

Special Interview | Sustainable Management

Sustainability in an energy company working to meet the challenge of realizing net zero carbon emissions

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Changes in the external environment and the global trend toward carbon neutrality

Yamada In May 2021, the Company declared it would achieve net zero carbon emissions by 2050. Towards this goal, we established Vision 2030, which lays out the vision for our company in 2030, as well as the Seventh Consolidated Medium-Term Management Plan (hereafter, "the Seventh MTMP") which began in FY2023. Although the direction of our decarbonization efforts has not changed, 2050 is still a very long way off. We must be aware of wide ranging and ever-changing trends in countries around the world. These trends include regulations, as well as changes in investor and consumer awareness. Additionally, as the situation in Ukraine began immediately before

the formulation of the Seventh MTMP, the Company, as energy companies deeply involved in global energy trends, remain vigilant and keenly aware that the management decision-making and actions we take hereafter will have a huge impact on our enterprise value in the next decades. As uncertainties remain high, I believe it is vital for us to keep flexibility when it comes to making changes and additions even when this applies to our business strategy. At the same time, we will be keeping a close watch on what is happening all around us.

Kurosaki The situation in Ukraine was a huge shock to the world for several reasons. For Europe, supplies of Russian natural gas were cut and this led to an accelerated shift toward renewable energy within Europe. For the US, the budget for combating climate change accumulated under the IRA¹. These effects gave us a clearer picture of the different moves being made in each region, such as in Europe and North America. In addition, there is large movement in regard to China, and I believe that Japanese companies are struggling with how to manage the situation. On the other hand, to help drive the shift to a carbon-free world, we are beginning to see frameworks for evaluating decarbonization and financing initiatives. With these developments, we are also seeing companies in the financial services industry actively seeking to deepen their knowledge about energy. We are in the midst of a huge period of transformation where we must maintain the balance of energy supply and demand while making future-minded investments, etc. The exacerbation of natural disasters caused by climate change has inspired stakeholders

across the globe to become keenly aware of climate-related issues and how these are being addressed. In recent years, there has been a global demand for action towards the 1.5°C scenario to prevent crossing the critical climate threshold. Even if we reach zero carbon dioxide emissions in 2050, since residual greenhouse gas (GHG) emissions will remain, activities to remove carbon dioxide will be essential. Although initiatives such as those listed in your Vision 2030, including making renewable energy a main power source, carbon-neutral fuels, and CCS/CCUS², are challenging, I believe that we are currently in the most crucial moment for taking them on.

Yamada Since the situation in Ukraine began, and from the standpoint of energy security as well, I really feel the importance of realistic initiatives to achieve carbon neutrality. It is vital that we promote steady decarbonization while continuing to fulfil our role as an energy provider.

Kurosaki Yes, I agree. There are a great number of companies who are saying that 2023 is the year to start taking steps toward carbon neutrality. In fact, in 2022 alone, oil companies invested some US\$33.0 billion³ in decarbonization. Until now there was active investment in the electric power sector, but recently, investments in electric power and carbon-neutral fuels, such as hydrogen, are split approximately 50-50. This development is one we must watch carefully. Looking at these figures,

¹ IRA (Inflation Reduction Act): Law passed in the US in 2022 to curb inflation and promote swift measures for energy security and to combat climate change.

² CCS: Carbon Capture and Storage technologies // CCUS: Carbon Capture, Usage and Storage

³ Source: BloombergNEF



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we can discern that oil companies are making use of the knowledge and expertise they have gained over the years to develop decarbonized businesses in all corners of the globe.

Yamada The unavoidable cost incurred during this period of energy transition raises concern about weakening industrial competitiveness compared to China and India. However, while initial investments will be costly, I believe there will come a time when we can provide green electricity and next-generation energy at the same cost as fossil fuels. Already in Europe, there are cases where the price of green electricity is the same, or less expensive, than fossil fuels.

Kurosaki In China and India, against the backdrop of a massive market size, the introduction of renewable energy is increasing at a rapid pace. Pricewise, it is likely that China and India will have an edge in terms of industrial competitiveness in the short term. However, as we have seen in the example of the EU approval and introduction of the Carbon Border Adjustment Measure, we can expect to see the global spread of carbon pricing, in which the amount of carbon emitted in the production process is taxed. With this, I believe that industrial competitiveness will return to developed countries. Also, an issue facing Japan is that the country's energy transition promotion measures and subsidy systems are not as robust as those of other countries. We are seeing a rise in consumer awareness about carbon neutrality due to the IRA providing a significant incentive in the US and the sufficient subsidies provided in Europe to replace home heat pumps or switch to green electricity, as well as for efforts involving home insulation, etc.

Commitment to bolstering the green electricity supply chain

Yamada The theme of Vision 2030 is: *To create energy that shapes the future, energy that sustains society, and new forms of value.* Under this vision, we plan to invest ¥400.0 billion in *New fields*, such as green electricity and next-generation energy by 2030. Regarding the first pillar of our vision, *Bolstering the Green Electricity Supply Chain*, the Group has been involved in onshore wind power generation for quite a while and commands the third largest domestic share. Moving forward, we would like to expand our wind power generation businesses even further, including offshore wind power generation. In addition, when considering the shift in electric power sales from FIT to FIP⁴, we plan to begin validating our power storage business since supply-demand adjustment capabilities will be crucial in the future. Furthermore, we anticipate that our large-scale network of existing Petroleum Business customers will become prospective customers for green electricity in the future. For this reason, we will bolster our own independent supply chain that integrates power generation, supply-demand adjustment, and electric power sales. As set forth in the Seventh MTMP, we plan to invest ¥140.0 billion in *New fields* over three years.

Kurosaki Looking at your medium-term management plan, I sensed your company's strong commitment based on the fact that planned investment in *New fields* increased more than fourfold between the Sixth MTMP to the Seventh. I thought your



company has made a significant change in course. As an analyst, I was quite familiar with your company's projects and I recognize that Japanese wind power generation businesses require long-term assessments and constitute a highly challenging field. I also serve as an independent advisor for the RE100⁵ initiative and believe that based on the increase in RE100 member companies we can estimate that demand for green electricity will increase and thereby make green electricity supply chains a particularly important field. Until now, the challenge for many of the companies operating green electricity businesses was gaining new customers, but your

⁴ FIT: Feed-in Tariff; scheme in which renewable energy producers receive a fixed price for their energy // FIP: Feed-in Premium; scheme in which renewable energy producers receive a premium in addition to market price.

⁵ RE100: Global initiative committed to procuring 100% renewable electricity for electricity consumed during the course of business activities.

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company has a huge advantage in that you have already built up an extensive customer network.

Yamada The challenges we face in terms of bolstering our green electricity supply chain lie in the supply-demand adjustment area. Therefore, the plan for our electricity storage business is to start small in the form of a demonstration project and accumulate various data.

Kurosaki I agree that supply-demand adjustment is the most difficult part of green electricity businesses. As Japan also sees long-term carbon-free power source market growth and companies seek 100% renewable energy sources, it will be hard to satisfy these needs. I think it comes down to how energy storage businesses, as you just mentioned, are utilized. I work with a climate tech venture capital firm and we observe various

companies that seek renewable electric power 24 hours a day, 365 days a year. Storage batteries are vital in trying to meet this need. Charging and discharging of lithium storage batteries takes approximately four hours, but in the Japanese market, costs are extremely high, and few market incentives exist. This situation makes for a reality where not many good business models exist. Currently underway in the US is a 100 hour-storage battery technology project using technology provided by one of the businesses in our portfolio. To reduce costs, the electric power company handling the project applied to a subsidy program run by the US Department of Energy. Since the Japanese government still offers few incentives, I think it's also important for you to engage with them as you pursue your energy storage business.

Yamada If we don't provide a stable supply of green electricity and push to make it a main power source, the goal of net zero carbon emissions will be difficult to achieve. We aim to bolster our green electricity supply chain and work to forge a new path forward.

Kurosaki I am hopeful that you will.

Initiatives for next-generation energy expected to experience a sharp increase in global demand

Yamada The second pillar of Vision 2030 is the *Expansion of Next-generation Energy*. The Group aims to mass-produce Japan's first domestically produced SAF⁶ and in June 2023, we began construction of a large-scale pilot production facility inside the Sakai Refinery. We established joint venture SAFFAIRE SKY ENERGY LLC for this project and, in 2025, we plan to produce 30,000 kiloliters of SAF per year, made from waste cooking oil. However, as this is only one tenth of the amount of SAF the Group aims to produce, we aim to establish a 300,000 kiloliter-per-year supply system in 2030 by producing SAF using highly efficient ATJ technology⁷ developed by US-based LanzaJet, Inc. Going forward, in addition to entering the hydrogen supply chain market and commencing discussions about turquoise hydrogen⁸ production technology, we would like to be involved in the utilization of ammonia fuel and research and development for synthetic fuels.

Kurosaki As it appears that the demand for both cargo and passenger flights will not decrease, the importance of alternative fuels cannot be

⁶ SAF (Sustainable Aviation Fuel): fuel produced mainly from biomass-derived raw materials, including plants, as well as waste and waste cooking oil from restaurants and households. It enables the reduction of carbon dioxide emissions compared to fossil fuels.

⁷ ATJ (Alcohol-to-Jet) technology: uses a catalytic process to turn ethanol into SAF.

⁸ Turquoise hydrogen: hydrogen produced from natural gas via direct pyrolysis that uses a medium such as plasma. Solid carbon, not carbon dioxide, is produced as a by-product, and thus is not released into the atmosphere.

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overstated. I have high expectations for your SAF production project. Furthermore, as we have seen no decrease in shipping demand, shipping fuel will likely shift from heavy oil to LNG, methanol, and ammonia going forward. The trend towards alternative fuels is seen not only in the aviation industry but in all areas of transportation. With this in mind, I would recommend that while excelling in the SAF field, you also continue to expand businesses that would respond to the next key field.

Yamada I also consider ammonia fuel to be of the utmost importance. In fact, the Group is carrying out initiatives such as a demonstration project aimed at the practical application of ammonia fuel, as well as an effort to charter ships able to carry not just LPG, but also ammonia. However, with ammonia, there are concerns that there is an overwhelming lack of blue and green hydrogen⁹ used in the production process. If we produce ammonia with blue or green hydrogen, I am unsure if we will be able to achieve a quantitative balance. Also, since blue and green hydrogen are not just used for ammonia production, they are utilized in a wide variety of fields as carbon-neutral fuels, and the amount required would likely be considerable.

Kurosaki Precisely. I think that there will be competition for hydrogen. If you consider that green hydrogen is produced using renewable energy, as well as that the demand for renewable energy in the field of electric power already exists, it is likely that some regions won't be able to use that renewable energy for hydrogen production. Furthermore, in addition to the needs of those

who want to produce methanol using green hydrogen, and bearing in mind that ammonia is most often used as fertilizer to begin with, we are looking at the possibility that the competition not just for green hydrogen, but for its feedstock, which is renewable energy, will only get worse. There is also the issue of cost competition, and it is anticipated that the battle for renewable energy will begin where it is cheapest. At the same time, many different blue hydrogen production technologies have emerged, and while the situation is quite chaotic, the field itself can still be seen as moving forward. Not limited to the shipping industry either, ammonia is viewed as a promising hydrogen carrier and ammonia cracking technologies are garnering considerable attention as well. In short, I think we're in the process of trying to see which is the most efficient and affordable.

Facing the challenge of energy transition with a people strategy that motivates employees and harnesses their skills

Kurosaki Your Seventh MTMP is truly visionary and I'm really looking forward to the business developments that come with realizing your Vision 2030. Green electricity and next-generation energy are, of course, necessary

⁹ Blue hydrogen: hydrogen produced mainly from natural gas using CCUS technology, without releasing carbon dioxide as a by-product into the atmosphere.

Green hydrogen: hydrogen generated through electrolysis of water using electric power produced from renewable energy sources.

technologies or fields, as attested to by the increasing need for them by companies and consumers. In terms of your Petroleum Business, as the Intergovernmental Panel on Climate Change (IPCC) states in their assessment report that CCS and CCUS are vital technologies, I believe that while these technologies are costly, a range of innovations in the near future will push them forward. I am eager for your contributions to decarbonization in your main line of business as well.

Yamada Realizing net zero carbon emissions is a huge priority for us and that will not change. In this period of great transformation that is energy transition, it is essential that we focus investments in the Group's areas of strategic focus in anticipation of the external environment and societal demand. The demand for green



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electricity and next-generation energy will undoubtedly increase rapidly, so, looking ahead, I'd like to continue to further refine our business plan, including the next medium-term management plan.

Kurosaki Regarding investments, the transition finance movement in Japan is becoming increasingly strong. Overseas, however, the movement has less momentum due to concerns about greenwashing which can sometimes, depending on the case, damage a company's brand. On the other hand, when it comes to GX bonds, investors are making different moves.

Yamada Investing in an age of great energy transformation, including forecasting feasibility and estimated energy recovery, is exceedingly difficult, but I'd like to add upfront investments, such as in moonshot projects and breakthrough technologies, to our plans. Clearly, there are some things that a single company cannot accomplish, so we believe that having support from the government, etc., makes it easier to take that step. As laid out in the basic policies of our Seventh MTMP, we plan to not only make conventional investments, but also investments that contribute to strengthening non-financial areas of our business, such as in HRX, DX, and GX. When it comes to carrying out technological innovations, DX, and GX, it is our *people* that are most important, as they are the ones who drive these transformations. That's why we are determined to focus on human resource development and enrichment.

Kurosaki When trying new things, human resources are most crucial, with innovations in corporate culture coming next. I'm sure that your strong determination for human resource development will filter down to your employees. Previously, when I was an ESG analyst, I reviewed the indicators of many different companies. True assessments of changes in human resources and corporate culture are difficult to express, but personally, I found that dialogue is most effective when working with organizations like ESG rating agencies, etc. Dialogue with your employees is, of course, a great way to improve engagement as well. People strategy is on your agenda over the medium- to long-term and I hold high hopes for these initiatives.

Yamada Since being appointed Group CEO, I've been visiting our refineries and other business sites one by one and talking directly to employees there. Doing so and engaging in dialogue has allowed me to experience firsthand the level of passion that employees have. They all have this immensely powerful energy. I believe that one of our biggest strengths as a company is that our employees agree with the broad direction that the Group is moving in and are self-motivated. Going forward, I will continue to focus on a people strategy that motivates employees and harnesses their skills so we are able to live up to the powerful words of advice you gave us and to the expectations you hold.

