carbon neutrality, and the results will be widely shared with the world, with the spirit that our ideas and technology can solve problems.

Keynote Sessions

Keynote 1

Speech by Prof. Steven Chu (Professor of Physics, Professor of Molecular and Cellular Physiology and Professor of Energy Science and Engineering, Department of Physics, Stanford University)

Speech by Dr. NOGUCHI Soichi
(Astronaut, Entrepreneur; CEO Miraispace Co., Ltd;
Professor, University of Tokyo; Executive Chief Fellow, IISE)

Keynote 2

Video Message by Mr.Gerd Müller
(Director General of the United Nations Industrial Development Organization (UNIDO))

Keynote 3

Panel Discussion by Prof. Andrew Zachary Fire (Professor, Pathology and Genetics, Stanford University School of Medicine),
Sir Paul Maxime Nurse (Director, The Francis Crick Institute),
Prof. Phoebe Koundouri (Professor, Athens University of Economics and Business and Technical University of Denmark),
Dr. Marcia McNutt (President, U.S. National Academy of Sciences)
and Moderated by Mr. TANAKA Nobuo (Chair of ICEF Steering Committee).

Keynote 4

Dialogue between Dr. Fatih Birol (Executive Director of International Energy Agency (IEA)) and Mr. TANAKA Nobuo (Chair of ICEF Steering Committee)(Pre-recorded dialogue)

Plenary Sessions

Plenary Session 1 Innovative Policy Making

In this session, various aspects of energy and environmental policies were discussed. For example, Europe's strengths in energy policy, including emission caps, evidence-based policy formulation, and stakeholder consultations were emphasized. Europe positions its climate policy as a growth strategy which contributes to innovation and competitiveness, but it was also emphasized that future policies must consider the circumstances of member countries. The need to bridge the gap between knowledge, policy, and action was also pointed out. Incorporating decarbonization policies into law, enforcing policies to promote project implementation, and achieving effective governance were proposed. The session included the U.S. government's support for high-risk and high-performance R&D projects, including incorporating these technologies into policy and legislation. Japan's initiatives to minimize waste through community partnerships were presented, and the importance of innovation, youth involvement, and global collaboration was emphasized. Japan's potential for wind power and offshore wind was highlighted, and the need for infrastructure development and consensus building with local industries for decarbonization was stressed. The importance of decarbonization policies in the aviation sector was emphasized, and international collaboration, energy diversification, and renewable energy infrastructure resilience were recommended.

During the panel discussion, participants argued that both top-down and bottom-up policy approaches have respective advantages, suggesting the necessity of both perspectives, and emphasized the need for a backcasting approach for effective planning and implementation of the necessary infrastructure in the development of decarbonization technology infrastructure.

Changhua Wu (Moderator)
ICEF Steering Committee

TANAKA Nobuo (Moderator)
Chair, ICEF Steering Committee

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

SAKANO Akira
Co-founder, Green innovation

IMAI Masanori
Chairman and representative director,
TODA CORPORATION

María Fernanda Espinosa Garcés
Former Minister of Foreign Affairs and of Defense of Ecuador;
Former President of the UN General Assembly
Executive Director, GWL Voices for Change and Inclusion

Evelyn Ning-Yi Wang
Director, Advanced Research Projects Agency-Energy
(ARPA-E), U.S. Department of Energy

Henry Hooi Hing Lee
Founder,Volar Air Mobility

Plenary Session 2 GX Together

In this session, various topics regarding the evolving energy landscape and the necessity for a just transition amid global energy and environmental challenges were discussed. For instance, changing perceptions of energy in response to recent global events and the challenges in ensuring energy security with the increasing prominence of renewable energy sources were highlighted. Key actions for a just transition were proposed, including collaboration with governments and related institutions to support carbon-intensive industries, investment in employment, education, and reskilling, allocation of larger budgets for climate finance, and the establishment of human-centered and gender-sensitive monitoring and reporting processes. The rapid expansion of carbon footprints in developing countries due to economic growth and the need for tailored measures to manage transition costs while supporting economic growth were also addressed. The importance of investing in new technologies in addition to existing solutions was stressed. The necessity of a phase-out of coal-fired thermal power generation for a just transition and the limited technologies available for holding global temperature rise to 1.5 °C were discussed, while stressing the importance of preventing stranded assets. Empowering young leaders through increased investments in education, climate funds, and job opportunities was advocated, and the need for education and re-skilling in carbon intensive industries and knowledge sharing between countries was discussed. Related financial issues were also noted, including the phase-out of coal-fired thermal power, the balance of economic development and emissions reduction in developing nations, and the creation of jobs using untapped resources to achieve the Sustainable Development Goals (SDGs). Potential systemic risks and injustices related to innovation, income redistribution through carbon border taxes for developing countries, and government-level mechanisms to expand investments in decarbonization were also discussed.

Jon David Moore (Moderator)
ICEF Steering Committee

Hoesung Lee (Moderator)
ICEF Steering Committee

Eija-Riitta Korhola
ICEF Steering Committee

YAMAGUCHI Shinobu
Director, Institute for the Advanced Study of Sustainability,
United Nations University

ISHIKAWA Tomohiro
Chief Regulatory Engagement Officer,
Mitsubishi UFJ Financial Group

Andrew Jeffries
Just Energy Transition Partnership (JETP) Advisor,
Energy Sector Office, Asian Development Bank

Humphrey Mrema
Chairman, Youth Survival Organization

Summarizing Plenary Session

- Overlooking the Outcome of All sessions at ICEF2023 -

In the summary session, each ICEF Steering Committee member gave remarks presenting an overview of all the sessions and discussions held in ICEF2023, as well as ideas for the agenda of next year' s ICEF2024.
As a review of all the sessions, the importance of innovative policy-making, the importance of accelerating technological innovation and involving a diverse range of innovators, and the security of supply chains were emphasized. The pivotal role of education, the necessity of a phase-out of fossil fuel facilities, and investment in clean alternatives for ensuring a just transition were mentioned. While recognizing the challenges in addressing the uncertainty of climate change, the importance of time and trust-building for addressing these climate and social issues was emphasized. The importance of addressing problems in the agricultural sector, especially concerning water consumption and waste, and the necessity of public acceptance of renewable energy were also mentioned.
As important agenda items for the future, the necessity of integrating climate change in the context of the SDGs, the roles of innovation and artificial intelligence (AI), finance, an integrated approach, and a balanced, open, and inclusive dialogue were emphasized.
The session concluded with advice to world leaders emphasizing persistence, science-based policies, clear strategies, and an unwavering commitment to mitigating climate change.

ICEF Steering Committee Members


TANAKA Nobuo (Chair)


Sally Merrick Benson


Georg Erdmann


Eija-Riitta Korhola


KURODA Reiko


Hoesung Lee


Vikram Singh Mehta


Jon David Moore


Valli Moosa


Nebojsa Nakicenovic


David Sandalow


Ismail Serageldin


Vaclav Smil


Changhua Wu


YAMAJI Kenji

Concurrent Sessions

Concurrent Session 1 Global Stocktake

In this session, the discussion focused on the Global Stocktake (GST), a mechanism to assess progress in efforts to reduce greenhouse gas emissions stipulated in the Paris Agreement. Ms. Heather N. Maseko-Msyale (UNFCCC), who opened the session, gave an outline of the GST process and presented the process itself, moving from the technical phase of the assessment into the current political phase. Professor Petra Minnerop (Durham University) then introduced an innovative legal argument about the role of the NDCs (Nationally Determined Contributions) and the GST as an interplay, arguing that NDCs are unilateral acts under international law, and are qualified through the GST. Ms. Akibi Tsukui (IGES) noted that the importance of the involvement of non-state actors such as the private sector, academia, and NGOs has been recognized through the GST process, and GST outcomes at COP28 need to be actionable and implementable so that citizens can take action.

Closing the session, Mr. David Sandalow, the moderator, pointed out that the focus on innovation highlighted at the ICEF played directly into the shaping of the Paris Agreement in some very important ways, both in innovative diplomacy and the focus on innovation in the Agreement. He concluded that the ICEF continues to be very closely connected with the UNFCCC process, including with dialogue on important topics like the GST that will be central to COP28.

David Sandalow (Moderator)
ICEF Steering Committee

Petra Minnerop
Professor of International Law, Durham Law Shool, Durham University

TSUKUI Akibi
Fellow, Institute for Global Environmental Strategies

Heather N. Maseko-Msyale
Programme Officer, UNFCCC

Concurrent Session 2 Food, Water and Climate Change

This session highlighted the need for collaboration and innovation, and not a business-as-usual approach, to address the challenges of food, water, and climate change. Food-related issues in vulnerable regions of Africa were discussed, emphasizing the need for cross-sector collaboration, clarification of the roles of government, and innovative resilience approaches. An example of a platform for participation by next-generation scientists were also presented. A human rights approach based on a low-carbon economy and climate-smart world were proposed, emphasizing the need for climate-smart solutions for resource efficiency, energy security by investing in renewables, and market entry through agricultural innovation. For water resources, reducing carbon emissions, conserving water resources to achieve the SDGs, and promoting low-carbon initiatives were argued. The need to transform food production, consumption, and land management to combat rising global temperatures, while relating food security to soil quality, was emphasized. A model that integrates food security, GHG reduction, biodiversity agreements, and related issues was introduced. Simultaneously with offering policy recommendations, mobilization of partners to realize food security and sustainability was also proposed.

The discussions in this session stressed the need to address agriculture and food production as important as reducing fossil fuels when discussing climate change. The discussion of food loss included post-production and post-harvest waste, and recommended a review of food expiration dates and labeling in developed countries.

Ismail Serageldin (Moderator)
ICEF Steering Committee

Patricia Scotland
Secretary-General of the Commonwealth

Phoebe Koundouri
Professor, Athens University of Economics and Business and Technical University of Denmark

Dhesigen Pydiah Naidoo
Executive, Climate Adaptation and Resilience, Presidential Climate Commission

Rattan Lal
Distinguished University Professor and Director, CFAES Rattan Lal Center for Carbon Management and Sequestration, The Ohio State University

Faten Attig-Bahar
Steering Committee member, Future Earth Water-Energy-Food Nexus Global Research Network

Concurrent Session 3 Innovative Use of Renewables

This session highlighted the importance of innovative use of renewable energy. The role of renewable energy needs to be considered systematically, not only in terms of supply, but also conversion methods and end uses. The importance of public-private sector collaboration and technical solutions for grid integration of variable renewable energy in expanding the use of renewable energy was pointed out. Trends in cutting-edge renewable energy generation technologies, including perovskite solar cells and next-generation floating offshore wind turbine technologies such as the double inverted vertical shaft turbine were introduced. The interconnected "jukebox" approach to reaching the last mile of renewable electricity access in developing countries and community-engaging approaches that have proved successful in deploying geothermal power were also discussed.
The issue of inertia accompanying massive integration of renewable power was discussed, and solutions such as power-to-gas (P2G) hydrogen/ammonia production technologies and digitalizing the grid were mentioned. Innovative uses of renewable energy included conversion of low-cost renewables to hydrogen and its derivatives, hydrogen applications, and local use of renewables tailored to local needs. The importance of recycling renewable power generation equipment and motivation to use renewables was also emphasized.

Nebojsa Nakicenovic (Moderator)
ICEF Steering Committee

YAMAJI Kenji (Moderator)
ICEF Steering Committee

KURODA Reiko (Moderator)
ICEF Steering Committee

Bjørn Simonsen
CEO, World Wide Wind AS

Douglas Arent
Executive Director, Strategic Public-Private Partnerships,
The National Renewable Energy Laboratory

Rebecca Bregant
Co-founder & CMO, PineBerry

SANDO Akihiro
Senior Researcher, Renewable Energy Institute

NIKI Shigeru
Director General,
Sustainable Energy Unit, Technology Strategy Center,
New Energy and Industrial Technology Development
Organization (NEDO)

Concurrent Session 4 Sustainable Aviation

In this session, the latest sustainable aviation technologies for reducing greenhouse gas (GHG) emissions were discussed. GHG emissions from the global air transport sector account for more than 2%, but are expected to rise in the future. The future of aviation fuels is considered to be hydrogen, Sustainable Aviation Fuel (SAF), and electricity. Four experts in SAF and electric aircraft discussed the competitiveness, applicability, and operating costs of future aviation fuels, as well as the necessity of government subsidies. SAF and electric aircraft are not competing technologies, and are capable of coexisting.
Although electricity will be superior to hydrogen and SAF in operation cost, symbiosis of fuels based on energy density and the type of aircraft is possible. For example, low-energy density electricity may be advantageous for small aircraft, whereas SAF is suitable for large aircraft owing to its high energy density. While the current cost of fossil fuels is low, new technologies with government support can compete in different ways in the future as society progresses toward decarbonization. The development of these technologies will make it possible to achieve “sustainable aviation.”

Georg Erdmann (Moderator)
ICEF Steering Committee

Vikram Singh Mehta (Moderator)
ICEF Steering Committee

ENOMOTO Hiroshi
Director, Technology Strategy Center, NEDO;
Associate Prof., Institute of Science and Engineering, Kanazawa University

NISHIMURA Yuki
Program Manager, Sustainability Co-Creation Unit, JGC Holdings

Laura Leoncini
Senior Business Developer,
Energy Transition and Digital Services, Eaton

Ada Tse
Co-founder and Director, Volar Air Mobility

Concurrent Session 5 Nuclear Fusion Technology

In this session, the discussion focused mainly on the role of the ITER project, the need for public and private investment in fusion technology, and the role of the private sector, including start-up companies. Dr. Yutaka Kamada introduced the ITER project as a platform for fusion technology and human resource development which is open to the world. Dr. Scott Hsu and Mr. Carl Page pointed out that fusion is a useful option for achieving climate change goals while ensuring economic rationality, and accelerated public and private investment is needed in order to reach the demonstration stage. Ms. Francesca Ferrazza and Mr. Takaya Taguchi, representing a major energy company and a start-up company, introduced their companies' efforts and future visions for magnetic confinement fusion technology.
During the Q&A session, in response to a question on ways to accelerate the fusion technology development cycle, the speakers answered that collaboration between the public and private sectors is necessary for demonstrations of various technologies and approaches. In response to a question on the efforts required to establish a supply chain, the speakers answered that it is necessary to prepare common global standards and regulations.

Sally Merrick Benson (Moderator)
ICEF Steering Committee

TANAKA Nobuo (Moderator)
Chair, ICEF Steering Committee

TAGUCHI Takaya
CEO, Helical Fusion Co., Ltd.

Scott C. Hsu
Senior Advisor and Lead Fusion Coordinator,
Office of the Under Secretary for Science and Innovation,
U.S. Department of Energy

KAMADA Yutaka
Deputy Director General, ITER Organization

Carl Page
President and Co-Founder, Energy,
Anthropocene Institute

Francesca Ferrazza
Head, Magnetic Fusion Initiatives, Eni S.p.A.

Other Events

Other Event NEDO Green Innovation Fund Projects Symposium "Carbon Neutral City achieved by Next-generation Photovoltaics"

Large-scale introduction of renewables is underway worldwide with the aim of achieving carbon neutrality. One issue in such efforts is carbon neutrality in urban areas, where renewable energy installation locations are limited. Perovskite photovoltaics are expected to be a next-generation photovoltaic which is suitable for these conditions.
In this session, experts from industry, academia, and government focused on the overview of R&D and demonstrations of perovskite photovoltaics in Japan's "Green Innovation Fund Projects," and discussed various ways to achieve cost reduction and implementation strategies.
They also emphasized the importance of active stakeholder involvement, as dissemination in urban areas requires the support of building integrated photovoltaic (BIPV) specialists, local governments, and urban planners. In this context, the discussion highlighted the fact that "Green Innovation Fund Projects" offer a good model for promoting the expansion of photovoltaics with the cooperation of multiple stakeholders in Japan and the world.

TAKAMURA Yukari (Moderator)
Professor, Institute for Future Initiatives, The University of Tokyo

YAMAZAKI Mitsuhiro
Director, New Energy Technology Department, NEDO

BESSHO Takeru
Section Manager, PV Group, R&D Center Corporate, Sekisui Chemical Company, Ltd.

YAMAMOTO Kenji
Senior Officer, General Manager, Photovoltaic & Thin Film Device Research Laboratories, Kaneka Corporation

Francesco Frontini
Head of Building System Sector Department for Environment Construction and Design (DACD), University of Applied Sciences and Arts of Southern Switzerland (SUPSI)

Nguyen Minh Tien
Power Leader, Power Department, Thang Long Industrial Park (Vinh Phuc) Corporation

ANZAI Kazutaka
Deputy Director, New and Renewable Energy Division, Agency for Natural Resources and Energy

Other Event Carbon Dioxide Removal (CDR) "Initial demand creation towards the expansion of the CDR market"

In the keynote speeches of this session, Japanese and U.S. policy makers introduced trends from both countries toward expansion of the market for Carbon Dioxide Removal (CDR). Japan presented the future direction of government support and rule formation based on the discussions of the Study Group for Creating Markets of Negative Emissions Technologies, and the United States introduced an overview of carbon management activities, including the Inflation Reduction Act, DAC Hub, and activities under Mission Innovation.
The panel discussion invited CDR project developers (suppliers), buyers, and trade intermediaries to consider the necessity of CDR for realizing net-zero emissions, the merits and significance of early efforts, measures necessary for future market expansion, and the role of initial demand.

TANAKA Tetsuya (Moderator / Speaker)
Deputy Director General, Industrial Science, Technology and Environment Policy Bureau, METI

Mark Ackiewicz
Director, Office of Fossil Energy & Carbon Management, U.S. Department of Energy (DOE)

Christoph Beuttler
Chief Climate Policy Officer, Climate Policy, Climeworks

KOYAMA Masao
Head of Carbon Dioxide Removal, Mitsubishi Corporation

KODA Kazura
Project Manager, Mitsui O.S.K Lines, Ltd.

Other Event Conversation with Young-generation Innovators

In this session, the roles of young innovators and start-ups in achieving a decarbonized society were discussed. The session brought together some of the most inspiring early-to-mid-career innovators from around the world for a dialogue with members of the ICEF Steering Committee who have been playing crucial roles in advancing innovation and the clean energy revolution.
Topics ranged from communication with the public, entrepreneurship, and education to the role of social media. The speakers presented examples of ideas based on their own experience, for example, the use of picture books to help foster the interest of future generations in climate change, and the significance of exchanging information not only through social media but also by face-to-face communication. The speakers, conversely, addressed questions to the ICEF Steering Committee members. The importance of the participation of younger generations and women in decision-making was discussed. An advisory group of young innovators in each government was also proposed for the possible contribution to carbon neutrality. It was also argued that this type of forum should continue to be held in the future.

Changhua Wu (Moderator)
ICEF Steering Committee

Nebojsa Nakicenovic (Moderator)
ICEF Steering Committee

Andrew Zachary Fire
Professor, Pathology and Genetics,
Stanford University School of Medicine

TAGUCHI Takaya
CEO, Helical Fusion Co., Ltd.

Laura Leoncini
Senior Business Developer, Energy Transition and Digital Services, Eaton

SANDO Akihiro
Senior Researcher, Renewable Energy Institute

Trishna Nagrani
Co-founder, Kaiku

Jing Chen
Postdoctoral researcher, School of Social Sciences, Tsinghua University

WADA Natsumi
Environment and Human Rights officer,SOLIT, Inc.

Faten Attig-Bahar
Steering Committee member,
Future Earth Water-Energy-Food Nexus Global Research Network

Other Event The Co-hosted Event by BloombergNEF “Global and Japanese Climate Transition Scenarios : Business Opportunities and Risks”

In this session, BloombergNEF (BNEF) discussed its global and Japanese climate transition scenarios, and highlighted business opportunities and risks related to the energy transition.
In the first half of the session, BNEF discussed its scenario exercises analyzing long-term energy outlooks (https://about.bnef.com/new-energy-outlook-series/). The modeling takes account of the technology costs of the power, transport, industry, and building sectors, and applies a carbon budget, or emission constraints, to the Net Zero Scenario in which the world achieves net zero while meeting the target of the Paris Agreement. The Net Zero Scenario underscores the importance of immediate decarbonization efforts, the deployment of emerging climate technologies in all sectors, and the huge investment opportunities in the energy transition globally. BNEF also provided policy recommendations that governments could consider in order to keep on track to net zero.
In the second half, BNEF showcased the risks and opportunities of the energy transition for companies, and highlighted the importance of portfolio evaluation based on forward-looking measures, including levels of exposures to the energy transition. (https://about.bnef.com/blog/climate-transition-an-accelerating-threat-to-corporate-futures/)

Jonas Rooze
Head of Sustainability and Climate Research, BloombergNEF

Ali Izadi Najafabadi
Head of Asia Pacific, BloombergNEF

KIKUMA Isshu
Japan Energy Senior Associate, BloombergNEF

Other Event The Co-hosted Event by UNIDO "Making just transitional changes towards deep decarbonisation in steel and cement industries - how to stimulate supply and demand for low to zero carbon products"

In this session, the speakers discussed how to achieve deep decarbonization in the steel and cement industries by sharing the challenges they face in day-to-day activities and views on the necessary conditions for promoting industrial decarbonization.
As the organizer of this event, UNIDO introduced the Industrial Deep Decarbonization Initiative (IDDI), a global coalition of the governmental and private sectors aimed at stimulating demand for low carbon materials through green public procurement by harmonizing global standards.
As the keynote speaker, Dr. Chris Bataille of Columbia University Center on Global Energy Policy presented his views on the challenges, possible solutions, and technologies to accelerate industrial decarbonization in the global context. He stressed that efficiency and circularity are particularly important for decarbonization of these industries, which are the world's largest CO2 emitter.
In the Panel Discussion following the keynote address, four speakers from the public and private sectors discussed decarbonization of the steel and cement industries from the viewpoints of data collection and reporting, finance and incentives, R&D, and international partnerships. The necessity of international cooperation, including public-private partnerships, for effectively addressing the challenges of industrial decarbonization was discussed and affirmed.

SUZUKI Yoshinari (MC)
Industrial Development Officer,
Division of Decarbonization and Sustainable Energy,
United Nations Industrial Development Organization (UNIDO)

Rana Ghoneim (Moderator)
Chief, Energy Systems and Industrial Decarbonization Unit,
United Nations Industrial Development Organization (UNIDO)

Chris Bataille (Keynote Speaker)
Adjunct Research Fellow,
Columbia University Centre on Global Energy Policy (CGEP)

Canan Derinöz Gencel
Director, Environment and Climate Change Department,
Turkish Cement Manufacturer Association (TURKCIMENTO)

Thomas Guillot
Chief Executive, Global Cement and Concrete Association

Ayman Fathy
Product Development & Quality Control Executive Manager, EZZ Steel

DOHNOMAE Hitoshi
Chair, International Environmental Strategic Committee,
The Japan Iron and Steel Federation

Special Session Special Dialogue on the Energy Transition

In this session, three prominent speakers debated the current global situation and pathways toward net-zero emissions. It was emphasized that the energy transition is not a transition from gadget A to gadget B, but a change in the world as a whole; that is, everything has to change. We are not on track toward net-zero emissions, and we must take really dramatic, fast, deep action on a scale that we are not doing, and do not grasp, at present. The possibility that we may overshoot our climate targets and try to reduce greenhouse gas afterwards by negative carbon emissions was mentioned. It may be valuable to go back to the agricultural sector, because there is much that can be done to transform that sector from a major contributor to problems to a major contributor to solutions. It was also noted that innovation is the key to achieving net-zero emissions, and there are opportunities for innovation everywhere.

David Sandalow (Moderator)
ICEF Steering Committee

Ismail Serageldin
ICEF Steering Committee

Vaclav Smil
ICEF Steering Committee

Michael Liebreich
Chairman & CEO, Liebreich Associates

Closing Session

❶ Announcement of the Roadmap
David Sandalow
ICEF Steering Committee

❷ Announcement of the Statement from the Steering Committee
YAMAJI Kenji
ICEF Steering Committee

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

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

Statement

ICEF2023 Statement from the Steering Committee

October 5, 2023

ICEF's 10th Anniversary

The 2023 Innovation for Cool Earth Forum or ICEF celebrates its 10th anniversary.
Taking this memorable opportunity, the Steering Committee is issuing the following special statement, looking back at the journey travelled collectively in the past nine years and looking forward to the next decade.

1. What we have achieved since the ICEF inaugural annual meeting in 2014

- In 2014, ICEF was initiated by Japan's late former Prime Minister Abe Shinzo, who "proposed the establishment of a new international conference where the world's leading policy makers, businesspersons, and researchers can meet and cooperate with each other to address climate change through innovation". He participated in the first annual meeting, which, he stated, was "an unprecedented attempt, an energy- and environment-focused version of the World Economic Forum."

- One of the early achievements of ICEF was helping shape the Paris Agreement, by highlighting the importance of innovation in the negotiations that led to the success of COP21 in 2015.

- In 2016, ICEF championed the ambitious goal of achieving "at least net-zero anthropogenic CO2 emissions." Since then, ICEF's continuous advocacy for this goal has contributed to many countries, sub-national entities and companies pledging to achieve net-zero emissions around the mid-century.

- Since its inception, ICEF's consistent message has been that innovation, both technological and social, is essential to addressing climate change. With this belief in mind, ICEF has elaborated on the roles of both the public and private sectors. International cooperation has also become a central theme.

- Since 2017, ICEF's strong creed has been that diversity, inclusiveness and justice must be enhanced to address the social and governance aspects of climate change. At ICEF conferences, a balanced participation including youth and women has been realized and led to multi-faceted discussions.

- ICEF has consistently adopted a technology-neutral approach to decarbonization, including discussion of renewables, sustainable nuclear power, carbon capture and storage, and new end-use technologies across all sectors.

- ICEF's contributions also include the development of innovation roadmaps for clean energy technologies. Roadmaps on carbon utilization, direct air capture, carbon mineralization and low-carbon ammonia, among other topics, have helped inform a wide range of stakeholders about technologies that can help achieve net zero emissions. The term "biomass carbon removal and storage (BiCRS)" was first proposed in an ICEF roadmap and is now used widely.

- ICEF has been a unique forum for a wide range of stakeholders to interact and advocate for innovation in addressing climate change. In Japan, ICEF has attracted a series of other relevant international conferences on its margin, now culminating as the "Tokyo GX Week."

- As ICEF has evolved over the past nine years, the global situation surrounding climate change has significantly changed. After the adoption of the Paris Agreement in 2015, the IPCC Special Report on 1.5°C in 2018 created further momentum for countries and regions to commit to net-zero around the mid-century. We have witnessed massive deployment of new technologies, most notably with renewables and electric vehicles. However a huge gap remains between countries' Nationally-Determined Contributions (NDCs) and the 1.5°C pathway. Accelerated progress is needed to fill this gap.

2. What we need to advance the green transformation (GX)

- Under Japan's presidency this year, the G7 leaders in Hiroshima agreed to "globally advance and promote a green transformation, working together to realize transformation of our economies".
  Obviously agreement among the G7 is not necessarily a global consensus, but green transformation or GX is our common challenge and shared opportunity.

- The G7 leaders are "commit(ted) to holistically addressing energy security, the climate crisis, and geopolitical risks." They also said, "While acknowledging various pathways according to each country's energy situation, industrial and social structures and geographical conditions, we highlight that these should lead to our common goal of net-zero by 2050." Such statements show the basic and shared directions for us to pursue GX.

- To increase energy security and reduce the risk of adverse environmental impacts from the energy transition, it is imperative to expand and diversify supply chains for clean energy technologies and find substitutes for critical minerals.

- Efforts by developed economies alone are far from sufficient. Strengthening North-South international cooperation on topics including transfer of technologies and climate finance is essential.

3. Towards the future

- ICEF's fundamental role and mission remain unchanged. We remain firmly committed to promoting both technological and social innovation while strengthening diversity and inclusiveness. In the years ahead, our efforts will be enhanced. As AR6 of IPCC pointed out, the choices and actions in this decade will have impacts now and for thousands of years to come. More urgently than ever, we need to accelerate scaling of solutions to tackle the climate crisis in this critical decade.

- ICEF embraces new focal challenges, including accelerating deployment of the solutions available today and continuing to innovate approaches for reducing greenhouse gas emissions and removing carbon dioxide from the atmosphere. In doing so, ICEF underscores the importance of not only country perspectives but also sectoral thinking, particularly on hard-to-abate sectors. In addition, sustainable finance deserves stronger focus. The financial community needs to be engaged more in scaling up deployment of clean energy technologies.

- ICEF is dedicated to developing new, diverse and secure supply chains for critical materials, energy technologies and manufacturing.

- ICEF pays particular attention to increasing the scale and improving the effectiveness of North-South collaboration to help the Global South thrive in the energy transition and manage inevitable climate impacts.

- ICEF continues to empower the next generation of innovators to succeed in bringing new solutions to fruition by supporting those innovators to interact directly with global leaders, access resources and reach new markets.

ICEF 2023

Under the main theme of "Innovation for Just, Secure and Sustainable Global Green Transformation (GX)", the ICEF's tenth annual meeting (ICEF2023) was convened in a hybrid format on October 4 and 5, 2023 as an initiative of the "Tokyo GX Week", when a series of 10 conferences discussed a wide range of energy and environmental issues. Around 1,700 people from governments, international organizations, industry, and academia participated in this event, representing 79 countries and regions. At the conclusion of ICEF2023, the Steering Committee summarizes a series of discussions as follows.

- ICEF2023 had in-depth discussions on innovative policy-making for building secure and resilient supply chains of energy and resources. The need for cross-border cooperation was identified and the interface of policy, technology, finance and innovation was discussed.

- ICEF2023 also discussed “GX together” where GX is pursued inclusively with no one left behind. Just transition was discussed from regional and socio-economic perspectives, and the role of public and private blended financing mechanisms were elaborated.

- Leading experts dealt with the following five specific issues:
  - First, the Global Stocktake, a process to inform the Parties to UN Framework Convention on Climate Change in updating and enhancing their NDCs every five years under the Paris Agreement. The first Global Stocktake will soon culminate at COP 28. ICEF2023 provided an excellent opportunity to collect the views of the private sector and NGOs.

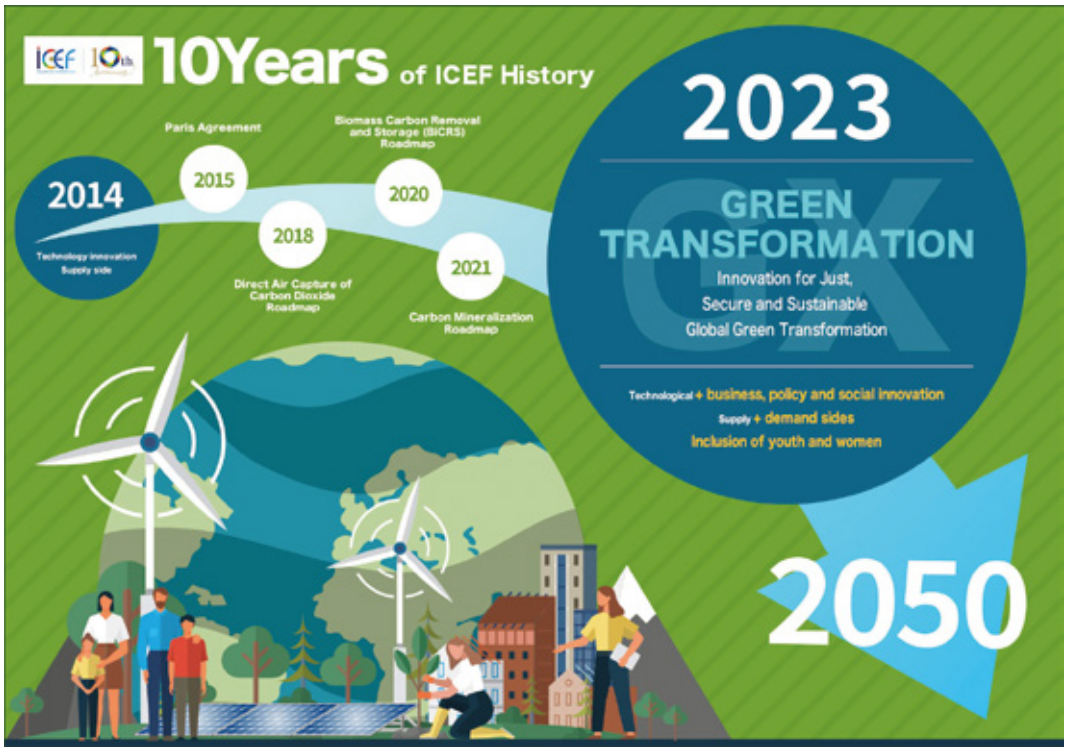
  - Second, linkages between food, water, energy, and climate change. Sustainable agriculture and food security in relation to water and soil, as well as adaptation and resilience measures needed for addressing climate change, were discussed.

  - Third, the innovative and inclusive use of renewables. Topics included how maximize benefits and minimize negative impacts on local communities, environments and ecosystems through synergies and co-benefits with the 17 UN Sustainable Development Goals. The role of developing economies was emphasized.

  - Fourth, sustainable aviation. Topics included forecasting sustainable aviation fuel (SAF) supply beyond 2050, identifying alternatives for aviation fuels and opportunities for improving propulsion system such as hydrogen electric powertrain.

  - Fifth, nuclear fusion technology. Recent trends, including the role of startups and university spin-offs in developing promising technologies and attracting investment, were discussed.

- The ICEF Steering Committee expresses our deepest appreciation for the active participation of speakers and audience at ICEF 2023 and at the previous nine meetings. We remain firmly committed to engaging diverse stakeholders, in particular leading youth, women and innovators, and thereby creating stronger momentum for technological and social innovation for a carbon-neutral and sustainable future.



Roadmap Project

ICEF Roadmap Project Artificial Intelligence for Climate Change Mitigation

A draft roadmap on “Artificial Intelligence for Climate Change Mitigation” was presented in this session. In the Introduction, Mr. Sandalow explained that the roadmap is based on the question, “How can AI reduce greenhouse gas emissions?” The Roadmap examines areas where AI could reduce emissions, including GHG emission monitoring, power systems, manufacturing, materials innovation, food systems, and road transport, discusses cross-cutting topics such as barriers, risks, and policies, and summarizes findings and recommendations.

Dr. Kucukelbir of Columbia University explained the three elements of AI (data, model, and computation) and emphasized that AI relies on machine learning, Ms. Nagrani of KAIKU referred to the impact of climate change, and Dr. Friedmann of Carbon Direct introduced climate change models as an example of AI applications. Dr. McCormick of Carbon Direct noted the potential use of AI in processing large-scale sensor data for monitoring methane emissions, but pointed out barriers such as AI literacy. Mr. Fan of Columbia University mentioned the potential application of AI in developing energy system models for power grid infrastructure, and Ms. Leal of Columbia University mentioned that application of AI to agriculture could reduce food system emissions, which are estimated to account for 30% of global GHG emissions.

During the Q&A session, questions included the possibility of using AI to improve lifecycle emissions and to recognize indigenous knowledge. The panelists indicated the possibility of using AI to develop materials optimized for decarbonization through LCA, and the moderator introduced a case study of a dramatic increase in translation performance through AI-based language interpretation, and pointed out the possibility of facilitating cross-cultural communication in the future.

David Sandalow (Moderator)
ICEF Steering Committee

Julio Friedmann
Senior Scientist, Carbon Direct

Zhiyuan Fan
Ph.D student, research associate, Columbia University

Colin McCormick
Chief Innovation Officer, Carbon Direct

Alp Kucukelbir
Associate Adjunct Professor, Computer Science, Columbia University

Trishna Nagrani
Co-founder, Kaiku

Elena Méndez Leal
School of International and Public Affairs, Columbia University

Steering Committee Members

TANAKA Nobuo (Chair)
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

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

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

Richard K. Lester
Associate Provost,International Activities,
Massachusetts Institute of Technology

Jon David Moore
Chief Executive Officer, BloombergNEF

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)

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

Changhua Wu
China /Asia Director, Office of Jeremy Rifkin;
Co-founder, Professional Association for China's Environment;
Chief Strategist, CN Innovation;
Vice Chair, Governing Council, Asia Pacific Water Forum

Sally Merrick 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

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

Hoesung Lee
Former Chair of the Intergovernmental Panel on Climate Change (IPCC)

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

Valli Moosa
Head of the South African Presidential Climate Commission;
Former President of the International Union for Conservation of Nature and Natural Resources (IUCN)

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

Vaclav Smil
Distinguished Professor Emeritus, University of Manitoba

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

Messages from Co-Hosts

Ministry of Foreign Affairs

HOSAKA Yasushi

Parliamentary Vice-Minister for Foreign Affairs

As attention to increases in the run-up to COP28, where assesses the global progress of climate actions, I congratulate ICEF for providing a valuable opportunity for leaders from industry, government, and academia from various countries and regions to gather and discuss innovations to achieve net-zero.
The G7 Hiroshima Leaders' Communiqué included a commitment to "holistically addressing energy security, the climate crisis, and geopolitical risks." In light of the recent international situation, it has been becoming more and more of an issue how each country can achieve a balance between energy security and climate actions. Innovation is the very key to achieving this goal.
I hope that this conference will bring an excellent outcome that will lead to solutions to climate change.

Ministry of Education, Culture, Sports, Science and Technology

YAMADA Taro

Parliamentary Vice-Minister of Education, Culture, Sports, Science and Technology

On behalf of MEXT, one of the co-sponsors, I would like to extend my congratulations on the holding of ICEF2023, where leaders from industry, academia, and government are gathering to discuss climate change issues.
In order to achieve carbon neutrality, it is essential for industry, academia, and governments worldwide to harness their capabilities to create innovation through research and development.
Today leaders from around the world with diverse backgrounds from government, international organizations, industry, academia, and others will discuss and consider innovation, which is the key for solving global warming issues. We hope that the importance of such approaches will be communicated to the wider world.
I wish to thank you all for your great contributions and to express my sincere hope that this Forum will further promote international cooperation. Thank you.

Ministry of Agriculture, Forestry and Fisheries

TAKAHASHI Mitsuo

Parliamentary Vice-Minister for Agriculture, Forestry and Fisheries

I would like to express my appreciation to the leading figures representing the industries, governments and academia attending this forum, which celebrates its 10th anniversary.
Based on the MIDORI Strategy launched in May 2021 and the related law enforced last year, MAFF is striving to achieve both increased productivity and sustainability in the agriculture and food system through innovation.
In addition, under "ASEAN-Japan MIDORI Cooperation Plan" adopted in October this year, we envisage to enhance resilient and sustainable agriculture and food system for our ASEAN partners in the Asian-monsoon region, which has climatic condition similar to Japan.
Through these efforts, MAFF continues to be committed to achieve carbon neutrality by 2050.

Ministry of the Environment

ASAHI Kentaro

Parliamentary Vice-Minister of the Environment

Japan presided at the G7 Ministers' Meeting on Climate, Energy and Environment in Sapporo this year, where we shared recognition of the importance of realizing net-zero, circular economies and nature-positive economies in an integrated manner. This outcome carried through to the G7 Hiroshima Summit, where we also reaffirmed that "while Russia's war of aggression against Ukraine impacts energy markets and supply chains globally, our goal to achieve net-zero greenhouse gas emissions by 2050 at the latest remains unchanged."
I hope everyone's discussion about innovations needed to move the world forward to achieving its goals in the face of various challenges contributes to the realization of net-zero by 2050.

ICEF2023 Photo Gallery


Innovation for
Cool Earth Forum


Innovation for
Cool Earth Forum
ICEF
NEDO Green Innovation Fund Projects Symposium
"Carbon Neutral City Achieved by Next-generation Photovoltaics"


10th
TOKYO

Innovation for Cool Earth Forum

ICEF2024

11th Annual Meeting

Autumn, 2024

(Tentative)

Official Website
https://www.icef.go.jp/

ICEF Official YouTube Channel
https://www.youtube.com/channel/UC7ouNL9NbvDomDTfiubi8iw

Follow us on LinkdIn
www.linkedin.com/company/icef-forum-tokyo/