

## Report

Hitachi-UTokyo Laboratory: Sixth Industry-Academia Collaboration Forum

# Toward Realizing Energy Systems to Support Society 5.0

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#Carbon Neutral #Co-creation and Open Innovation #Sustainability #Research & Development

## Highlight

The Hitachi-UTokyo Laboratory has been publishing proposals titled "Toward Realizing Energy Systems to Support Society 5.0" since 2018. These include a wide range of suggestions related to energy transition scenarios, based on energy supply and demand simulations generated by backcasting from 2050. This sixth industry-academia collaboration forum included a review of Hitachi-UTokyo Laboratory's past activities and explored themes of "Growth Strategies Advancing in Tandem with Carbon Neutrality" and "Japan in the Midst of Geopolitical Changes in Terms of Climate, Energy, and the Environment." This led to discussions from such perspectives as the structural changes that are needed in society and industry to realize carbon neutrality and their impact on energy systems; the direction that should be taken for energy infrastructure; and the systems and policies needed to support this.



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## Opening Remarks

In the seven years since the founding of Hitachi-UTokyo Laboratory in 2016, it has served as a venue for various stakeholders from government and industry to come together to discuss how the energy field in Japan should develop in the future. The sixth Hitachi-UTokyo Laboratory industry-academia collaboration forum was held in February 2024.

In his opening remarks, President Teruo Fujii touched upon the myriad complex issues facing human society at this moment in time, including the fluidity of international relations and the increasing severity of climate change. He described The University of Tokyo's activities last year, which included entering a collaboration agreement with the UK's Imperial College London (ICL) in fields such as creating decarbonization technologies. They held joint workshops to exchange opinions on how to solve problems and secure international cooperation to achieve carbon neutrality (CN). President Fujii had the following to say about his hopes for discussions at the Forum: "While acknowledging that leading-edge technologies such as generative artificial intelligence (AI) will cause the growth in energy demand to continue, I hope that our discussions will identify roadmaps and transition scenarios that can achieve both CN and economic growth in industrial fields. These discussions can be a sound first step toward resolving the issues that human society currently faces."

Toshiaki Higashihara, Executive Chairman and Director of Hitachi, Ltd., emphasized that a holistic debate was required that takes into account the wide range of people and things that will be affected by both the process and result of achieving CN. He said that as energy demand will only grow in the future, it is important to find a balance between demand policies and supply policies so that both CN and a stable energy supply can be achieved by 2050.

"For example, in addition to obvious demand measures such as saving energy and supply measures such as boosting renewable energy, I believe that the time has come for us all to debate the use of other energy sources, including atomic power and nuclear fusion. Even though the circumstances we face as a society are fluid, if we devise a basic roadmap, then we can adapt it as necessary according to changing conditions and move toward our goals. I hope that we can use today's Forum as a starting point for constructive discussions."



Teruo Fujii  
President, The University of Tokyo



Toshiaki Higashihara  
Director, Executive Chairman, Hitachi, Ltd.

## Overview of Hitachi-UTokyo Laboratory Activities and Proposals

Next, Professor Shinobu Yoshimura from the Graduate School of Engineering, The University of Tokyo, introduced the basic outline of Hitachi-UTokyo Laboratory's systems and activities. Working under the goals of "Creating a vision toward realizing Society 5.0 (super smart society)" and "Communicating models for resolving societal challenges in post-COVID society (technology development, policy proposals)," Hitachi-UTokyo Laboratory has been conducting collaborative activities through a "Habitat Innovation Project" based on the theme of urban development and an "Energy Project" based on the theme of energy systems. Experts from a wide range of fields are participating in working groups (WGs) to study and test specific measures. They outline big picture concepts through wide-ranging discussions based on scientific evidence, and engage in further debate through closed workshops and open forums held every six months. With regard to cooperation with the UK's ICL, the joint research system has been strengthened through measures such as entering a collaboration related to clean technology (May 2023) and holding a joint workshop (November 2023).



Professor Shinobu Yoshimura  
Graduate School of Engineering,  
The University of Tokyo

Then, Naohiro Kusumi, General Manager at the Center for Sustainability, Research & Development Group, Hitachi, Ltd., spoke about changes in society due to the increasing severity of abnormal weather resulting from climate change, the impact on supply chains caused by geopolitical risks, and the diversification of behavior and lifestyles resulting from the global pandemic, as well as the responses of major countries around the world to these changes. He emphasized that since different networks affect each other and cause a complex interaction of issues, it is important to keep in mind the desired vision of a future society when considering policies. Based on this, the issues raised at this Forum can be summarized in the following four proposals.



Naohiro Kusumi  
General Manager, Center for Sustainability, Research & Development Group, Hitachi, Ltd.

- (1) Establish countermeasures for increasing power demands in information communication fields, exemplified by generative AI
- (2) Create a roadmap for using the transition to CN in industrial and other fields to generate growth
- (3) Absorb carbon through coexistence with nature, such as blue carbon
- (4) Collaborate with Japan's international partners, focusing on the Asia-Pacific region

Based on the discussions at this Forum, the sixth version of Hitachi-UTokyo Laboratory's proposal "Toward Realizing Energy Systems to Support Society 5.0" has been published in June 2024.

## Hitachi-UTokyo Laboratory Reports and Discussions

# Part 1 "Growth Strategies Advancing in Tandem with Carbon Neutrality from Vision to Realization"

Next, each WG gave a report and participants engaged in discussions based on these. In Hitachi-UTokyo Laboratory Reports and Discussions: Part 1 "Growth Strategies Advancing in Tandem with Carbon Neutrality from Vision to Realization," Professor Ryoichi Komiyama from the Graduate School of Engineering, The University of Tokyo and Tomomichi Ito, Senior Manager at the Center for Technology Innovation – Decarbonized Energy, Research & Development Group, Hitachi, Ltd. gave a report about "The Future Ideal and Growth Strategies for Energy Systems Reflecting Social and Industrial Changes." Hiroshi Ohashi, Vice President of The University of Tokyo, presented a report about "Energy Systems to Support Social Growth: Issues and Innovations for Electricity System Reform." Based on these reports, experts then held discussions around the theme of "Industrial and Regional Growth Strategies Advancing in Tandem with Carbon Neutrality." Summaries of each session are described below.

## (1) The Future Ideal and Growth Strategies for Energy Systems Reflecting Social and Industrial Changes

Currently, there is a global trend to replace work support and product development support with AI, and the market for generative AI is expected to expand dramatically in the next decade. As a result, the amount of information handled worldwide is forecast to increase exponentially, leading to growth in power demand as high as 260 TWh by 2050, even accounting for technological advances in servers and related devices.

In response to this issue, Hitachi-UTokyo Laboratory WG1 explored whether CN is possible while supplying this huge energy demand, and what kind of countermeasures would be effective. They divided their study between the following four scenarios: (1) 100% renewable energy, (2) Thermal power carbon-dioxide capture and storage (CCS) limitations, (3) Utilization of nuclear power, and (4) Procurement of hydrogen power. These discussions concluded that scenario (3) would provide the best balance both for combating climate change and ensuring the stable supply of energy while taking into account overall costs, variable renewable energy (VRE), self-sufficiency rates, and storage rates. However, it was found that even under this scenario, to satisfy the increased power demand from information and communications technology (ICT), in addition to increasing the number of nuclear power stations, it would be necessary to double the number of offshore wind power stations planned under the previous green growth strategy.

Managing the natural fluctuations of power in the grid due to variable output of renewable energy sources such as offshore wind remains a difficult issue. At present, under the direction of the national government, non-firm type connections that utilize renewable energy using existing transmission lines are being developed; however, this is expected to cause grid congestion nationwide. In response, countermeasures are needed to increase the stability of supply through appropriate congestion processing and ensuring balance between supply and demand, as well as to make grid operations more efficient and reduce the overall power costs of the grid. To restrain power costs, this report also identified the importance of providing appropriate on-site guidance to major consumers of electric power, such as data centers and large factories, and the formation of price signals that reflect the congestion status of the grid, such as nodal control\*).

The second half of the report presented the results of specific studies based on simulations that were conducted with regard to three issues: (1) Ensuring electric power stability and dealing with the uncertainty of renewable energy sources in order to maintain Security, Energy Security, Economy, and Environmental Conservation (S+3E), (2) Revitalizing regional economies to achieve both environmental and economic benefits, and (3) Devising decarbonization measures in industries where electrification is difficult, such as advanced use of heat or carbon dioxide absorption.

Hitachi-UTokyo Laboratory will continue discussions and analysis aimed at solving the issues identified in this study.



Professor Ryoichi Komiyama  
Graduate School of Engineering,  
The University of Tokyo



Tomomichi Ito  
Senior Manager, Center for Tech  
nology Innovation – Decarbonize  
d Energy, Research & Developm  
ent Group, Hitachi, Ltd.

\*) This is a framework for optimizing overall grid operations based on grid information (such as power source and demand locations, transmission constraints, and power source characteristics), in order to substitute power sources economically across the entire grid, control output, and manage power flows economically and rationally.

## (2) Energy Systems to Support Social Growth: Issues and Innovations for Electricity System Reform

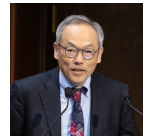
In the past, the power system in Japan was characterized by regional monopolies, rate-of-return regulations, and vertical integration (integration of power generation and sales). The Electricity System Reform (Fifth System Reform) was introduced from 2011 to 2020 based on a diverse range of perspectives, such as ensuring flow between different power markets, increasing price flexibility, and increasing the ratio of renewable energy. The most significant of these changes was the increase in options available to consumers. The purpose of this reform was to change from the previous system where local retailers supplied power to consumers within a local monopoly to a system where consumers themselves can choose which retailer to use. This encourages competition and reduces prices.

However, new problems were revealed in the process of demonstrating this reform. One concern was about supply capabilities and procurement capabilities. In the previous system based on a local monopoly and rate-of-return regulations, it was easy to forecast future demand and relatively easy to plan fuel procurement and facility investments. In contrast, these issues became unclear in the new competitive environment, making it difficult for operators to make investment decisions due to uncertainties in demand and price.

Furthermore, when the vertically integrated systems were separated into power generation and sales, a non-discrimination rule was introduced that forced power producers to sell their electricity to any sales company instead of specific ones. This rule revealed the advantages of the previous system that integrated power generation and sales. Specifically, since power generation and sales under the previous system was performed in an integrated manner by a specific corporate group, there was a necessity to balance the interests of the power producer that wanted to sell at a high price and the sales company that wanted to buy at a low price. This naturally restricted the market power of the power generators.

The design of power systems is currently at a crossroads, with debate focused on whether to switch to a centralized system that consolidates fuel procurement and power generation operators to improve the accuracy of quantity planning, or to create a framework that can make long-term forecasts and maintain the current decentralized system. If a monopoly system is to be pursued with an emphasis on efficiency, a new issue of how to restrain the monopoly of power producers will need to be addressed from the perspective of consumers.

Hitachi-UTokyo Laboratory will continue its research from a wide range of viewpoints, including the need to foster a competitive environment that will generate innovation, and to create energy policies aimed at revitalizing local communities and developing industry.



Professor Hiroshi Ohashi  
Vice President, The University of  
Tokyo

### (3) Discussion: Industrial and Regional Growth Strategies Advancing in Tandem with Carbon Neutrality

Next, there was a panel discussion, moderated by Kazuhiko Ogimoto, Project Professor at the Institute of Industrial Science, The University of Tokyo. The panel was composed of three speakers who presented the reports described above, and three additional experts. They discussed how to combine economic growth with the changes in industry and society that are expected to occur in the future during the transition to CN.



[Moderator]  
Professor Kazuhiko Ogimoto  
Project Professor, Institute of Industrial Science, The University of Tokyo

**Ogimoto :** First of all, do you have any comments or questions about the Hitachi-UTokyo Laboratory reports that we heard today?

**Kondo :** Japan has set targets for carbon neutrality by 2050 and for a 46% reduction of greenhouse gas emissions by 2030. To achieve these targets, it will be essential to maximize the use of renewable energy in a way that suits regional characteristics, and to do this, it is important to participate in local decarbonization activities led by regional governments, who are closest to local communities and lifestyles. This is why the Ministry of the Environment is currently promoting the creation of a decarbonization framework that is led by regional communities. As we heard in today's presentations, Hitachi-UTokyo Laboratory has debated many of these issues. What kind of role do you think local authorities, such as prefectural or city governments, should play in this regard?



[Panelists]  
Takayuki Kondo  
Director, Regional Decarbonization Projects Division, Ministry of the Environment

**Ito :** I think that it's important for local governments to recognize that their role is to be an initiator. While understanding that the sense of urgency differs between each local government, people from the outside cannot play a coordinating role for businesses and citizens in the local community. As awareness of the need for decarbonization rises and actual actions start to be taken, we need to continue the debate about where and in what way local governments should take ownership.

**Ohashi :** While some areas will be tackled by individual local governments, I think there are quite a lot of areas where it would be better for multiple local governments to cooperate across a larger scale. For example, in efforts toward realizing a circular economy (CE), each local government has established its own ordinances for the collection of renewable resources, such as storage batteries, and actions cannot be taken beyond these boundaries. In this case, it would be better for action to be taken on a nationwide scale rather than by individual governments, and to do this, the Ministry of the Environment needs to be the initiator.



[Panelists]  
Masato Ikeda  
CSR Division Head, ESG Planning & Management Senior Director, SoftBank Corporation

**Ikeda :** For regional power systems, decisions on which operators should generate power in which locations and where data centers should be established will be points of competition. In this context, who should take the lead in drawing up a vision for achieving net zero by 2050 while maintaining a balance between all these issues?

**Komiyama :** In the energy field as well, whether to centralize or decentralize has been a focus of debate for a long time. But since technologies such as photovoltaic power generation, fuel cells, batteries, and data centers cannot be controlled in a centralized system, an autonomous decentralized type of system will become key over the long term. I think that more than deciding who is the initiator, it is more important to create a framework where decentralized management can proceed autonomously; for example, by establishing location-specific pricing.



[Panelists]  
Professor Masaaki Bannai  
Emeritus Professor Mie University; Manager, Bannai Design Office

**Ohashi :** From an economics perspective, I feel an affinity for inducements based on pricing, but for this issue, I don't know how much of an inducement effect that location-specific pricing would have. Also, locating data centers in places where the transmission line infrastructure is weak will result in huge costs, but not all local governments understand this reality. So, while regional decentralization is important, I also think that some kind of guidance is also necessary.

**Bannai :** There are two questions that I would like to ask. First, renewable energy is generated using natural phenomena, so its output will inevitably fluctuate. However, demand response (DR) on the consumer side has not progressed. How should storage batteries be positioned and used when the demand side and supply side do not match? Also, we heard earlier that an increase in power demand of as much as 260 TWh is expected in the future. Instead of focusing on electricity generation, how can we save power in the future from the perspective of electricity use?

**Ito :** To make renewable energy our main power source, it's important to move away from the concept of consumers using as much power as they like whenever they like. For example, demand greatly drops during lunch time and then rises again at the end of the lunch break. This type of demand pattern will need to be changed where possible. Also, although storage batteries are an important resource for storing energy, since their service life is limited, they should be used after taking full account of their characteristics.

**Komiyama :** To respond to the large demand of data centers and save energy, I think it's important to create specific areas of demand. Japan has already installed a large number of photovoltaic generation systems, even by international standards, and wind power generation is also steadily expanding. Since wind power resources are concentrated in the northern regions of Hokkaido and Tohoku, the power grid must be expanded to reach the areas of demand. Therefore, the establishment of long-distance DC power transmission is a meaningful plan to overcome the gaps in uneven regional distribution. Creating demand by building data centers close to wind power resources could also accelerate the use of wind power.

In the second half of the panel discussion, three of the panelists each gave a short presentation, and then the panel had further discussions about their contents.

Takayuki Kondo, Director at the Regional Decarbonization Projects Division, Ministry of the Environment, spoke about decarbonization led by local governments. He said that decarbonization on the local level does not progress unless there are advantages for the regional economy. He gave an outline of Decarbonization Leading Areas that were established as model areas and the activities that were performed there, and he then talked about their future prospects.

"As we promote decarbonization as a part of our international commitments, our government wants to link this green transformation (GX) to economic growth. Earlier we heard about constraints in the power grid, and I would like to use the discussion we had today as a springboard for generating policy proposals linked to regional growth strategies."

Masato Ikeda, CSR Division Head and ESG Planning & Management Senior Director at SoftBank Corp. spoke from the viewpoint of a telecommunications carrier. He introduced analysis by SoftBank about the huge amount of data generation and its distribution processing resulting from the rise of generative AI, and reported on his company's initiatives for responding to the future increase in power demand and its impact on climate change.

"The visualization and analysis of data as a means toward decarbonization is a difficult problem. But if we can develop tools to do this and provide environments that can be used by many consumers, including small- and medium-sized enterprises, I believe that it will help drive forward decarbonization. As a company, we see decarbonization not as a cost, but as an opportunity, and we need to consider how to further progress in the future."

Also speaking was Masaaki Bannai, Emeritus Professor at Mie University, who is supporting CN and energy saving initiatives at small- and medium-sized enterprises in Mie Prefecture. He touched upon the current status of small- and medium-sized enterprises that are working toward CN, specific support processes, and the future prospects for autonomous decentralized forms of work in regional communities.

"I think that autonomous decentralized structures will become important for regional economies in the future. Electricity is being generated using the biomass and renewable energy sources that are located in these regions, and the energy will be circulated close to these communities. To achieve this, it will be necessary to develop further links with local industry and create regional frameworks."

## Part 2 "Japan in the Midst of Geopolitical Changes in Terms of Climate, Energy, and the Environment"

In Hitachi-UTokyo Laboratory Reports and Discussions: Part 2 "Japan in the Midst of Geopolitical Changes in Terms of Climate, Energy, and the Environment," Tomoko Suzuki, Corporate Chief Engineer at Research & Development Group, Hitachi, Ltd. gave a report titled "Changing Global Landscapes and Integrated Transition" and then experts discussed the theme of "Japan's Challenges in the Asia-Pacific Region."

Summaries of each session are described below.

## (1) Changing Global Landscapes and Integrated Transition

Sub Working Group (SWG) 3 at Hitachi-UTokyo Laboratory is creating transition scenarios that describe pathways for the changes required for Japan to achieve CN by 2050. In FY2023, they declared a mission of "Clarifying Transition Strategies in Japan and the Role of Japan in the Global Transition to Ensure Prosperity within Planetary Boundaries" and started new Phase 3 activities.

Currently, discussions are underway in Japan about the necessity of reducing greenhouse gas emissions in various fields, and corporate decarbonization activities are also becoming mainstream. At the same time, some issues have also come to light, such as the need to deliver both the green transition and a stable power supply at the same time, consistency among government policies related to climate and energy, and the fast enactment of innovative policies. Meanwhile, around the globe, the economic development of emerging countries in the Global South and other regions has raised concerns about further climate change caused by increased energy consumption and use of resources, and imbalances in ecosystems.

Analysis shows that the multi-layered crises over last few years have resulted in Sustainable Development Goals (SDGs) falling into serious stagnation. These and other issues facing human society are becoming ever more complex.

In response, Hitachi-UTokyo Laboratory conducted analysis based on research and expert interviews about the current status of industry in Japan and how to conduct an integrated transition encompassing CN, CE, and Nature Positive (NP). Future issues faced by industry in Japan were summarized in the following four points.

### (1) Creating a market that accelerates CN

The formation of a market where operators can recover their investments is important. Until such a market is formed, support such as regulations or public procurement is required.

### (2) Changing the awareness of citizens

Changing consciousness across society as a whole is essential to get consumers to accept the price increases that will accompany environmental measures. Society needs to transition to a form where products and operators that have a high environmental impact are steadily eliminated.

### (3) Selecting technologies in anticipation of the future

When developing innovative technologies, it is important to confirm whether these technologies anticipate competitive strengths for future industry, and that they are not being held back by existing assets.

### (4) Transforming industrial structures and creating employment

Requirements include proactive international collaboration to achieve the transformation to a green economy, the reconfiguration of industry, and a response to the resulting changes in employment.

In addition, the group reported that the promotion of consistent activities for CN, CE, and NP, which are interrelated through synergies and trade-offs, requires close collaboration between the main government ministries, or between the ministries and local governments. Frameworks and human resource education are needed to achieve the integrated governance that can deliver this. They also described how energy demand is expected to grow dramatically in Japan as well, so the aim should be to achieve the transition in cooperation with the Asia-Pacific region.



Tomoko Suzuki  
Corporate Chief Engineer, Research & Development Group, Hitachi, Ltd.

## (2) Discussion: Japan's Challenges in the Asia-Pacific Region

Next, there was a panel discussion, moderated by Hisashi Yoshikawa, Project Professor at the Institute for Future Initiatives, The University of Tokyo. The other panelists were Yukari Takamura, from the same Institute, and Tetsuya Watanabe, President of the Economic Research Institute for ASEAN and East Asia. They discussed the integration of CN and NP economies, issues involving green innovation in Japan and pathways to transition through international collaboration in the Asia-Pacific region.



[Moderator]  
Professor Hisashi Yoshikawa  
Project Professor, Institute for Future Initiatives, The University of Tokyo

**Yoshikawa :** Looking back at today's theme of "Japan in the Midst of Geopolitical Changes in Terms of Climate, Energy, and the Environment," what are your thoughts and what kind of issues do you foresee?

**Takamura :** I think that three changes are occurring in government policy, society, and economics as we progress toward achieving CN. First in terms of government policy, the ambitious climate change policy of CN has penetrated a wide range of policy fields, including energy, and CN-related laws are continuing to be established and revised. This demonstrates the importance of prioritizing a clear vision. To achieve CN, every aspect of society and the economy, including industry and infrastructure, will have to make huge changes to transition to a decarbonized or low-carbon future. As a result, industrial policy is becoming more focused on decarbonization and developing the next generation of industry.



[Panelists]  
Professor Yukari Takamura  
Institute for Future Initiatives, The University of Tokyo

Next are the changes in corporations and finance. As part of the growing trend of integrating the issues of climate change and sustainability within corporate management, such as the new obligations to disclose information related to sustainability, financial institutions are now also required to disclose information and conduct risk evaluations for their investments and loans. Organizations are responding to sustainability not only in their direct business activities and management, but also across their entire value chain, including their business partners.

Finally, there is a growing trend to use climate change as an opportunity to create a better economy and society, not only in terms of CN, but also by aiming to protect biodiversity and improve resource efficiency in an integrated manner. Since climate change, natural capital, and biodiversity are closely related issues, it is important to conduct activities that link them all together.



[Panelists]  
Tetsuya Watanabe  
President, Economic Research Institute for ASEAN and East Asia

**Watanabe :** In December 2023, the Association of South-East Asian Nations (ASEAN) Commemorative Summit and the Asia Zero Emission Community (AZEC) Leaders Meeting were held in Tokyo. Participants in these events discussed various issues, such as energy transition and the decarbonization of supply chains. The Economic Research Institute for ASEAN and East Asia (ERIA) is an international think tank, where we research and propose government policies in response to issues in Asia and in cooperation with various countries, and we take on the challenge of offering solutions. As the secretariat of AZEC, ERIA is involved in activities such as creating individual roadmaps for countries to achieve decarbonization, financing transition, identifying specific technologies for energy transition, and supporting the formation of projects. These are aligned with ASEAN initiatives related to climate change in order to work toward zero carbon while taking into account realities in Asia.

**Yoshikawa :** In Japan, steady progress is being made toward decarbonization, such as the enactment of the Act on Promotion of Global Warming Countermeasure, the establishment by many corporations of their vision for decarbonization, and in local government activities. However, as Japan transitions to a green economy that ranks among the best in the world, what barriers remain, and how do you think we can overcome them?

**Takamura :** To reduce the occurrence of natural disasters and other risks inherent in climate change, greenhouse gas emission will need to be reduced at an ambitious speed and scale. To do this, I believe that it is very important to establish government policies that will transform industrial structures and encourage companies or regions to take action toward decarbonization without hesitation. Specifically, there is a need for both short-term policies that promote business activities and the expansion of products and services that have a low environmental impact, and policies that anticipate strategies 30 years into the future. It is also crucial for integrated policies to be formed between all the responsible ministries as they work toward achieving the three major targets of CN, CE, and NP. We look forward to hearing about Hitachi-UTokyo Laboratory's next move in this area.

**Yoshikawa :** Looking worldwide, I find it ironic that individual countries and regions are competing with their own industrial policies to try to solve a global problem like climate change. How do you feel about this?

**Takamura :** As you say, at the moment countries must cooperate while also competing with each other. While it goes without saying that international cooperation is important, as the structure of society is changing, there is competition over who will take the initiative. In this context, it is important to pay close attention to trends in the global market when evaluating and selecting technologies, while also trying to change the mindset of consumers and demand-side users. The means not only raising awareness, but also creating frameworks that encourage consumers to spontaneously choose products and services with a low environmental impact.

**Yoshikawa :** What do you think about the initiatives for transitioning to a green economy in the diverse regions of ASEAN, and Japan's contribution?



**Watanabe** : I think that helping Southeast Asia, India, and other rising economies to achieve decarbonization will be a crucial issue as global decarbonization progresses. As economies grow, populations expand, and incomes rise, carbon dioxide emissions will also increase. How to balance this with achieving net zero is a difficult challenge for growing markets. Since conditions such as energy resources and the ratio of renewable energy differ according to each country, actions will need to be taken while taking into consideration diverse circumstances. From the perspective of an integrated approach, Southeast Asia is said to be rapidly losing its biodiversity, and discussions are being held on combining energy transition with the goals of protecting the environment and society, and reducing natural disasters. In this context, ASEAN countries have high expectations of Japan, hoping that it plays a role through Japanese technologies and assisting with industrial competitiveness. Japan is expected to be a partner in helping to solve problems in Asia together with local companies and investors.

**Yoshikawa** : President Watanabe, I hear that you met various executives at a recent Ministerial Meeting to celebrate the 50th anniversary of founding the International Energy Agency (IEA). Current hot topics at international organizations include debate about India joining the IEA and the applications by Indonesia and Thailand to join the Organisation for Economic Co-operation and Development (OECD). What do you think about these series of developments?

**Watanabe** : Joining these international organizations is a huge step for countries in Southeast Asia, which have identified participation in global governance as a key national target. The participation of these countries will also fundamentally change the governance of the organizations themselves, and we expect that including voices from rising economies will help push forward debate about climate change and energy transition. On the other hand, it is a fact that the sense of urgency in these countries is different from that in European countries.

**Yoshikawa** : New knowledge, behavior, and decision-making is essential as we move toward a holistic response. With this in mind, what kind of human resources will be required in the future?

**Takamura** : The importance of regional communities was discussed in Part 1. If the essence of a green economy is to improve the well-being of each of us as individuals, we need human resources who can help build the pathway to a green economy focused on the future. I think it's important to develop human resources who can identify issues together with local stakeholders and integrate various opinions based on science and data.

**Suzuki** : Various projects are already underway aimed at regional decarbonization, but it is unlikely that many of them will be successful. However, by focusing on the few successful cases, we can study why they were successful and perform screening by identifying the elements related to human resources that led to success. This will be a shortcut to developing the necessary human resources.

**Yoshikawa** : On the issue of analyzing case studies, universities and research bodies should be able to make a contribution. Another issue is that looking at recent international debate about decarbonization, discussions seem to be gradually moving beyond energy and spreading to a variety of values, most notably democracy. In addition, systems are changing to a form that includes not only local governments, but also citizens and other stakeholders. Do you have any thoughts about current global governance with regard to decarbonization?

**Takamura** : I'm worried about the issue of global governance. Furthermore, this year will see elections in many major countries, and new governments in various countries could have a huge impact on governance between nations. I believe that the role of non-state actors is crucial for creating stronger global governance both for climate change and in wider fields. It's not unusual to see major discussions at international negotiations, such as for international rules or international standards, based on or led by the private sector. One key method to creating an even better green economy is to establish governance that incorporates the role of the private sector.

**Yoshikawa** : Hitachi-UTokyo Laboratory will continue to work together with diverse actors to conduct research and take on the challenge of identifying pathways toward an integrated transition in Japan. What are your hopes for Hitachi-UTokyo Laboratory, do you have any advice for us?

**Watanabe** : I think that the ability to take an integrated approach is one of Japan's strengths. The various countries in Southeast Asia have high expectations for Japan, and in the future, I think that cooperation with various actors from Japan will become even more important for them in the field of energy transition.

**Takamura** : I think that the biggest challenge in achieving an integrated transition is to understand the interrelated issues of CN, CE, and NP holistically, and create government policies and corporate management strategies based on this knowledge. There is also huge potential for developing technologies that transcend fields. When the EU established its net zero target in 2018, they analyzed multiple social and economic scenarios and compiled seven common technical issues that were encountered when taking actions such as improving energy efficiency and expanding renewable energy. The interesting thing is that all seven issues shared the common keyword of "digital." This is further proof that we can expect digital technologies to be a major driver of decarbonization and smart technology adoption in other fields.

## Closing Remarks

After all the programs were finished, the closing remarks were given by Itaru Nishizawa, Vice President and Executive Officer, CTO and GM of the Research & Development Group at Hitachi, Ltd. Reviewing the contents of the previous three and a half hours of reports and discussions, he spoke as follows.

"Through our discussions today, I became keenly aware of the importance of pursuing both growth in the information industry and the decarbonization of energy in tandem. Hitachi has businesses in both the energy and digital fields. We want to continue to develop technologies in the future that will make Japan a good partner in the Asia-Pacific region and enable the creation of scenarios for mutual growth."

Next to speak was Atsushi Tsuda, Executive Director and Vice President at The University of Tokyo. Touching on his own specialist background in oceanography, he said, "Keywords used in discussions at today's Forum such as blue carbon, biodiversity, and regionalism are very familiar to me, even though I'm not an expert in energy systems. In this way, I felt our discussions and debates were truly holistic. In the future, I would like to include more people from a wider range of fields to help drive forward global transition." He expressed high hopes for the initiatives of Hitachi-UTokyo Laboratory, which are penetrating government and industry, and expanding further worldwide.



Itaru Nishizawa  
Vice President and Executive Officer, CTO, GM of the Research & Development Group, Hitachi, Ltd.



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# Hitachi Review

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