MESSAGE

Hitachi's Energy Business Aiming to Contribute to Decarbonization

Creating New Value in Energy through Open Collaborative Creation

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The energy industry is approaching a major turning point, with use of renewable energy growing against a background of accelerating global action on decarbonization at the same time as the industry faces new requirements driven by factors such as the spread of electric vehicles, the expanding scale of data centers, and the growing electrification of industry. Having set itself targets that include achieving the Sustainable Development Goals and enhancing three different forms of value, namely social, environmental, and economic value, as it works to advance its Social Innovation Business, how will Hitachi go about contributing to overcoming the challenges associated with energy? *Hitachi Review* invited Hiroko Kiba, a freelance newscaster and a visiting professor at Chiba University who is familiar with the energy problem, to put this question to Hitachi Senior Vice President and Executive Officer, Atsushi Oda.

Rising Global Concern over Climate Change

Kiba: As we welcome in 2020, the year when the Paris Agreement fully kicks into gear, we see action on decarbonization proceeding at a rapid pace. One example is RE100, an international initiative in which participants pledge to acquire 100% of their energy from renewable sources. Membership exceeded 200 companies as of December 2019, including companies from India and China as well as Europe and USA. What is your take on action like this aimed at decarbonization?

Oda: Natural disasters caused by abnormal weather conditions around the world are currently getting worse. With concern about climate change rising in Japan and elsewhere against a background that includes the 25th Session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP25) held in August 2019, it seems that the move toward decarbonization is unlikely to halt. Unfortunately, even if countries meet all of the goals they pledged to at COP25, it will still be insufficient to achieve the targets of the Paris Agreement. Decarbonization demands that all nations do more, not least Japan, which had the ignominious distinction of being dubbed "Fossil of the Day" at COP25. That RE100's membership has passed 200 companies could be taken as a sign of growing awareness that climate change is an issue for the entire world that needs to be given top priority.

While this is going on, Hitachi is engaged in a variety of initiatives in its role as a company that provides social infrastructure, without being held back by outmoded thinking. As zero emissions is not something that can be achieved in a day, reductions in CO_2 will in practice be

achieved gradually and by a variety of different methods. What matters now is to produce a practical roadmap and for governments everywhere to commit to it. The consent of the public will also be essential to the creation of a decarbonized society.

While there is some debate about when the point of no return will be reached, whatever the truth is, overcoming this problem for all of humanity will only be possible with resort to rather drastic measures. Recognizing this, I believe that devising and implementing energy systems for a decarbonized society will require us to consider measures that go beyond the boundaries of industry and technology in their current form, and that we need to fully mobilize through collaboration across different sectors.

Kiba: Since five or six years ago, I have been a member of a Ministry of the Environment committee for coordinating citizen action on preventing global warming to help achieve a low-carbon society. It is noteworthy that the government has just recently shifted its terminology from "low-carbon" to "decarbonized." I also sympathize with the importance of raising public awareness. The results of recent opinion surveys give clear insight into the different views of people around the world and in Japan. Whereas approximately 70% of Japanese have a negative view of decarbonization and energy conservation, perhaps out of concern for the cost and effort, people overseas appear to believe that taking action will lead to a better quality of life. Sadly, the surveys report that awareness of the importance of decarbonization is particularly poor among Japan's younger generation.

On the other hand, industry is being called on to take the initiative in addressing problems such as the environment, economy, and human rights on the basis of the Sustainable Development Goals (SDGs) and we now live in a time when such matters directly impact corporate value. Even companies that are not in the energy sector are feeling a sense of crisis, recognizing that a failure to take the problems of energy and CO_2 seriously could put their very survival at risk.

Oda: Conscious of investor sentiment, companies are embarking on ambitious measures as exemplified by "environment, social, and governance" (ESG) investment. Meanwhile the hesitancy by the government to start talking in terms of "decarbonization" was likely due to an inability to change energy policy quickly given that our existing industrial base is heavily dependent on fossil fuels.

Kiba: While it is simple to think in all or nothing terms like the Swedish environmental activist Greta Thunberg, parts of Japanese industry are dependent on coal and we also face the question of what to do about nuclear power in the future. It seems we need an explicit timetable so that we can all head in the same direction, even if only slowly.

Oda: Right. You spoke earlier about how young people see the issue, and it is important that people acquire an awareness of the problem while they are still students. That is why I feel that education and the news media have an important role to play.

Kiba: I agree. Given the lack of any link between ratings and what is important, major media outlets tend to only carry those things that rate highly. This is a tendency among the young that is also evident at election time. They resign themselves to the belief that their solitary vote won't change the world, feeling that they can leave these matters for others to deal with for them. Enlightening people about the energy problem will also, I believe, be a test of whether we can transform such attitudes.

Energy Landscape in the Midst of a Paradigm Shift

Kiba: At the same time as action on decarbonization is accelerating on the supply side of energy, the shift to renewable energy being one such example, I believe a paradigm shift is also taking place on the demand side.

Oda: That's right. For customers to sell electric power they have generated from their own photovoltaic panels was far from standard practice in the past, and the requirements of energy users are going through major changes that include the spread of electric vehicles (EVs) and the increasing scale of data centers as well as the growing use of electrical and electrically driven equipment in industry.

As EVs have a part to play in distributed energy, they are recognized as having the potential to bring major changes to existing electricity supply systems. The situation with the expanding size of data centers, meanwhile, is slightly different. A survey reported data center investment in 2018 of approximately 17 trillion yen and 20% annual growth, with further increases projected for the future. Unfortunately, data centers consume large amounts of energy and therefore their continued expansion leads directly to higher CO_2 emissions, meaning that progress on improving their environmental performance will become more important than ever. Hitachi intends to expand its operations that help reduce the power consumption of data center equipment and other information and communication technology (ICT) through operational enhancements, such as improving the refrigeration efficiency of air conditioning equipment or making use of free cooling, and also through other measures like the use of artificial intelligence (AI) to improve energy efficiency.

New Value in Energy Provided by Hitachi

Kiba: Hitachi has in recent years been supplying a variety of different sectors with solutions that utilize digital technologies such as AI, the Internet of Things (IoT), and big data. What is your thinking with regard to the use of digital technology for decarbonization?

Oda: One initiative involving digital technology is the use of predictive diagnosis. The technology originated in industry where it is used to predict fault intervals from data on plant operation. One example is how a failure of one of the large presses used in car plants brings the production line to a halt. The business impact is even greater if it takes a long time to get it running again. To deal with this, Hitachi took steps early on to reduce lost business opportunities by providing the ability to identify the warning signs of potential faults. In the energy sector, Hitachi has sought to use digital technologies like this to make improvements across the entire energy value chain, including by enhancing electricity demand prediction, boosting the operational efficiency of power plants, and using techniques like demand response and virtual power plants (VPPs) for optimal control of distributed power sources.

While nuclear power is seen as essential for supplying base load capacity to enable the decarbonized society of the future, work on the decommissioning of Fukushima Daiichi Nuclear Power Plant also continues. It is impossible to do without robots for work at locations where radiation levels are high. The various data collected by robots, such as views of places where people cannot go, are helpful for overcoming practical challenges including through their use in analysis and simulation. Digital technology's ability to demonstrate its capabilities even under harsh conditions such as high radiation levels may well be its greatest strength.

Kiba: I believe that, as digitalization progresses in the energy sector, it will become increasingly clear that energy is surrounded by a diverse variety of challenges in different countries and regions. In October of last year I served as moderator for "Revitalizing Japan with Regional Energy," one of the business sessions at Hitachi Social Innovation Forum 2019 Tokyo. What is Hitachi doing in the area of regional energy?

Oda: Distributed generation is one of the first things that comes to mind when speaking of regional energy. Hitachi has put together a basic model of energy management comprising supply, demand, storage, and control and it supplies a wide range of solutions targeting zero CO_2 emissions to suit different regional characteristics, including solutions for offshore islands and for the local production and consumption of energy.

One such initiative is a collaborative creation demonstration project on the Isles of Scilly in the UK. Located off the southwest coast of the UK, these scenic islands with a resident population of 2,000 attract more than 100,000 tourists annually. They face severe energy problems with a high level of CO_2 emissions due to their reliance on fossil fuels. The project is already underway and has set itself ambitious goals to be achieved by 2025. These are to reduce electricity bills by 40%, to supply 40% of electricity demand from renewable sources, and to replace 40% of the vehicle fleet with low-carbon or electric models. Hitachi is part of the project and is currently undertaking work that will help make good use of renewable energy and maintain stability, utilizing AI and other digital technologies as well as an IoT platform for the energy systems installed on the islands (photovoltaic power generation systems, storage batteries, and heat pumps).

Atsushi Oda
Senior Vice President and Executive Officer, Hitachi, Ltd.
Joined Hitachi, Ltd. in 1980. Following work including the design of piping and plant systems for nuclear power plants and project management at new and existing plants, he was appointed Vice President of Hitachi Power Systems America, Ltd. in 2006, President of Hitachi Power Solutions Co., Ltd. in 2013, General Manager of Transmission & Distribution Systems Division, Energy Solutions Company and COO of Power Systems Company, Power & Infrastructure Systems Group in 2015, and appointed Vice President and Executive Officer in 2016. He took up his current position in April 2019. He is a member of the Institute of Electrical Engineers of Japan.

Kiba: Control, Hitachi's area of expertise, is particularly important for the system-wide optimization of energy. I have recently had the opportunity to speak with telecommunications company managers on the subject of smart cities. Whereas energy problems were the initial focus with smart cities, our conversation focused on how the latest digital technologies such as the IoT and 5th-generation (5G) telecommunications can be used to deliver services that will make life easier for the public, covering the topic of civil defense and how to convey data on rising water levels during heavy rain events as well as things like the use of facial recognition for access control security and the use of drones for lunch delivery.

Oda: Social infrastructure is like the air: rather than the use of electricity as such, what people want is to live a comfortable life. It is the experience that matters to them. Our attitude to cars is shifting from their being something we own to something we share. Nevertheless, we cannot forget that, as in the case with smart cities, it is energy that underpins all of this.

Kiba: Yes. The purpose of smart cities is to resolve the challenges facing society. While IT is an important tool for doing this, the infrastructure of energy is also essential to living well and overcoming these challenges. The ideal is to build smart cities layered with the technologies for solving these problems.

Open Collaborative Creation Essential to Innovation

Kiba: I believe that achieving decarbonization will require us to raise environmental awareness and bring different stakeholders together. I understand that Hitachi works on solving problems with customers through a process of collaborative creation.

Oda: We are actively pushing ahead with demonstration projects around the world, engaging in collaborative creation with a wide range of customers. In addition to the Isles of Scilly, projects are also proceeding on Maui in Hawaii and in places like Germany and Slovenia. A large-scale hybrid power storage system demonstration project in Germany is using the charging and discharging of two different types of batteries to provide an economic means of balancing supply and demand for electric power. The project also aims to establish a business model designed with new forms of electricity trading in mind to help maintain stability on grids that already include large amounts of renewable energy. Among the demonstration projects currently underway, we are engaging in collaborative creation with a wide variety of stakeholders, with a cloud-based energy management system in Slovenia, and the use of large numbers of EVs in London, UK.

We also recognize the importance of presenting ideas to society through collaboration between industry and academia. Hitachi-UTokyo Laboratory, a facility established to foster innovation for Society 5.0, put out a proposal in 2018 entitled, "Toward Realizing Electricity Systems to Support Society 5.0." The work that went into compiling this proposal included the development of a simulator for assessing how to maximize the public good with respect to the challenges posed by the installation of large amounts of renewable energy, and this was accompanied by the provision of opportunities for open debate on various different measures. This is because, factoring in improvements on the policy front or the design of new regulatory systems, etc. we believe in the importance of open debate informed by quantitative facts. Hitachi-UTokyo Laboratory has held two open forums, the most recent of which was attended by about 700 people at the Yasuda Auditorium, including members of the general public, and included vigorous discussion among the panelists in particular.

Hitachi made a decision in 2018 to acquire the power grid business of ABB Ltd. While the details are still being finalized, I am confident that combining ABB's world-leading products and technologies for transmission and distribution systems and grid automation with Hitachi's strengths in digital technology will deliver innovations to help achieve decarbonization.

Kiba: As the limits on what individual companies can do become clearer, we appear to be entering a time when companies will increasingly align their different areas of expertise to build new strong and flexible organizations that can adapt to a changing world.

Interviewer
Hiroko Kiba
Freelance Newscaster and Visiting Professor at Chiba University
After graduating from the Faculty of Education at Chiba University, she joined Tokyo Broadcasting System Television, Inc. (TBS) as an announcer in 1987 where she was responsible for numerous sports programs as the station's first female sportscaster. She became a freelance reporter in 1992. She was a member of the Council for Regulatory Reform and a Cool Earth Ambassador for the 2008 G8 Hokkaido Toyako Summit in 2007 and a member of the Meeting on Education Rebuilding in 2009. She currently sits on committees for seven government ministries and agencies. She has been a visiting professor at Chiba University since 2013, an outside Audit and Supervisory Board Member of INPEX Corporation, and the Executive Director of the Ports & Harbours Association of Japan. She is a preventive healthcare instructor.

Oda: I agree. "Openness" is a key feature of collaborative creation at Hitachi. As in the concept behind Lumada, I believe that new innovation arises out of bringing machines and people together.

Looking to the Future of Energy

Kiba: I was surprised to hear about Hitachi's acquisition of the power grid business of ABB you mentioned earlier. Looking to the future of energy, including electricity grids, what sorts of businesses does Hitachi intend to develop?

Oda: First of all, I believe it is vital to conduct our business activities with a clear mission. The Corporate Credo of Hitachi is "contribute to society through the development of superior, original technology and products" and we aim to achieve social innovation by holding to this credo and seeking to improve three forms of value: social, environmental, and economic. In the context of energy, social value is represented by things like ensuring energy security and providing resiliency, especially the reliable supply of clean electric power at low cost. Environmental value means the achievement of a decarbonized society and economic value is enhanced by putting all of these things together. This is what we see as our mission.

In terms of the SDGs, our particular strategic focus is on addressing the three development goals of "affordable and clean energy," "sustainable cities and communities," and "climate action." In addition to the initiatives I have already mentioned, what this means in practice is that we take up the new challenges posed by growth areas driven by electrification and electrically driven equipment as well as promoting businesses that recognize the changing trends in how electricity is used. Combining digital technologies such as Lumada with our strengths in energy solution technologies will deliver social innovation in the energy sector, and this in turn will enhance the three forms of value and facilitate achievement of the SDGs.

Kiba: Incidentally, I am a member of a group set up by the Ministry of Land, Infrastructure, Transport and Tourism to study the role of blue carbon in helping prevent global warming. "Blue carbon" refers to the potential for seaweed and other marine organisms to absorb and sequester carbon, a topic that has attracted interest in recent years. The group has been measuring how much CO_2 is absorbed in terms of absorption coefficients and areas (activity levels) with the intention of presenting its results to the United Nations in 2025. Unexpectedly, I was pleased to learn that it is the USA, a nation seen as something of a global warming denier, that has taken the lead in successfully pursuing blue carbon initiatives.

Oda: Hearing you say that reminded me of how more than 70 countries or regions announced an intention to reduce greenhouse gas emission to zero by 2050 at the United Nations Climate Action Summit in September 2019. With so many other countries and regions setting such high goals, I feel it is incumbent on Japan too to make an effort to change itself.

Kiba: Thanks to the actions of global companies like Hitachi, I believe that the issues that Japan should be addressing in the future have been made clear. Thank you for your time today.