Innovation for Cool Earth Forum

Innovation for Cool Earth Forum

ICEF2015 Report

METI Ministry of Economy, Trade and Industry

NEDO

2nd Annual Meeting

Date:	October 7 (Wednesday) - October 8 (Thursday), 2015
Venue:	Hotel Chinzanso, Tokyo, Japan
Hosts:	Ministry of Economy, Trade and Industry (METI), New Energy and Industrial Technology Development Organization (NEDO)
Co-Hosts:	Ministry of Foreign Affairs (MOFA), Ministry of the Environment (MOE)
Attendees:	More than 1,000 participants from around 70 countries, representing their respective governments, companies, academia and international agencies

What is ICEF?

Prime Minister Shinzo Abe announced that the Government of Japan will host an annual global conference, the Innovation for Cool Earth Forum (ICEF) every year in October in Tokyo. ICEF is aimed at providing a global platform to promote discussions and cooperation among researchers, business persons, and policymakers from around the world in order to address climate change through innovation of energy and environmental technologies including their dissemination. ICEF will also provide the On-line Discussion in order to promote year-round discussions between annual forums.
ICEF is hosted by Ministry of Economy, Trade and Industry (METI) and the New Energy and Industrial Technology Development Organization (NEDO) and co-hosted by Ministry of Foreign Affairs (MOFA) and Ministry of the Environment (MOE). The Steering Committee has been established in order to ensure that ICEF is operated in a manner reflecting the wide range of views of the international communities.

Program

*ICEF Networking Plaza: 20:00-21:30, Tue., October 6

Opening Speech

Innovation for Cool Earth Forum

A video message was shown from Prime Minister Shinzo Abe, who first proposed the foundation of the Innovation for Cool Earth Forum (ICEF). In the message, Prime Minister Abe described that the key to solving the issue of climate change lies in innovation, and set out his vision for the future development of ICEF as a place for leaders from countries all around the world, including both developed and developing countries, to come together and share their collective wisdom. (Photo: Lower left)
Dr. John Holdren, who serves as Assistant to the President for Science and Technology in the United States, expressed President Obama's gratitude to the hosts of ICEF and to all participants working together to tackle climate change, and described some of the latest examples of countermeasures taken in the United States against global warming and the innovative technologies that have been developed there. (Photo: Lower right)

Plenary Session

3 Sessions

Innovation for Cool Earth Forum

Plenary Session Part 1

Principal Issues in the Future GHG Reduction

Presentations on the challenges in greenhouse gas (GHG) reduction were given by government officials from both developed and developing countries, as well as representatives from industry, from academic fields connected with climate change and from international financial institutions. A panel discussion followed, which discussed the role and importance of finance in developing low carbon technologies, as well as issues expected to be discussed in COP21.

Plenary Session Part 2

Future Perspectives from Innovators, Visionaries and Global Leaders

Section 1: Speeches on various measures on innovation were given by politicians and global leaders. In particular, speakers from developing countries, which are likely to be particularly affected by the problem of global warming, emphasized the need to develop cooperative partnerships throughout the international community.

Section 2: Innovators and key figures from academia and industry showed up and made presentations on development and dissemination of renewable energy and energy-saving technologies. During the following panel discussion there were discussions on examples of innovations in particular attention, on how to improve efficiency of energy industry, and how to generate innovation in countries where the infrastructure development has fallen behind.

Plenary Session Part 3

Future Strategy for Climate Change

This session featured presentations from experts on international frameworks, from government officials of both developed and developing countries and from industry representatives. Presentations are focused on their visions for the international framework to be developed following COP21 and what kinds of innovation are required. Areas discussed included government policies and corporate decision-making that can generate innovation, and possible forms of international partnership aiming for development of innovation.

Concurrent Sessions

19 Sessions

Innovation for Cool Earth Forum

Geothermal Power

Representatives from Kenya and Switzerland gave presentations on case studies of long-term policies related to geothermal energy. This was followed by presentations given by researchers from Japan and Iceland on trends and specific cases in development of supercritical generation technology. Topics discussed during the panel discussion included the question of how to win society's support for the development of geothermal power, and what will be required for technological development in the future, including Enhanced Geothermal Systems (EGS).

Hydrogen Energy

This session featured presentations on the current state of initiatives across the hydrogen energy value chain, from hydrogen energy policies to the production and usage of hydrogen. During the panel discussion, there were lively discussions on how to overcome the so-called "valley of death", which hampers the full-scale adoption of hydrogen energy and must be overcome prior to commercialization. It also indicated the importance of collaboration among suppliers and the need for governments to make commitments in terms of hydrogen infrastructure.

Nuclear Energy

This session featured presentations on the need for nuclear energy if a low-carbon society is to be made a reality, on nuclear energy's contribution to energy security, on trends in technology development of nuclear energy around the world, and on the current state of initiatives for safety assurance. In the panel discussion, participants discussed the significance of nuclear energy as a base load power in liberalized energy markets and necessary support for them. They also discussed human resources securing, international cooperation for nuclear emerging countries and measures to counter terrorism and cyber-attacks.

Cement

Presentations were given on low-carbon technology roadmap of cement sector, on current situation in India who will be the world's largest producer of cement, on carbon capture and utilization (CCU) technology, and on contribution by cement sector as social infrastructure. The panel discussion featured discussions on the various barriers to energy-saving technologies in countries and regions, and on how to bridge the gap between technology roadmaps and reality.

Iron and Steel

Representatives gave presentations on current state of energy-saving initiatives in iron and steel industry, on challenges faced, on future initiatives needed for further technological development, and on contributions to global warming mitigation and adaptation by iron and steel industry. In the panel discussion, discussions were held on the importance of technology transfers and role of governments for development and dissemination of innovative technologies.

Energy Systems

Experts and industry players from a wide range of sectors including energy, urban city design, information technology (IT) and ecosystems showed up and discussed ways to progress innovation in energy systems. They noted necessity of long term direction in governmental policies and importance of an open energy market. The discussion also referred to relationship with human sense of values and lifestyles.

Technology Transfer to Developing Countries and Investment Promotion

This session featured presentations on specific technology transfer initiatives and methods for assessment, on the general direction of technology transfer and on policies required to promote it. In the panel discussion, there were discussions on appropriate assessment methods for technology transfers, on the role that the private sector should play, and on what triggers innovation in technology transfer.

Artificial Photosynthesis

Participants gave presentations sharing progress and challenges faced in artificial photosynthesis research in the United States, South Korea and Japan and they looked at questions how artificial photosynthesis can help with mitigating CO_2 emissions. During the panel discussion, they noted the challenges and direction of the artificial photosynthesis research, and they indicated the importance of research pursuing cost reduction and safety.

Wind Power

Presentations were given on reducing the costs of offshore wind farming, on demonstration of floating offshore wind farms, on grid-connection challenges in wind power in India, and effective policies to support wind power penetration. The panel discussion featured discussions on challenges relating to the penetration of offshore wind power, on measures that should be taken to overcome them, and on the shape of wind power dissemination in Japan.

Electricity Storage

Presentations were given on the latest trends of electricity storage systems in regions where large-scale renewable energy is adopted in Europe and the United States. There were also presentations on technology roadmap and next-generation technology development of electricity storage system. During the panel discussion, participants discussed the role of electricity storage systems on grid-side rather than consumer-side, possibility of cost reduction that could trigger their dissemination, and potential of various business models.

Smart Grids

This session featured presentations that discussed how the adoption of renewable energy can be accelerated and how the supply-demand balance can be maintained, based on observations of the power grids and utility companies in various countries. During the panel discussion, there were discussions on future business models for utility companies and the mix of tools to be adopted for responding to demand variability.

Zero Energy Building

Presentations were given on initiatives to realize and disseminate ZEB/PEB*. During the panel discussion, participants discussed the general direction of the innovations aiming at realizing ZEB/PEB. They also noted the importance of consciousness and knowledge sharing of the many different kinds of benefits in building market stakeholders, in order to promote and disseminate ZEB/PEB further.

*ZEB: Zero Energy Buildings; PEB: Positive Energy Buildings

Low-Carbon Mobility

This session featured presentations on CO_2 emissions trends from vehicles, on policies for disseminating next-generation vehicles, and on initiatives being taken by automotive industry and aviation industry. In the panel discussion, there were discussions on improvement of batteries in vehicles, on batteries and alternative fuels in ships, and on emission regulations. They also noted the need for improved efficiency in motor vehicle engines, collaboration between industry, academia and government, and shifts in usage patterns for motor vehicles at the individual level.

Business Engagement in Tackling Climate Change

Participants gave presentations on initiatives taken by industry in the run-up to the COP21 held in Paris, and on what they expect for it. The panel discussion included discussions on the kinds of mechanisms that were required to ensure industry's proactive role in measures for mitigation and adaptation of climate change.

Role of Public Funding for Research, Development and Demonstration

Presentations were given by public funding agencies from countries and they were on policies and strategies for funding energy- and environment-related technologies and successful examples of such funding. The panel discussion included discussions on the roles and roles allocation of funding agencies. It was emphasized that developing a cooperative partnership like ICEF would be effective in terms of roles allocation.

Advanced Liquid Biofuels

This session featured presentations on general trends, merits, commercializing experiences and advancing policies in advanced liquid biofuels, such as bio-jet fuels and cellulosic biofuels. During the panel discussion, participants discussed the challenges facing in commercializing advanced liquid biofuels, and measures for responding to the challenges.

Solar Energy

Presentations were given on the ICEF's Rooftop Solar with Storage Roadmap, including the introduction of contents and the perspectives required to formulate the roadmap. The panel discussion included discussion on technological innovations, policies and business models in the areas of solar energy and electricity storage.

CCS

This session featured presentations on the role and importance of carbon capture and storage (CCS), on CCS projects ongoing, on cost reduction of CO2 capture technologies, and on safe and effective storage technologies and policies, and the latest example of large-scale CCS demonstration. In the panel discussion, participants discussed the social acceptability and safety of CCS and cost reduction. They noted the importance of exchanging opinions with members of the general public in particular.

International Framework for Complementing UN

Participants gave presentations on international frameworks and initiatives to complement the United Nations Framework Convention on Climate Change (UNFCCC). In the panel discussion, there were discussions on the need of setting clear goals, on the benefit as a result of their action and on the importance of actions based on agreement. Participants reaffirmed the benefits of complementing UNFCCC processes and ideas for realizing this.

ICEF2015 Statement from Steering Committee

To establish a pathway for large-scale reductions in GHG emissions, the ICEF Steering Committee has issued a statement based on the three following principles as its global recommendations**: (1) Implementation of policies to promote research, development and dissemination of innovative technologies; (2) Establishment of concrete action plans based on a shared vision of the future; and (3) Promotion of proper finance scheme for technology transfer to developing countries.** (Photo above: Yoichi Kaya, Chair of the Steering Committee, announces the ICEF Statement.)

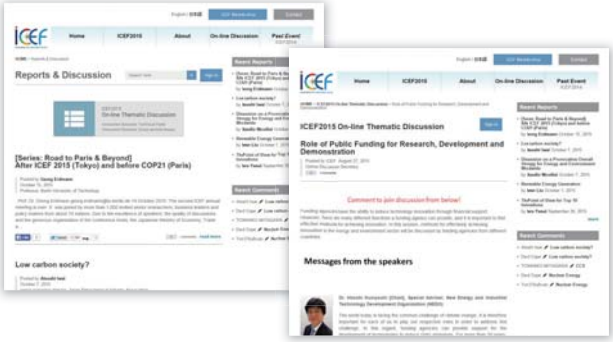
ICEF Innovation Roadmap Project

Centering on the efforts of Steering Committee member Mr. David Sandalow (a former Under Secretary of Energy, the U.S. Department of Energy), the Rooftop Solar with Storage Roadmap has been created as a global industry-academia-government initiative for sharing visions for the development and dissemination of innovative low carbon technologies as a step leading to concrete initiatives. Following discussions at a concurrent sessions, a draft version of the roadmap was presented at the Closing Session.
After the draft was modified to reflect the discussions at ICEF and the comments made by key figures who reviewed the draft, a finalized version was presented at a side event of COP21.

On-line Discussion

An On-line Discussion page has been set up on the ICEF website, with the aim of providing a space for continuous discussions even outside the ICEF Annual Meetings. It is hoped that the ICEF On-line Discussion page will serve as a venue for experts from various fields to exchange opinions with one another all year round and take their discussions to a deeper level.

Participants in the On-line Discussion page can:
- post their opinions on the latest examples of innovations in the domains of energy and the environment, and on issues relating to such innovations
- browse among the various opinions that have been posted, and add their own opinions on what they read.



Facility Tours

Participants were taken on Facility Tours as an opportunity to observe for themselves the cutting-edge technology that Japan possesses in the domains of energy and the environment, with four courses available: “Hydrogen Energy,” “Power Generation,” “Test and Certification (Robot/Automobile)” and “IT and Electronics Exhibition.” There were also lively exchanges of views between the participants and the officers in charge of the facilities. (Photo: Scene from the "Hydrogen Energy" Facility Tour)

ICEF TOP 10 INNOVATIONS

ICEF Steering Committee members and technical experts looked at examples of top-level technological developments, business models and government policies in the domains of environment and energy that had been presented within the past year, and selected the 25 best examples based on the three perspectives of (1) GHG emissions reduction potential, (2) innovativeness and (3) feasibility, from which the top 10 examples were chosen through votes cast by ICEF participants

Category: R&D | **Field:** Solar

French-German partnership achieves 46% PV conversion efficiency in the lab

Organization: Soitec (France), CEA-Leti (France), Fraunhofer ISE (Germany)

France-based semiconductor maker Soitec and technology firm CEA-Leti in partnership with Germany-based Fraunhofer Institute for Solar Energy Systems have tested a multi-junction photovoltaic cell that converts 46% of solar light into electrical energy. The achievement marks a new world record for PV conversion efficiency. Japan's National Institute of Advanced Industrial Science and Technology has verified the claim.

New record solar cell efficiency at 46 % on a 100 mm wafer yielding approximately 500 concentrator solar cell devices. ©Fraunhofer ISE/Photo Alexander Wekkeli

Category: R&D | **Field:** Carbon Capture

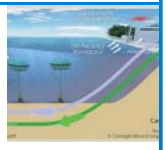
Researchers develop high-performance ionic-liquid-based membranes to capture CO_2

Organization: 3M Company (US), University of Colorado, Boulder (US)

The University of Colorado at Boulder and its partner The 3M Company, have developed and fabricated innovative new thin-film composite (TFC) membranes that can capture CO_2 at a cost of less than $15 per ton—a level that is significantly lower than today's best carbon capture technologies. The research was conducted through ARPA-E's program. The TFC gas separation membranes are created by coating room-temperature ionic liquid (RITL) - polymer composites as thin layers onto porous support structures in such a way that the membrane has good mechanical strength. They achieved the highest CO_2 permenance value reported for a membrane with such high selectivity.

Adapted with permission from Industrial & Engineering Chemistry Research. © 2014 American Chemical Society.

Category: Pilot & Startup | **Field:** Wave



CETO 5 Wave Energy Farm commences operations in Australia

Organization: Carnegie Wave Energy Limited (Australia)

The Australian company Carnegie Wave Energy Limited has announced that a three-unit array of its CETO 5 wave energy generator has been completed and is operating at the Perth Wave Energy Project, located off Garden Island in Western Australia. The CETO system differs from other wave energy systems because it operates under water where it is protected from severe storms and is invisible from the shore. The fully submerged buoys can drive seabed pump units to deliver high-pressure fluid onshore through a subsea pipe to standard hydroelectric turbines, generating zero-emission electricity. The high-pressure water can also be used to supply a reverse osmosis desalination plant, replacing or reducing reliance on the fossil fuel power driven pumps usually required for such plants. If successful, construction is expected to start of a larger commercial-scale version - 3 MW CETO 6 wave farm - in 2016.

Category: Pilot and Startup | **Field:** Energy Storage

World's largest Superconducting Flywheel Energy Storage System test machine is developed

Organization: Railway Technical Research Institute, Kubotek Corporation, et al (Japan)

The Railway Technical Research Institute (RTRI) has developed a superconducting flywheel power storage system, as a next-generation power storage system, with support from NEDO. This is the world's first superconducting magnetic bearing to use a superconducting material both for its rotor and bearing, and is capable of supporting a heavy weight, although it is a compact system.

Category: Commercialization | **Field:** Next-generation Cars

Toyota Launches First Commercial FCV, MIRAI

Organization: Toyota (Japan, US)

Toyota has launched MIRAI, the first commercial hydrogen vehicle poised for mass production. In addition to the vehicle's introduction in Japan in December 2014, Toyota has launched MIRAI in the U.S., and will be available from the fall of 2015. After the introduction in these two markets, additional markets will follow. MIRAI is a 4 door, mid-size fuel cell sedan with performance that fully competes with traditional internal combustion engines, and it refuels in 3–5 minutes, and travels up to 300 miles (482 km) on a full tank, thus overcoming many of the hurdles that EVs are currently facing in gaining recognition from ordinary consumers.

Category: Commercialization | **Field:** Solar

Hybrid power plant with 600 kW of solar power was commissioned in Berlin

Organization: GE (Germany), Kofler Energies (Germany), BELECTRIC (Germany)

The project partners GE, Kofler Energies, and BELECTRIC have commissioned a hybrid power plant with 600 kW of PV power, a 400 kW gas CHP plant, and a battery array with 200 kWh charge capacity at GE Power Conversion production site in Berlin-Marienfelde. The project breaks new ground in the area of innovative, decentralized energy supply. The conventional energy portion is not drawn from the grid, but is generated by the CHP plant on site. The battery buffers excess energy, and an energy management system controls the output of the hybrid power plant to meet demand. The plant will not only supply power and heat to the GE Power Conversion production site in Berlin-Marienfelde, Germany, but will also feed power into the grid.

Category: Commercialization | **Field:** Next-generation Cars

Mazda releases most fuel efficient diesel car ever, Demio

Organization: Mazda (Japan)

Mazda has released version 4 of the Demio series, which won the car of the year Japan award. The compact Demio car comes in both diesel and gasoline version, and sports extremely high fuel efficiency, with the diesel engine topping 30 km/L, unrivaled compared to its non-hybrid brethren. The new car builds on Mazda's original concept of fuel-efficient technology, SKYACTIV.

Category: Commercialization | **Field:** Wind

MHI Vestas V164-8.0 MW breaks power production record

Organization: MHI Vestas Offshore Wind A/S (Denmark)

The MHI Vestas V164-8.0 MW prototype turbine broke the record for power production by a wind turbine during a 24-hour period from 6-7 October 2014 when the turbine produced 192,000 kWh under steady wind conditions at a test site in Østerild, northern Denmark. The power produced by the turbine in one day was enough to supply the energy needs of approximately 13,500 Danish households. The world's most powerful turbine combines a mix of cutting-edge and innovative solutions in a largely evolutionary design and scaling process. MHI Vestas Offshore Wind has already signed a stream of contracts for the turbine to be used in a large number of offshore wind projects, such as 450 MW for the "Borkum Riffgrund 2" project in Germany and 630 – 970 MW for the Navitus Bay project in the UK.

Category: Challenging | **Field:** Solar

Researchers at Michigan State University develop transparent solar windows

Organization: Michigan State University (US)

Researchers at Michigan State University (MSU) have developed a technology that uses transparent, uncolored plastic, which can be placed over windows or smartphone screens, to produce electricity from sunlight. The new technology is called a transparent luminescent solar contractor and absorbs non-visible wavelengths. If the technology can be scaled up, a whole new spectrum of photovoltaic applications will open up. The current conversion efficiency is around 1%, however the group is aiming to reach an efficiency of 5 % when the invention is fully optimized.

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Category: Policy and Standardization | **Field:** Smart Grid

Europe creates a unified gas and electricity market

Organization: EU transmission companies (EU)

The European Union has been driving for a common energy market (Internal Energy Market, IEM) since the 1990s. Connections are increasing; the latest projects include the Italy-France transmission line (announced in April 2015, 1.2 GW), U.K.-Norway transmission line (announced in March 2015, 4 GW). Apart from ever increasing transmission capacity, most of the west and northern European electricity markets were price coupled in late 2014, with the rest of the markets slated to join in 2015 or 2016. This means that electricity can be traded between markets using the same rules, and the buyers and sellers won't have to take into consideration transmission constraints, maximizing the use of available transmission capacity, and the possibility to send energy that originates from variable generation between regions.

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ICEF2016
Save the Date

Innovation for Cool Earth Forum
3rd Annual Meeting

Date: **October 5-6, 2016**

Venue: **Hotel Chinzanso Tokyo, Japan**

Innovation for Cool Earth Forum

ICEF2015 Report

ICEF 2015
Innovation for Cool Earth Forum

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2nd Annual Meeting

Date October 7-8, 2015
*Networking Plaza will be held on October 6

Venue Hotel Chinzanso Tokyo, Japan

METI
Ministry of Economy, Trade and Industry

NEDO

Greetings

The first decade of the 21st century have been warmer than any preceding period since global temperature records began in 1850 and it is extremely likely that human influence has been the dominant cause of the observed warming, according to the latest IPCC reports. Climate change is a challenge that humanity is facing at this very moment, not in the future.

In 2007, I, as Prime Minister of Japan, proposed a 50% reduction of global greenhouse gas emissions by 2050. Innovation is the key to achieving this ambitious goal and it is essential for governments, businesses, and academia around the world to share their wisdom and closely cooperate with each other.

Based on this concept, I proposed the establishment of a new international conference where the world's leading policy makers, business persons, and researchers can meet and cooperate with each other to address climate change through innovation. This is an unprecedented attempt, an energy- and environment-focused version of the World Economic Forum.

It would be very beneficial if you, who are at the forefront of one of the biggest challenges to humanity, climate change, and are responsible for shaping the future of the earth, would participate in this forum. I hope to see you in Tokyo.

Shinzo Abe

Shinzo Abe

Prime Minister of Japan

About ICEF

Prime Minister Shinzo Abe announced that the Government of Japan will host an annual global conference, the Innovation for Cool Earth Forum (ICEF) every year in October in Tokyo. ICEF is aimed at providing a global platform to promote discussions and cooperation among researchers, business persons, and policymakers from around the world in order to address climate change through innovation of energy and environmental technologies including their dissemination.
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Program

*ICEF Networking Plaza: 20:00-21:30, Tue., October 6

October 6th, 2015

20:00 – 21:30 **Networking Plaza**

October 7th, 2015

9:00 – 9:30 **Opening Session**

Opening Address

Shinzo Abe
Prime Minister of Japan (Video message)

Daishiro Yamagiwa
State Minister of Economy, Trade and Industry

John Holdren
Assistant to the President for Science and Technology, United States

9:30 – 11:50 **Plenary Session** (Part 1)

— *Principal Issues in the Future GHG Reduction* —

Moderator: **Georg Erdmann**
Professor, Berlin University of Technology

Leon Clarke
Senior Scientist and Group Leader, Pacific Northwest National Laboratory (PNNL)

Philippe Benoit
Head, Energy Efficiency and Environment (Climate) Division, International Energy Agency (IEA)

Laurence Tubiana
Ambassador for Climate Change and Special Representative for the 2015 Paris Climate Conference Ministry of Foreign Affairs and International Development of France

Anwar Hossain Manju
Minister of Environment and Forest, People's Republic of Bangladesh

Héla Cheikhrouhou
Executive Director of the Green Climate Fund

Richard K. Lester
Japan Steel Industry Professor of Nuclear Science and Engineering and Associate Provost, Massachusetts Institute of Technology

Hiroaki Nakanishi
Chairman & CEO , Hitachi, Ltd., Vice Chairman of KEIDANREN (Japan Business Federation)

11:50 – 13:00 **Networking Lunch**

13:00 – 15:45 **Plenary Session** (Part 2)

— *Future Perspectives from Innovators, Visionaries and Global Leaders* —

Section1: Short speeches from government/international leaders

Muhammad Yunus
Chairman, Yunus Centre

FIDEL CASTRO DIAZ-BALART
Scientific Advisor of State Council, Republic of Cuba

Bader Hamad Al-Essa
Minister of Education and Higher Education of the State of Kuwait

Chiheb Bouden
Minister of Higher Education and Scientific Research, Republic of Tunisia

Anatoly B. Chubais
Chief Executive Officer, RUSNANO

Section2: Panel discussion among innovators/visionaries

Moderator: **David Sandalow**
Inaugural Fellow, Center on Global Energy Policy, Columbia University

Sumant Sinha
Founder, Chairman & CEO, ReNew Power Ventures Pvt. Ltd.

Ed Abbo
President & Chief Technology Officer, C3 Energy

Vaclav Smil
Distinguished Professor Emeritus, University of Manitoba

Amory B. Lovins
Cofounder and Chief Scientist, Rocky Mountain Institute

Peter M. Robinson
President and CEO, United States Council for International Business (USCIB)

Takehiko Nakao
President of the Asian Development Bank

15:45 – 16:15 **Networking Coffee Break**

16:15 – 18:45 **Concurrent Sessions** (Part 1)

Geothermal Power

[Session overview]
Geothermal power is one of the most stable sources of renewable energy with significant potential for further development. In this session, the focus will be on policies with a remarkably long term outlook, such as 2030 and 2050 (e.g. Kenya, Switzerland). Secondly, technological development, especially new challenges aiming at supercritical fluids utilization will also be discussed.

Chair: **Roland N. Horne**
Thomas Davies Barrow Professor of Earth Sciences, Stanford University

Paul Kamau Ngugi
General Manager, Geothermal Development Companies

Keith Evans
Lecturer, Department of Earth Sciences, ETH Zürich

Hiroshi Asanuma
Leader, Geothermal Energy Team, National Institute of Advanced Industrial Science and Technology (AIST)

Gudmundur Fridleifsson
Chief Geologist, HS Orka hf

Hydrogen Energy

[Session overview]
Hydrogen is expected to become one of the major fuel resources in the future, as it produces no pollutants or greenhouse gases when used. It can also enhance energy security by using domestically available renewable resources for production. In this session, a policy roadmap for realizing hydrogen based society will be presented and discussed. Then, the session will look into economic and technological prerequisites for realizing this vision. Subsequently, the current situation and prospects of every stage of the value chain, including production, transportation and application, will be discussed.

Chair: **Kenichiro Ota**
Professor, Green Hydrogen Research Center, Yokohama National University

Katie Randolph
Technology Manager of the Fuel Cell Technologies Office, U.S. Department of Energy

Takeo Kikkawa
Professor of Management, Graduate School of Innovation Studies, Tokyo University of Science

Francois Venet
Group Vice President, Asia Pacific, Air Liquide

George P. Hansen
Director, Communications, General Motors Japan

Kenji Kitahashi
Mayor, City of Kitakyushu

Hanno Butsch
Head of International Cooperation, NOW GmbH

Nuclear Energy

[Session overview]

Nuclear power can play a major role as carbon-free base load power source to serve the growing electricity demand of the world. In this session, we will discuss the deployment of nuclear power plants in emerging and developing economies, strategies to make nuclear power more acceptable for society, and the prospect of R&D, along with how we can overcome challenges such as safety, nuclear waste handling, and non-proliferation of nuclear arms.

Chair: **Richard K. Lester**
Japan Steel Industry Professor of Nuclear Science and Engineering and Associate Provost, Massachusetts Institute of Technology

William D. Magwood, IV
Director-General, OECD Nuclear Energy Agency (NEA)

Shigenori SHIGA
Representative Officer, Senior Executive Vice President, Toshiba Corporation

Christophe Béhar
Director, Nuclear Energy Division, French Alternative Energies and Atomic Energy Commission (CEA)

Nobuo Tanaka
President, The Sasakawa Peace Foundation; Former Executive Director, International Energy Agency (IEA)

John Hopkins
Chairman and Chief Executive Officer, NuScale Power, LLC

Paul T. Dickman
Senior Policy Fellow, Argonne National Laboratory

Cement

[Session overview]

Sectoral cooperation in the cement sector has progressed through WBCSD CSI activities so far. In this session, a stock taking of the existing outcomes of the sectoral cooperation and discussions of future activities in the sector will take place. It will particularly cover innovative technologies (e.g. CCS) and the importance of social infrastructure (e.g. waste treatment).

Chair: **Vincent Mages**
Co-Chair of WBCSD CSI TF1; Vice President, Climate Change Initiatives, Lafarge Holcim

Philippe Fonta
Managing Director, Cement Sustainability Initiative (CSI), World Business Council for Sustainable Development (WBCSD)

S.K. Handoo
Advisor (Technical), Cement Manufacturers' Association (CMA)

Diane Thomas
Professor, Chemical and Biochemical Engineering Department, Faculty of Engineering, University of Mons

Eric Masanet
Head of Energy Demand Technology Unit, International Energy Agency (IEA)

Kenji Ogawa
Director, Senior Executive Officer, Taiheiyo Cement Corporation

Iron and Steel

[Session overview]

Iron and steel industry is one of the most energy-intensive industries and therefore holds a large greenhouse gas reduction potential. In this session, past and current energy conservation and CO_2 reduction measures of this industry will be shared, and based on this, possible actions for this industry and necessary support and policy measures to promote further CO_2 reduction from 2020 will be discussed. In addition, the iron and steel industries' possible global warming prevention contribution in other industries will be pointed out.

Chair: **Jun Arima**
Professor, Graduate School of Public Policy, The University of Tokyo

Edwin Basson
Director General, World Steel Association

Kazuhiko Hombu
Visiting Professor, Graduate School of Public Policy, The University of Tokyo

A. C. R. Das
Consultant, Ministry of Steel, Government of India

Hiroshi Tomono
Senior Advisor, Nippon Steel and Sumitomo Metal Corporation

Keigo Akimoto
Group Leader, Chief Researcher, Research Institute of Innovative Technology for the Earth (RITE)

Vaclav Smil
Distinguished Professor Emeritus, University of Manitoba

Energy Systems

[Session overview]
Energy supply and demand should be considered as a system composed of element technologies, and also as a societal subsystem related strongly with national security, economic development and environmental sustainability. In this session, recent topics including changes in the global energy market, possible emergence of new technologies and the relationship between the energy system and the ecosystem will be discussed. Furthermore, important long-term issues for the energy system will also be considered.

Chair: **Kenji Yamaji**
Director-General, Research Institute of Innovative Technology for the Earth (RITE)

Christopher Gunner
Country Chairman, Shell Japan Ltd.

Shozo Kaneko
Senior Researcher, Institute of Industrial Science, The University of Tokyo

Hiroshi Esaki
Professor, The University of Tokyo

Afshin Afshari
Professor of Practice, Masdar Institute

Michael Obersteiner
Program Director, International Institute for Applied Systems Analysis (IIASA)

Technology Transfer to Developing Countries and Investment Promotion

[Session overview]
Technology transfer from developed countries to developing countries plays an essential role in mitigating climate change. In the session, the international framework to promote technology transfer and private investment (both at UN and bilateral levels) will first be discussed. Secondly, discussions about enabling environment, such as policy and human capacity development, and necessary elements that technologies should fulfill to take root in recipient countries will take place.

Chair: **Ismail Serageldin**
Director, Library of Alexandria

Jukka Uosukainen
Director, Climate Technology Centre and Network (CTCN)

Dang Huy Dong
Deputy Minister, Ministry of Planning and Investment of Viet Nam

Michal Kleiber
Vice-President, European Academy of Sciences and Arts

Jon Moore
CEO, Bloomberg New Energy Finance

19:00 – 21:00 **Official Dinner**

October 8th, 2015

9:00 – 11:30 **Concurrent Sessions** (Part 2)

Artificial Photosynthesis

[Session overview]

Artificial photosynthesis is a promising method for creating sustainable fuel and chemicals. Since it is still in a research stage, this session will firstly focus on sharing the current status of research projects in three of the leading in this area: the USA, Korea, and Japan. Also, effectiveness and competitiveness compared with other technologies will be discussed. Finally, based on the abovementioned discussion, a plausible future image of practical use of artificial photosynthesis will be shared.

Chair: **Haruo Inoue**
Specially Appointed Professor, Department of Applied Chemistry, Tokyo Metropolitan University

Daniel G. Nocera
Patterson Rockwood Professor of Energy, Harvard University

Kyung Byung Yoon
Director, Korea Center for Artificial Photosynthesis

Kazunari Domen
Professor, Department of Chemical System Engineering, The University of Tokyo

Takeshi Morikawa
Laboratory Manager, Toyota Central R&D Labs., Inc.

Tohru Setoyama
Fellow, Executive Officer, Mitsubishi Chemical Corporation

Wind Power

[Session overview]

Wind power has become a global movement and is viewed as an important future source of energy supply. In this session, various wind power related technologies, such as onshore, offshore and floating wind turbines, grid integration will be discussed. Furthermore, different technical and social situations which can promote the use of wind energy will be brought into light.

Chair: **Preben Maegaard**
Director Emeritus, Nordic Folkecenter for Renewable Energy

Jin Kato
Co-CEO, MHI Vestas Offshore Wind A/S

Takeshi Ishihara
Professor, The University of Tokyo

Raghavan Venkatesh
National Council Member, Indian Wind Power Association (IWPA)

Volker Thomsen
Vice President and Treasurer, World Wind Energy Association Bonn Germany

Electricity Storage

[Session overview]

In recent years, the demand for Electricity Storage Systems (ESS) deployment in the power system is increasing, due to large-scale introduction of variable generation. In this session, deployment strategies and technology perspectives of ESS, specifically, ESS deployment strategy determined by locality and technology application will be covered, with presentations on region specific policies and technology development perspectives.

Chair: **Itaru Yasui**
Honorary Advisor, National Institute of Technology and Evaluation(NITE); Emeritus Professor, The University of Tokyo

Gabriel Petlin
Supervisor Grid Planning & Reliability, California Public Utilities Commission (CPUC)

Peter Eckerle
Managing Director, StoREgio

Cecilia Tam
Deputy Vice President, Asia Pacific Energy Research Centre (APERC)

Zempachi Ogumi
Professor Emeritus, Kyoto University

Ahmed Khaleel
Ambassador, Embassy of the Republic of Maldives

Smart Grids

[Session overview]

The development of the smart grid is seen as one important component in integrating large amounts of renewable energy into the electricity grid. In this session, the latest developments on smart grid technologies will be discussed together with topics such as how the electricity market should be regulated to facilitate the introduction of renewable energy, and how customers should be engaged regarding electricity use.

Chair: **Paddy Turnbull**
Chairman, Global Smart Grid Federation

Ruud Kempener
Technology Roadmap Analyst, International Renewable Energy Agency (IRENA)

Kazuhiko Ogimoto
Project Professor, Collaborative Research Center for Energy Engineering, Institute of Industrial Science, The University of Tokyo

Stefano Besseghini
President and CEO, Ricerca sul Sistema Energetico (RSE)

B.N. Sharma
Additional Secretary, Ministry of Power, India

Atul Mahajan
President and CEO, Oshawa Power and Utilities Corporation (OPUC)

Shoji Takenaka
Vice President and Chief Fellow, Social Infrastructure Systems Company, Toshiba Corporation

Zero Energy Building

[Session overview]

The buildings sector is the largest energy-consuming sectors, accounting for over one-third of final energy consumption globally, and as such it is a huge source of CO_2 emissions. Therefore, efforts to promote Zero Energy Buildings (ZEB)/Positive Energy Buildings (PEB) have been accelerating worldwide. In this session, technological innovation required for the realization of ZEB/PEB will be discussed. Following this, barriers that prevent the diffusion of ZEB/PEB, and the possible countermeasure policies will be highlighted.

Chair: **Shuzo Murakami**
President, Institute for Building Environment and Energy Conservation (IBEC)

Vincent Cheng
Director, Building Sustainability Group, Arup

Yoichi Miyamoto
President, Shimizu Corporation

Amory B. Lovins
Cofounder and Chief Scientist, Rocky Mountain Institute

Jane Henley
Senior Advisor, U.S. Green Building Council

Low-Carbon Mobility

[Session overview]

According to the IPCC, the transport sector represents about 14% of global GHG emissions. Whereas renewable energy is increasing in electricity generation, mobility is still largely dependent on fossil fuels. In this session, we will look at the outlook for light automobiles in particular, and how to get this sector to move towards sustainable alternative fuels. Furthermore, the session will investigate the state of innovation in technology of both new vehicles (EV* and FCV**) and conventional vehicles.

*Electric Vehicle, **Fuel Cell Vehicle

Chair: **Yasuhiro Daisho**
Professor, Graduate School of Environment and Energy Engineering, Waseda University

Michael Walsh
Special Adviser, The International Council on Clean Transprotation (ICCT)

Nobuhiko Koga
General Manager, Energy Affairs Department, Toyota Motor Corporation

Lutz Rothhardt
Director, Development Japan, BMW Group Japan

Ric Parker
Director of Research and Technology, Rolls-Royce

Business Engagement in Tackling Climate Change

[Session overview]
Business engagement is essential to tackle climate change effectively, since businesses have expertise on both low-carbon technologies and markets. This session highlights several themes associated with the role of businesses. The themes are as follows: communication on low-carbon technologies and policies between the government and business sector, channels to engage in the UN framework, lessons from industries' proactive action plans, innovation and technology dissemination to achieve substantial GHG reduction, etc.

Chair: **Taishi Sugiyama**
Senior Researcher, Central Research Institute of Electric Power Industry (CRIEPI)

Soichiro Sakuma
Chairman, Subcommittee on Global Environment, Committee on Environment and Safety, KEIDANREN (Japan Business Federation)

Emmanuel Gueri
Special Advisor to the France Climate Change Ambassador and Government Special Representative for COP21

Peter M. Robinson
President and CEO, United States Council for International Business (USCIB)

Peter Bakker
President & CEO, World Business Council for Sustainable Development (WBCSD)

Brian P. Flannery
Center Fellow, Resources for the Future

Bjørn K. Haugland
Chief Sustainability Officer, DNV GL

Hiroyuki Tezuka
Chair of Global Environment Strategy WG, Committee on Environment and Safety, KEIDANREN (Japan Business Federation)

David Victor
Professor of International Relations, School of Global Policy and Strategy, University of California, San Diego (UCSD)

Role of Public Funding for Research, Development and Demonstration

[Session overview]
Funding agencies have the ability to induce technology innovation through financial support. However, there are many different functions a funding agency can provide, and it is important to find effective methods for achieving innovation. In this session, methods for effectively achieving innovation in the energy and environment sector will be discussed by funding agencies from different countries.

Chair: **Hiroshi Kuniyoshi**
Special Adviser, New Energy and Industrial Technology Development Organization (NEDO)

François Moisan
Executive Director, French Agency for Environment and Energy Management (ADEME)

Pun-Arj Chairatana
Director, National Innovation Agency (NIA), Ministry of Science and Technology, Thailand

Lean Weng Yeoh
Director of Energy and Environment Research Directorate, National Research Foundation

John Loughhead
Chief Scientific Advisor, Department of Energy & Climate Change (DECC), UK

Shane Kosinski
Deputy Director for Operations, ARPA-E, U.S. Department of Energy

11:30 – 12:45 **Networking Lunch**

Advanced Liquid Biofuels

[Session overview]

In order to reduce CO_2 emissions from the transport sector, advanced liquid biofuels using lignocellulosic biomass, non-food crops or waste need to reach the market. This session will focus on opportunities and challenges in advanced liquid biofuels. Key issues, such as trends of the market and technologies, experiences and challenges of commercialization (i.e. innovative technologies, emerging pathways, and business models), enhancing innovation processes and partnerships for business development will be discussed.

Chair: **John Holladay**
Manager, Biomass Sector, Energy & Environment Directorate, Pacific Northwest National Laboratory (PNNL)

Dolf Gielen
Director of the Innovation and Technology Center, International Renewable Energy Agency (IRENA)

Masayuki Inui
Acting Group Leader, Chief Researcher, Research Institute of Innovative Technology for the Earth (RITE)

Andreas C. Kramvis
Vice Chairman, Honeywell

Bas Melssen
Director, Asia Pacific – Biomass Conversion, Novozymes

Ken C. Lai
Vice President of Asian Operation, LanzaTech Inc.

Yusfandri Gona
Head of Airport Authority Region IV, Directorate General of Civil Aviation; Chairman of Aviation Biofuel and Renewable Energy Task Force, Republic of Indonesia

Solar Energy

[Session overview]

In order to promote further deployment of solar energy, there are still issues that need to be addressed. One such issue is the intermittency of the power output, where energy storage can be considered as one possible solution to solve this. In this session, among the many different ways of harvesting solar power, focus will be on roof-top PVs. A roadmap for further deployment of roof top PVs with batteries will be presented and discussed.

Chair: **Colin McCormick**
Researcher, World Resources Institute

Ali Izadi-Najafabadi
Head of Japan, Bloomberg New Energy Finance

Afshin Afshari
Professor of Practice, Masdar Institute

Amory B. Lovins
Cofounder and Chief Scientist, Rocky Mountain Institute

Daniel G. Nocera
Patterson Rockwood Professor of Energy, Harvard University

Kazuhiko Ogimoto
Project Professor, Collaborative Research Center for Energy Engineering, Institute of Industrial Science, The University of Tokyo

Itaru Yasui
Honorary Advisor, National Institute of Technology and Evaluation(NITE); Emeritus Professor, The University of Tokyo

CCS

[Session overview]

CCS is expected to be one of the key technologies to mitigate climate change, and in increasingly attracting attention as the Boundary Dam Project, the world's first large-scale CCS project in the power sector, started in 2014. In this session, the current situation and future prospects of CCS projects will be reviewed, and challenges in CCS deployment (e.g. cost reduction, safety ensuring and expansion of demonstration projects) will be discussed from technological and social perspectives.

Chair: **Sally M. Benson**
Director, Precourt Institute for Energy; Professor, School of Earth, Energy & Environment Sciences, Stanford University

Leon Clarke
Senior Scientist and Group Leader, Pacific Northwest National Laboratory (PNNL)

John Gale
General Manager, IEA Greenhouse Gas R&D Programme (IEAGHG)

Shinichi Nakao
Group Leader, Chemical Research Group, Research Institute of Innovative Technology for the Earth (RITE)

Mike Monea
President, Carbon Capture and Storage Initiatives, SaskPower

International Framework for Complementing UN

[Session overview]
While the United Nations Framework Convention on Climate Change is expected to play a central role in the field, the regime is facing numerous challenges towards achieving its ultimate goal. In this session the following will be discussed: how to overcome those challenges, and how partnerships and collaboration among forums and regimes beyond the UNFCCC can complement the work of the UNFCCC.

Chair: **Robert N. Stavins**
Albert Pratt Professor of Business and Government, John F. Kennedy School of Government, Harvard University

Emmanuel Gueri
Special Advisor to the France Climate Change Ambassador and Government Special Representative for COP21

Eija-Riitta Korhola
Advisor in European Affairs, Former Member of the European Parliament

Mitsutsune Yamaguchi
Special Advisor, Research Institute of Innovative Technology for the Earth (RITE)

Helen Baker
Programme Lead, Low Carbon Technology Partnerships Initiative, World Business Council for Sustainable Development (WBCSD)

Qi Yue
Assistant Professor, National Center for Climate Change Strategy and International Cooperation (NCSC), National Development and Reform Commission (NDRC), China

Masakazu Toyoda
Chairman & CEO, The Institute of Energy Economics, Japan (IEEJ)

15:15 – 15:45 Networking Coffee Break

15:45 – 18:15 Plenary Session (Part 3)

— *Future Strategy for Climate Change* —

Moderator: **Nobuo Tanaka**
President, The Sasakawa Peace Foundation; Former Executive Director, International Energy Agency (IEA)

Robert N. Stavins
Albert Pratt Professor of Business and Government, John F. Kennedy School of Government, Harvard University

David Victor
Professor of International Relations, School of Global Policy and Strategy, University of California, San Diego (UCSD)

Patrick Pouyanné
Chief Executive Officer and President of the Executive Committee, Total

John Loughhead
Chief Scientific Advisor, UK Department of Energy and Climate Change

Win Tun
Union Minister for Environmental Conservation and Forestry, Republic of the Union of Myanmar

Peter Bakker
President & CEO, World Business Council for Sustainable Development (WBCSD)

18:15 – 18:45 Closing Session

TOP10 Innovations Announcement

ICEF Roadmap Announcement

ICEF2015 Statement from Steering Committee

Closing Remarks

Yoshihiro Seki
Parliamentary Vice-Minister of Economy, Trade and Industry

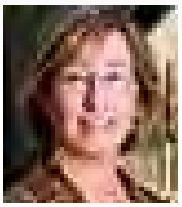
Kazuo Furukawa
Chairman, New Energy and Industrial Technology Development Organization (NEDO)

19:00 – 21:00 Farewell Dinner

Steering Committee Members

Yoichi Kaya (Chair)

President, Research Institute of Innovative Technology for the Earth, Japan



Sally M. Benson

Professor, Department of Energy Resources Engineering, School of Earth, Energy & Environmental Sciences, Stanford University

Director, Global Climate and Energy Project, Stanford University, United States

Zhou Dadi

The Director General (Emeritus) of the Energy Research Institute (ERI) of the National Development and Reform Commission, China

Ogunlade R. Davidson

Dean of Post-Graduate Studies at University of Sierra Leone

Former Co-Chair of WGIII of IPCC and Former Minister of Energy and Water Resources, Sierra Leone

Georg Erdmann

Professor, Berlin University of Technology

Member of the independent Expert group “Energy for the Future” consulting the Federal Government on the German Energy Transformation, Germany

José María Figueres

Chairman of the Board, Rocky Mountain Institute and Carbon War Room

Co-Chair, Global Ocean Commission, Costa Rica

Adam Heller

Research Professor, McKetta Department of Chemical Engineering, The University of Texas at Austin, TX, United States

Yoriko Kawaguchi

Professor of Meiji Institute for Global Affairs, Meiji University

Former Minister for Foreign Affairs and Minister of the Environment, Japan

Hoesung Lee

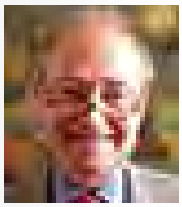
Professor at Korea University Graduate School of Energy and Environment

Member of the Board of Directors of the Korean Academy of Environmental Sciences, Korea

Nebojsa Nakicenovic

Deputy Director General and Deputy CEO, International Institute for Applied Systems Analysis (IIASA)

Full Professor of Energy Economics, Vienna University of Technology (TU Wien), Austria



Gwythian Prins

Emeritus Research Professor, London School of Economics

Convenor of the Hartwell Group, United Kingdom

David Sandalow

Inaugural Fellow, Center on Global Energy Policy, Columbia University, United States

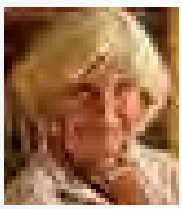
Ismail Serageldin

Director, Library of Alexandria, Egypt

Susan Solomon

Professor, Massachusetts Institute of Technology (MIT)

Former IPCC WGI Co-Chair, United States



Laurence Tubiana

Professor, Sciences Po Paris, France

Professor, Columbia University, United States

Itaru Yasui

Honorary Adviser, National Institute of Technology and Evaluation (NITE)

Emeritus Professor, The University of Tokyo, Japan

Participants

By Invitation (Senior Researchers, Business Persons, and Policy Makers)

Hosts

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

Co-Hosts

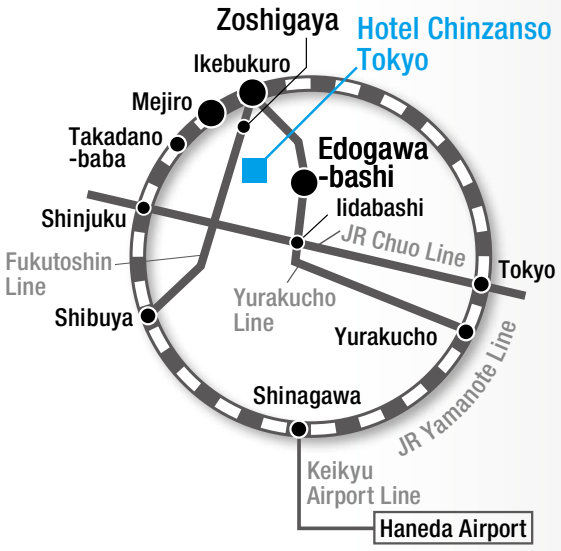
Ministry of Foreign Affairs (MOFA)
Ministry of the Environment (MOE)

Contact Us

[ICEF Secretariat]
E-mail: icef-reg@congre.co.jp

Venue

Hotel Chinzanso Tokyo, Japan



From the Airports

The orange-colored Airport Limousine Bus straight to the hotel run from Haneda Airport and Narita International Airport. The bus departs from the airport at regular intervals and drops guests off at the hotel. Another option is to take the bus from the airport to Sunshine City Prince Hotel, Ikebukuro, then take a 10-minute taxi ride to the Hotel.

From Narita International Airport

Travel time: 90 minutes by airport limousine bus
Distance: 60 kilometers / 37 miles

From Haneda Airport

Travel time: 50 minutes by airport limousine bus
Distance: 30 kilometers / 18.6 miles

By Train / Bus

From Mejiro Station on JR Yamanote Line

Take Toei Bus No.61 from either left bus station “Mejiro Ekimae (map❶)” or right one “Kawamura Gakuen Mae (map❷)” across the road from the station gate. Get off at the “Hotel Chinzanso Tokyo Mae” stop. (Approx. 10 mins.)

From Edogawabashi Station on the Tokyo Metro Yurakucho Line

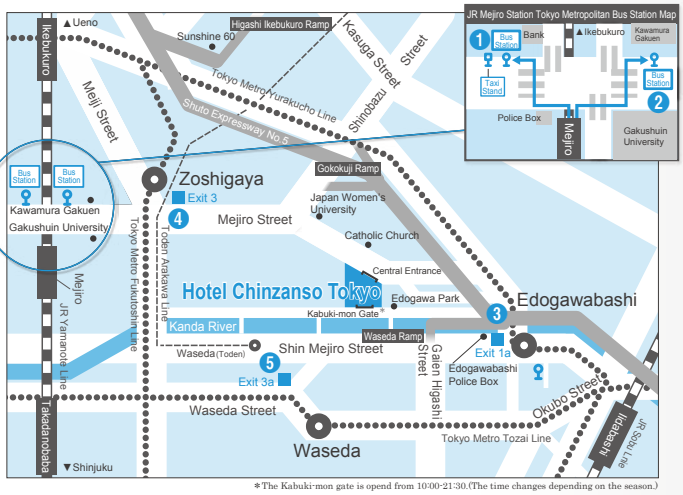
A 10-min. walk from exit 1a (map❸).

From Zoshigaya Station on the Tokyo Metoro Fukutoshin Line

A 15-min. walk from exit 3 (map❹).

From Waseda Station on the Tokyo Metro Tozai Line

A 20-min. walk from exit 3a (map❺).



*The Kabuki-mon gate is opend from 10:00-21:30.(The time changes depending on the season.)

Hosts

Co-Hosts