

Towards a Future Where Everyone Protects Global Commons

How Co-creation and Technology Will Transform Society

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Beginning with the increasing severity of climate change, there is an urgent need to resolve global societal challenges. In the industrial sector, companies have begun various initiatives from their respective positions, with Hitachi, Ltd. setting a target of achieving zero CO₂ emissions across its entire value chain by 2050. In academia, Naoko Ishii, a professor of the Institute for Future Initiatives at the University of Tokyo, played a central role in the establishment in 2020 of the university's Center for Global Commons, which seeks to address the diverse problems that confront the world. How can we transform our socio-economic systems to achieve carbon neutrality? *Hitachi Review* invited Professor Ishii and Norihiro Suzuki, Vice President and Executive Officer, CTO, and General Manager of the Research & Development Group at Hitachi, Ltd. to discuss this question.



Naoko Ishii

Director, Center for Global Commons and Professor, Institute for Future Initiatives, the University of Tokyo

Graduated from the Faculty of Economics, the University of Tokyo in 1981 and joined the Ministry of Finance the same year. Since then, she has held positions as Director of the Multilateral Development Banks Division, International Bureau at the Ministry of Finance, Country Director (Sri Lanka) for the World Bank, Deputy Vice Minister of Finance for International Affairs, Japan and Chief Executive Officer (CEO) of the Global Environment Facility (GEF). She took up her current position in August 2020. She holds a Ph.D. in International Development from the University of Tokyo. Publications include "The Economics of Macroeconomic Policy Coordination" (Nikkei Publishing Inc.) and "Empirical Analysis on Modern Economic Growth: Institutions Critical to Sustainable Economic Growth" (co-author, Nikkei Publishing Inc.).

Thinking Together about the Conflicts between an Economic Society and Environmental Systems

—The Center for Global Commons was established at the University of Tokyo in 2020. Please tell us how the center came to be and what it hopes to achieve.

Ishii: In the context of human history, our current situation is especially perilous. We face a variety of global environmental problems, including climate change, the loss of biodiversity, and pollution of the oceans and soils. At the heart of these is a conflict between, on the one hand, how our economies and societies operate and, on the other, the environment's carrying capacity*1 and systems. In other words, these global environmental problems are something that everyone in modern society needs to think about. It was with this in mind that we set up the Center for Global Commons. As "everyone" encompasses the economy, society, and individuals, it can be seen as a very ambitious endeavor.

*1 Amount of human activity that can be sustained without damaging the global environment.

An important resource when thinking about this conflict between how our economies and societies operate and the environment's carrying capacity and systems is the concept of planetary boundaries. Put forward by Johan Rockström in 2009, this concept was an attempt to quantify the safe boundaries of human activity within which humanity can continue to develop and thrive. It identifies nine critical global subsystems, including climate change and novel entities (chemical pollutants), and plots how close we are to crossing these boundaries (see Figure 1).

The conclusions indicate that, for some subsystems, our current relationship with the planet cannot continue in the way our socio-economic systems have functioned to date.

Two key agreements were reached on this topic in 2015: the Paris Agreement and the Sustainable Development Goals (SDGs). These agreements can be seen as a recognition by people that our socio-economic systems cannot continue in their current form.

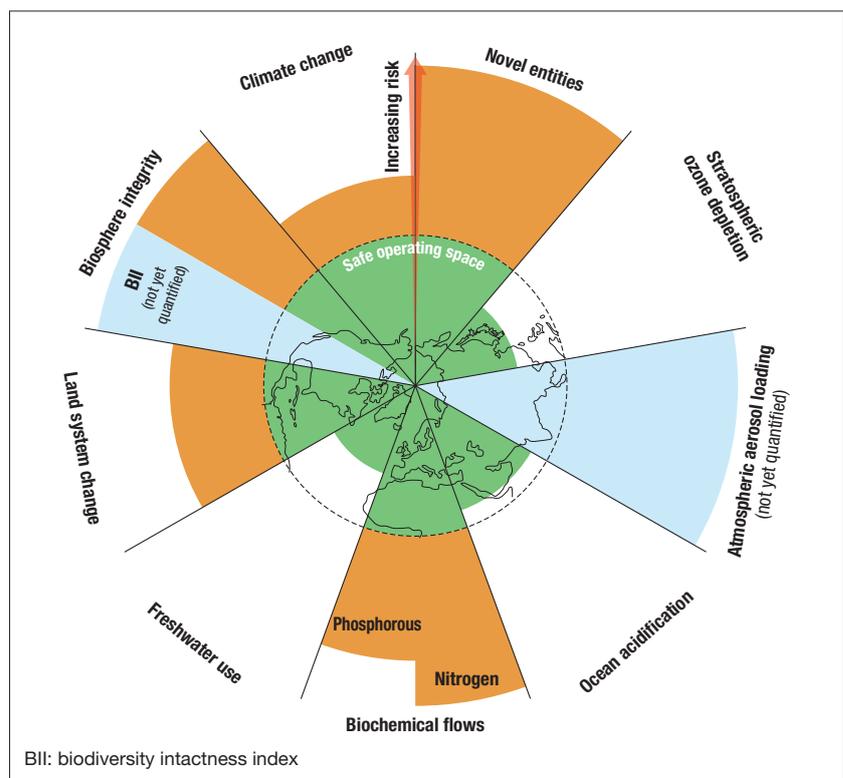
From the perspective of the global environment, the 17 goals of the SDGs can be viewed in terms of a three-tier model (see Figure 2).

The bottom tier duplicates some of the areas covered by planetary boundaries. That is, these goals will ensure that we remain well within planetary boundaries, with the second and third tiers of an inclusive society and sustainable economy built on top of this. However, we will not succeed by addressing the bottom tier only. This is because of the important interrelationships between the different tiers.

Accordingly, the mission of the Center for Global Commons is to give thought to how we should change our economies and societies.

Suzuki: As Professor Ishii mentioned, addressing challenges such as increasingly severe climate change, new infectious diseases, and the preservation of biodiversity, are serious issues for industry as well. At Hitachi, we set

Figure 1 | Nine Planetary Boundaries

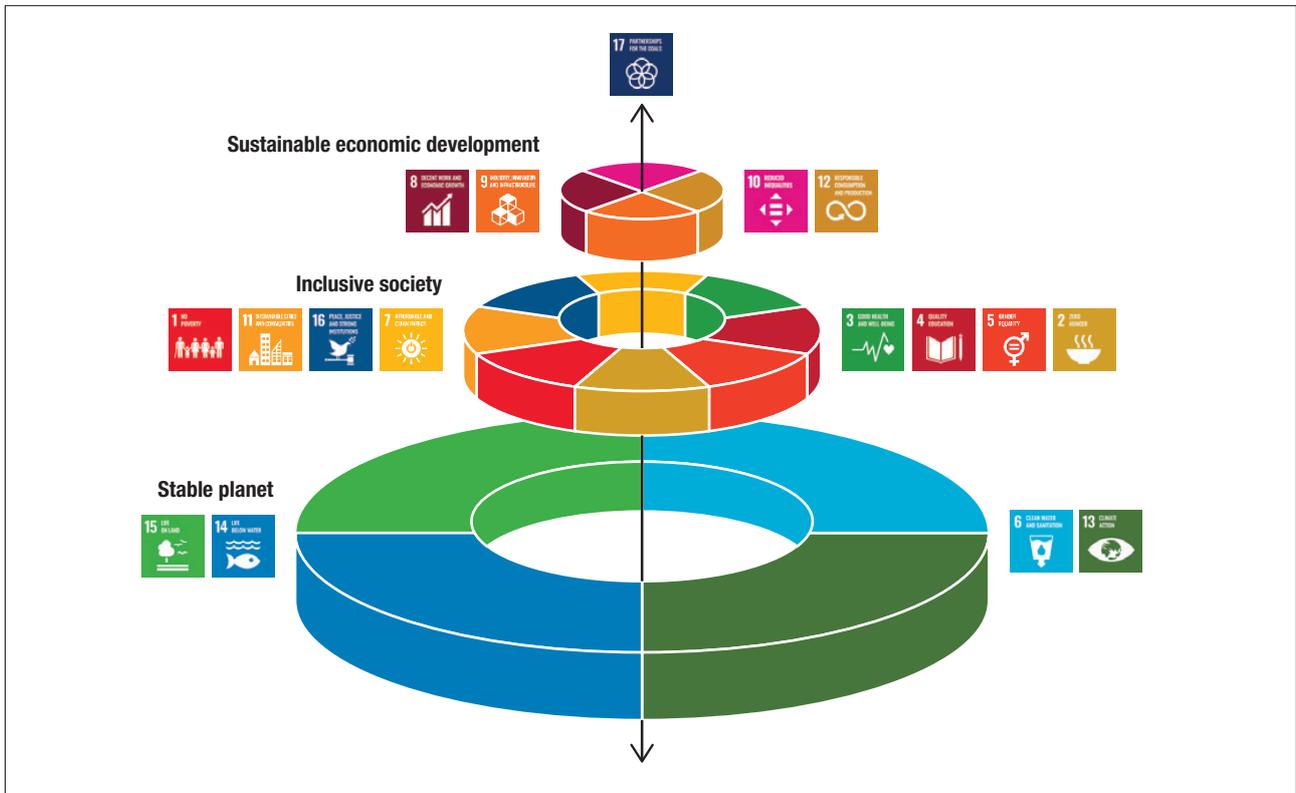


Norihiro Suzuki

Vice President and Executive Officer, CTO, and General Manager of Research & Development Group, Hitachi, Ltd.

Joined Hitachi in 1986 after completing his master's degree in the School of Engineering at the University of Tokyo. After focusing on research and development in areas such as digital image processing and embedded systems, he was appointed Senior Vice President and CTO of Hitachi America, Ltd. in 2012, General Manager of the Central Research Laboratory in 2014, and General Manager of the Global Center for Social Innovation in the Research & Development Group in 2015. He assumed his current position in 2016. Suzuki holds a Ph.D. in Engineering. He is a member of the Institute of Image Information and Television Engineers, the Institute of Electronics, Information and Communication Engineers, and a senior member of IEEE.

Figure 2 | Relationship between SDGs



ourselves the goals of achieving carbon neutrality in our offices and factories by 2030 and throughout our value chain by 2050, and are working towards these goals with various stakeholders.

How do we make the transition towards these goals – that is an important issue. That is why we established the Hitachi-UTokyo Laboratory with the University of Tokyo to study transition scenarios. In practice, this involves drafting scenarios based on an integrated view from the perspectives of the government, private sector, and consumers, and

sharing a vision of society in 2050 and technology changes with society through proposals and public forums.

Furthermore, I would like to build-up an open innovation ecosystem in which we can work through the steps of devising and trialing ideas in partnership with our co-creation partners and then put these into practice so that they become a driver of economic progress. By doing so, we are taking on the challenges of achieving carbon neutrality and resolving societal challenges within the constraints of the planetary boundaries.



Scenario-building Livens the Discourse with Multiple Stakeholders

—The 26th United Nations (UN) Climate Change Conference of the Parties (COP26) was held in Glasgow, UK in 2021. What are your impressions from attending COP26 in person?

Ishii: There were three things in particular that made the COP meeting special. The first was the agreement to keep the rise in temperature by 2050 to within 1.5°C. Two years ago people were still debating whether we actually need to

do anything, but now nobody doubts the need for action. I realized that there was a major shift in awareness.

The second thing I noticed was how people have come to think about the global environment and socio-economic systems in tandem. Out of a recognition that we are facing not just climate change, but also the necessity for change in our economies and societies themselves, people are now starting to look at the issues in more comprehensive terms. People are asking questions such as, how can we coexist with Nature and how should food supply systems be transformed? To me, this represents a big step toward a rebuilding of the relationship between the planet and our socio-economic systems.

The third particularly notable thing was the recognition of how important it is that a wide variety of stakeholders accept their joint responsibility to act. Overcoming the challenges of climate change calls for a major transformation of socio-economic systems. This is not something that nations can achieve on their own. While the road ahead may be tough, I am conscious of a willingness among a wide range of stakeholders, including industry, consumers, and investors, to take on the challenge of achieving our goals for 2050 together. I believe it has been demonstrated that global challenges can only be resolved by economies and societies collectively.

—Hitachi also attended COP26.

Suzuki: Hitachi was the first Japanese company ever to become a Principal Partner, and at COP26, supported the UK government. We hosted events and other activities both inside and outside the conference venue as well as online, one of which was a video presentation of transition scenarios using artificial intelligence (AI).

The presentation showed how transition scenarios towards realizing a decarbonized society could be generated, taking into account the economic, environmental, social, and other conditions of individual cities. We need to develop thorough roadmaps to 2050 through collaboration between industry, government, and academia. The scenario-building simulator is a meaningful tool as we think about what we should be doing now, backcasting from what sort of society we want to have in 2050. Simulation can show points in the future where paths branch off; when we go beyond a given point, there is no return. Such tools will

undoubtedly encourage constructive debate among multiple stakeholders.

Ishii: The use of digital technology in this way is a very good thing. Even if we adopt common goals for achieving carbon neutrality, figuring out how to achieve them is no simple task. There were several examples at the COP26 meeting where, precisely because uncertainties exist, multiple stakeholders came together to map out transition pathways through dialogue.

In Japan, the University of Tokyo teamed up with 13 major companies, Hitachi among them, to establish the Energy Transition Initiative – Center for Global Commons (ETI-CGC) as a platform for industry-academia collaboration with the aim of debating the pathways to carbon neutrality. Compared to Europe, renewable energy is very expensive in Japan and our industrial structure is heavily weighted toward manufacturing, meaning that, while our objectives may be the same, the paths we take to reach them will be different. The role of the ETI-CGC is to ask how best we can achieve our goals and to consider scenarios for doing so. This, too, is another very pleasing outcome of COP26.

—Could you please share your thoughts on what the studies undertaken at the Center for Global Commons tell us about the challenges facing Japan?

Ishii: Speaking in terms of the Global Commons Stewardship Index that measures and evaluates each nation's contribution to the transformation of socio-economic systems, including the environmental impact on the global commons (those global resources that are shared by all of humanity), there are two points to be made. The first is that



no nation scores very well on this index, something that is a problem not only for Japan, but also for all G20 member countries. As one of the world's major economies, we need to face up to our responsibilities. This is the first point.

The second point is that, because of imports, Japan scores poorly on the burden we impose on other countries. On a calorie basis, around 60% of Japan's food is imported and, through impacts such as deforestation, our score highlights how much load is imposed on the environment in the process of producing these imported products. Unless we as consumers think about the choices we make, the system will never be transformed in any meaningful sense. It is only when our responsibilities as a consumer nation and as a producer nation are brought together that the questions of how to make and sell environmentally low-load goods can be resolved.

In this regard, I see a lot of potential for utilizing digital and other new technologies to measure the load that production processes impose on the environment. It should be possible to foster a transformation in public awareness by clearly presenting this information to consumers.

Suzuki: As you say, encouraging a change in consumer behavior is key in creating a sustainable society as we approach 2050. This is all about optimizing societal systems in terms of the entire value chain, and I believe that changing the mindset of the people involved brings us that much closer to achieving it.

Ishii: The word "commons" refers to resources such as forests or wetlands that are shared by the community. They end up ruined if left uncontrolled, and are damaged by overuse.

As this comes back to impact the people themselves, the practice has been for them to safeguard the commons, which includes establishing rules within the community.

As economic activity becomes global, however, it becomes harder to keep track of the condition of the commons. To protect global-scale commons, we need to give global scope to the rules governing commons that, in the past, were only shared between people with a clear sense of the consequences of their own actions. This is an area where I have high hopes for digital technology. Use of this technology enables systems to reach a global scale and it would be great if we could instill a sense of community that transcends physical distance.

Critical Decade for Setting the Direction of the Anthropocene

—What significance do you anticipate the next 10 years to have?

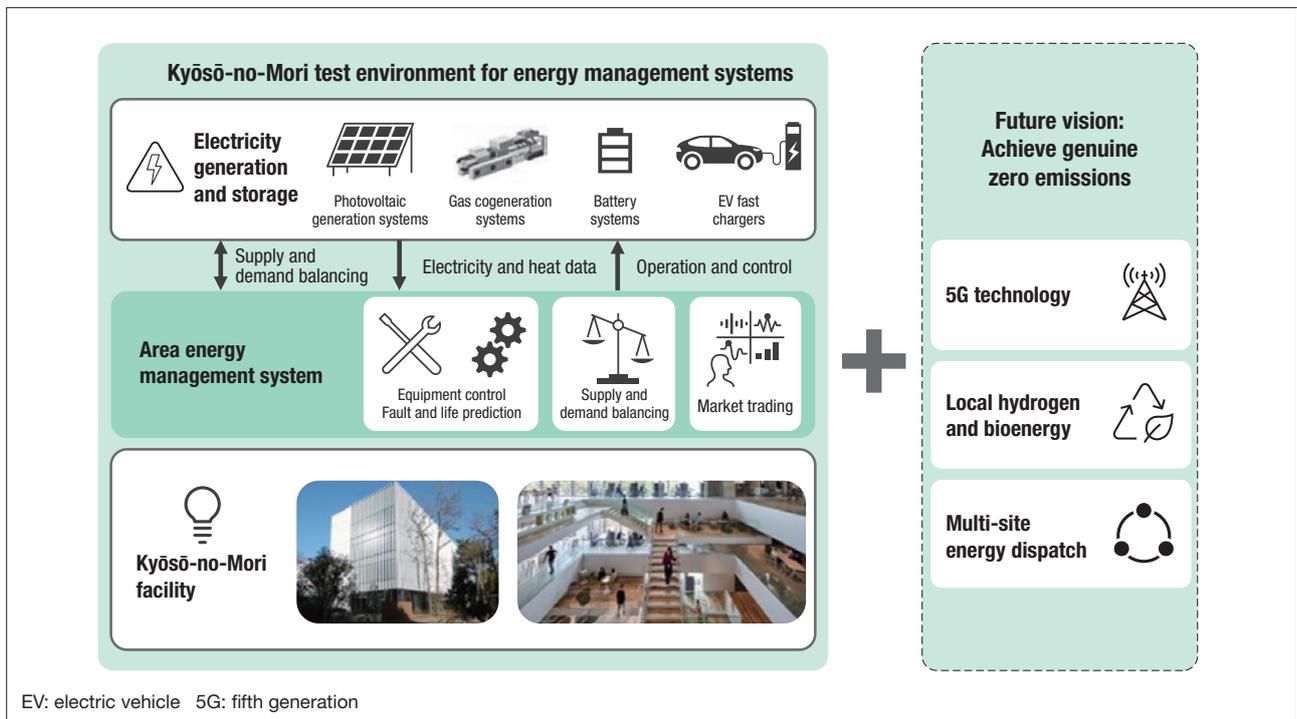
Ishii: People now talk about humanity having left the Holocene^{*2} and entered the Anthropocene^{*3}. The Anthropocene is the epoch in which human beings have become too powerful and have started to change the global environment. Unless the economy is controlled in a way that remains within the capacity of the Earth, the outcomes for society will be disastrous. We need to think very carefully about what sort of society we want to build for the future. This is a crucial issue for the coming decade or so.

^{*2} Current geological epoch covering the time from the end of most recent ice age 10,000 years ago to the present day.

^{*3} A new epoch classification proposed by the Dutch atmospheric chemist, Paul J. Crutzen, representing the period of significant human impact on Earth's ecosystems and climate.



Figure 3 | Energy Management System Using Distributed Direct-current Grid Test Environment



Rather than making us feel scared or powerless, a sense of urgency and the awareness that we are at a critical juncture needs to be harnessed to spur us into thinking about how we can collectively bring about change. New science, science-based narratives, and leadership will be vital to achieving this, and we also need to understand that we are all capable of change.

Suzuki: Hitachi is pursuing a wide variety of activities relating to energy and the environment. In particular, based on Hitachi’s strategy of “Green & Digital,” we are pursuing co-creation of a society that is both friendly to people and the environment, with many stakeholders, including local residents.

We set up a test environment for newly developed energy management technologies at the Kyōsō-no-Mori facility in our Central Research Laboratory and began operations in 2021 (see Figure 3). This includes coordinating the supply and demand for electric power with a system that also interconnects photovoltaic power generation and storage batteries, and the integration of an electricity trading system that leverages AI. Our goal is to realize complete zero emission at the Central Research Laboratory by FY2028 by continuing such initiatives.

Ishii: Listening to this, I am struck by how it reflects the outcomes of the Paris Agreement. While few technologies for decarbonization were commercially available when the Agreement was reached in 2015, the Agreement has led to international recognition that the world at large should act on decarbonization, causing the development and commercialization of the associated decarbonization technologies to proceed at an accelerated pace.

It is when a major vision like this becomes international that action on achieving it really gets underway, including technology development. As you said earlier, decarbonization will be a major trend over the coming decade, with rapid progress on technology development and commercialization. It seems to me that this represents a major form of wisdom for how to live properly in the time of the Anthropocene.

Suzuki: I believe so. While there are many steps involved in the commercialization of newly developed technology, by building up our own achievements and providing them to our customers, I hope to facilitate the early deployment of new technologies and contribute to overcoming societal challenges such as achieving carbon neutrality. Thank you for joining me in this discussion today.