

1. Introduction

The fifth annual meeting of the Innovation for Cool Earth Forum (ICEF 2018) was held in Tokyo on October 10 and 11. The theme of this year's forum was "Driving Green Innovation." More than 1,000 people from government institutions, international organizations, industry, and academia from approximately 70 countries and regions participated in the event. According to the ICEF Steering Committee, our mission is to facilitate discussion and encourage the cooperation among participants in order to promote technological and social innovation in the energy and environmental fields so as to reaffirm our ultimate goal of achieving net-zero CO₂ emissions. This ultimate goal cannot be achieved in the near future, but first steps and actions need to be taken today. This following statement summarizes what kind of actions should be taken with high priority.

2. Realization of a virtuous cycle of climate change countermeasures and economic growth

In order to achieve the net-zero goal, total CO₂ emissions must begin decreasing as soon as possible. However, worldwide emissions of carbon dioxide have not yet started to decline but are still rising. Under such circumstances, a combination of climate change countermeasures and economic growth is required. In recent years, there has been much activity by making use of corporate and investor-led financial innovation, largely centered on renewable energy. For example, the flow of global funds such as environment, social, and governance (ESG) investments and green bonds is expanding greatly. In addition, climate change countermeasures are no longer costs but are now considered to be a stimulus for economic growth. In fact, there has been a change of worldwide trend which reflects recommendation by Task Force on Climate-related Financial Disclosures (TCFD) based on G20's request. As such, financial and investment institutions (as well as various industry sectors) are beginning to promote business-led innovation. Furthermore, future energy savings will be possible with the spread of electrified vehicles and shared economy in the mobility field. The involvement of independent parties such as local governments and individual companies is also increasing, generating opportunities to scale up such advanced approaches. During ICEF 2018, these topics were taken up in plenary sessions. In addition, a total of 12 directions of innovations—six from social fields and six from technical fields—were chosen and discussed in concurrent sessions as following.

3. Toward social innovation

- Movement toward establishing sustainability at the core of business activities is progressing in order to pursue the Sustainable Development Goals (SDGs) specified in the United Nations "2030 Agenda for Sustainable Development." There are multiple co-benefits to achieving SDGs targets from CO₂ reduction.
- New business concepts such as "product as a service" have been actively introduced aiming to lead to economic activities not depending on resource consumption. A circular economy is also attracting attention as a possible measure for CO₂ reduction through a transition to economic activities less dependent on resource consumption.
- By aggregating and networking power generation and storage devices and optimally controlling them according to demand, microgrids have the potential to contribute to a massive introduction of renewable energy in harmony with existing grids. There is a movement to address the energy access problem by disseminating microgrids with renewables as a form of a distributed power supply.
- Companies are investigating how to change consumer behavior through innovation without sacrificing economic growth in order to reduce consumption-based CO₂.
- Proper application of FinTech is leading to developments in climate change countermeasures that utilize smartphone transaction applications and financial platforms, movements in renewable energy expansion, and applications of block chain technology.
- There are emerging trends to reduce CO₂ emissions not only through manufacturing processes but also through the spread of eco-friendly products across national borders.

4. Toward technological innovation

- Reductions in CO₂ emissions are being carried out through energy-saving processes, digitalization, and other IoT functions.
- Solutions are being sought for possible problems in power grid operation caused by the transition to renewable energies

for power generation.

- Various problems pertaining to the production, storage, transportation, and utilization of hydrogen are expected to be solved as part of efforts to increase its use as an energy source.
- Along with renewable energy and hydrogen, nuclear is feasible CO₂-free power source that has the potential to contribute considerable reduction of CO₂ emission. Further development of small modular reactor (SMR) is underway and it is one of the leading candidates having a possibility to produce CO₂-free energy.
- There is an expectation concerning an increasing use of biorefinery technologies for manufacturing chemical products and fuel from biomass resources.
- Further development of CO₂ capture from industry and air, utilization, and storage (CCUS) technology has the potential to make a big contribution to the reduction of CO₂ emissions. CCUS is an effective, transitional technology to reduce CO₂ emissions and to support energy security and diversity in power generation.

5. Key actions

Industry, government, academia, and investors must come together to realize and promote innovation and create businesses using innovation by facilitating research and development and investment under international collaborative frameworks. In this regard, the private sector should continue to play an active and central role. In order for the private sector to fully commercialize innovation and make it widely available, it is recommended that government and the industrial sector carry out the following key actions that are needed for the future with unprecedented urgency.

Action 1. Inspire investment in technology, products, and services for green growth

- Government should promote the industrial sector in visualizing the contributions and strengths of company climate change countermeasures in consideration of the key metrics to manage climate-related risks and opportunities as well as, if necessary, the internal carbon pricing. This will promote dialogue between manufacturing and service companies and the financial and investment sectors as proposed by TCFD.
- Government and the industrial sector should encourage the private sector to change consumer behavior for the establishment of a social mechanism that funds technology, products, and services that contribute to green growth. In such cases, it will be beneficial to explore consumer behavioral change using advanced behavioral science and technologies.
- Government and the industrial sector should encourage the private sector to establish sustainable business models that will further promote the inflow of investors. Investors should support efforts for sustainable growth to realize SDGs.

Action 2. Involve industry and consumers in accelerating technologies and innovation for decarbonisation

- The industrial sector should pursue every possibility in terms of decarbonisation technologies including electrified mobility, distributed power supplies, SMR, biorefineries, and CCUS as well as in terms of utilization of feasible CO₂-free power source such as renewable energy, hydrogen and nuclear.
- The industrial sector should utilize digital technologies such as IoT to further reduce CO₂ emissions. In addition, government and the industrial sector should solve institutional issues such as cyber security.
- Based on the fact that the spread of advanced technologies can influence consumer behavior, government and the industrial sector should help the private sector create products and services that will encourage environmentally friendly consumer behavior.

Action 3. Internationalize cooperative efforts for deploying innovation outcomes

- Government and the industrial sector should enhance worldwide cooperation to promote the introduction of market scheme for low-carbon society systems and removal of legal barriers.
- Government and the industrial sector should utilize the SDGs framework based on the premise of collaboration with various stakeholders inside and outside of a country.
- Government should establish a mechanism to disseminate the outcome of corporate-driven green innovations to society.
- The industrial sector should reduce global CO₂ emissions by promoting not only manufacturing processes with less emissions but also spreading eco-products across national borders so as to decarbonise through the global value chain. In addition, the industrial sector should consider the mitigation of short-lived climate pollutants such as black carbon.
- Governments and the industrial sector and investors should encourage private companies to promote their superior environmental technology developments in consideration of changes in worldwide trend such as caused by TCFD recommendations.

NET ZERO EMISSION



INNOVATION

Inspire



Visualization of the company climate change countermeasures



A social mechanism that funds contribution to green growth



Sustainable business models further promoting the inflow of investors

Involve



Every possibility in terms of decarbonisation technologies and CO2-free power source



Utilization of digital technologies and solution of institutional issues such as cyber security



Products and services that will encourage environmentally friendly consumer

Internationalize



Market scheme for low-carbon society systems and removal of legal barriers



SDGs framework based on the premise of collaboration with various stakeholders



A mechanism to disseminate the outcome of corporate-driven green innovations to society



Processes with less emissions and eco-products, and decarbonisation through the global value chain



Superior environmental technology developments in consideration of changes in worldwide trend